Annual Report 2025

Unfold

Institute of Science and Technology Austria

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Institute of Science and Technology Austria (ISTA)
Am Campus 1, 3400 Klosterneuburg
+43 (0)2243-9000, office@ista.ac.at
www.ista.ac.at

Editor-in-Chief
Harald Wilkoszewski

Editor
Tobias Nimpf

Editorial Team
Daniel Azar, Raluca Batanoiu-Bogaards, Kelan O'Brien, Veronika Oleksyn, Andreas Rothe, Florian Schlederer

Principal Photography & Photostory
Mathias Klötzler

Graphic Design
EGGER & LERCH Corporate Publishing
(Andrea Kirschbaum, Karin Noichl)

Photo Editing
EGGER & LERCH Corporate Publishing
(Reinhard Lang)

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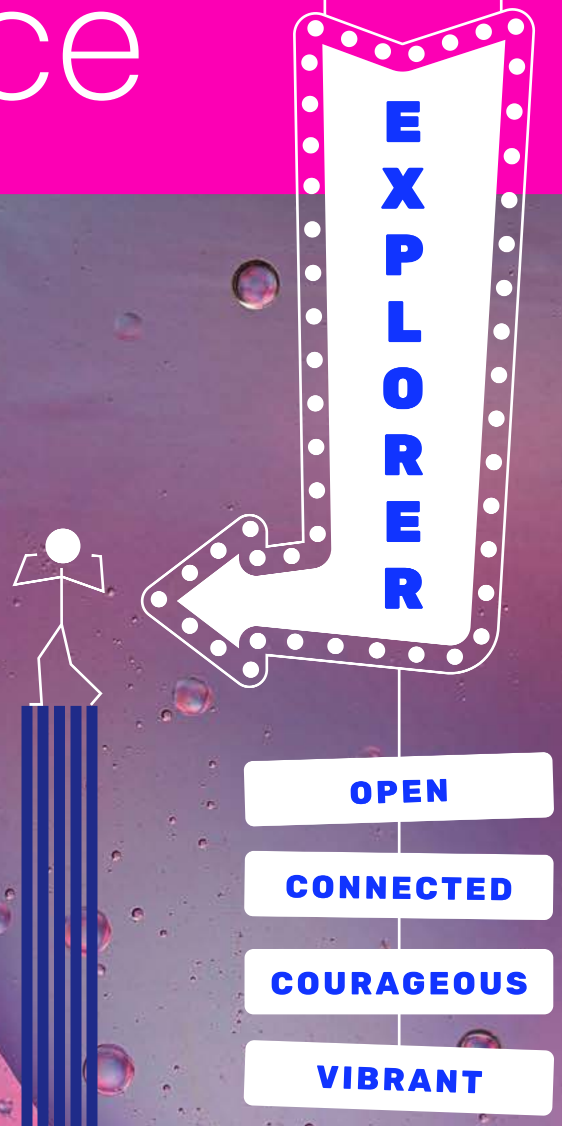
At a Glance

The Institute of Science and Technology Austria (ISTA) is a PhD-granting science institution dedicated to cutting-edge basic research. Founded in 2006 and operational since 2009, ISTA began as an ambitious experiment and has since grown into a flourishing institute.



ISTA's Commitment

Brave Science
for a Brighter Tomorrow

Fierce Empowerment
for Personal Growth

Collaborative Work
for Meaningful Progress

Core Missions

Perform **World-Class Research**

Implement **Best Practices** in **Science Management**

Promote **Science Education** and **Tech Transfer**

Train the **Next Generation** of **Scientific Leaders**

89

ERC Grants

hosted by ISTA between 2009 and 2025. These inlcudes all four core ERC grant schemes and ERC Proof-of-Concept grants, as well as 21 ERCs transferred to ISTA from other institutions.

Founding Principles

Under the leadership of President Martin Hetzer, the Institute is committed to its founding principles and core missions.

DIVERSE FUNDING	Public and Private
BASIC RESEARCH	Curiosity-Driven
EXPLOITING RESULTS	Intellectual Property
PHD GRANTING	Graduate School
SUPPORTING CAREERS	Tenure Track
MULTIDISCIPLINARY	One Campus
INTERNATIONAL	English as Working Language
INDEPENDENT BOARDS	Guidance and Advice

2009
37 Employees
4 Research Groups

2025

1,296

86 Faculty Members

Employees

44% women
56% men

(as of December 31, 2025)

2036
2,000 Employees
150 Research Groups
(estimated)

FOREWORD

Unfold

Martin Hetzer
President

"We strive to inspire, support, and guide the next generation in realizing its full scientific and professional potential. This requires continuous development, purposeful adaptation, and a clear commitment to improvement."

Martin Hetzer, President

As researchers, we are driven to explore the mysteries of nature. We seek to understand the phenomena that shape the world around us and within us. As an institute, however, our responsibility extends further: to inspire, support, and guide the next generation in realizing its full scientific and professional potential. This requires continuous development, purposeful adaptation, and a clear commitment to improvement. The notion of ***unfolding*** captures this shared endeavor.

At ISTA, unfolding means both growth and visibility. It describes our ongoing transformation to position ourselves among the leading research institutions worldwide. In 2025, we reached a key milestone with the completion of Phase II of our campus expansion—an integral step in our Masterplan 2036 and a testament to our successful partnership with the Ministry for Women, Science, and Research, the government of Lower Austria, and the city of Klosterneuburg. Building on this progress, we have already advanced into Phase III, which includes the development of Lab 7 and a new Facility Management Building. In addition, the XISTA Science Park is continuing to be expanded. With the opening of our new kindergarten, we are also investing in the youngest members of our community, supporting scientists, and in balancing research, work, and family life.

One of the most significant moments of 2025 was the opening of the VISTA Science Experience Center and its inaugural exhibition, *"Science in the Making,"* celebrated through a vibrant three-day festival. Designed as a bridge between science and society, VISTA now has a permanent home in the center of our campus, complementing its outreach in classrooms, public spaces, events, and digital formats.

With five new appointments ISTA now has 86 faculty members spanning all major scientific disciplines. While we remain firmly committed to our goal of 150 research groups and more than 2,000 employees by 2036, excellence—not scale—remains our guiding principle. The nine European Research Council grants awarded in 2025 are a clear reflection of the intellectual ambition and rigor that define our institute.

From more than 8,000 applications, we selected 79 outstanding students for our PhD program. I would like to express my sincere gratitude to Eva Benková for her dedicated service as Dean of the Graduate School, a role she handed over to Mario de Bono in 2025. Her unwavering commitment has laid a strong foundation for our students to grow into the next generation of scientific leaders.

Among the many distinguished guests who visited ISTA, it was a particular honor to welcome EU Commissioner Ekaterina Zaharieva. Our shared conviction in the essential role of fundamental research for Europe's future strengthens my optimism that, even in challenging times, ISTA will play a pivotal role in shaping tomorrow's research landscape.

As you unfold this annual report, I invite you to reconnect with your own curiosity. You will see how it comes fully into bloom during your next visit to ISTA—where the wonders of science, quite literally, are in the making.

OFFICIAL VISIT: EU COMMISSIONER ZAHARIEVA

EU Commissioner Ekaterina Zaharieva in discussion with ISTA postdocs and PhD students at the new Coffee Lab in the VISTA Science Experience Center.

Shaping Europe's Research Landscape

In November 2025, EU Commissioner for Startups, Research and Innovation Ekaterina Zaharieva visited the ISTA campus. The half-day tour began with a welcome by ISTA President Martin Hetzer, Managing Director Georg Schneider, Executive Vice President and Professor Gaia Novarino, Deputy Managing Director Barbara Abraham, and XISTA Managing Partner Markus Wanko.

Commissioner Zaharieva toured several research groups on ISTA's growing campus. At Maria Ibáñez's Werner Siemens Thermoelectric Laboratory, she learned about new materials for the energy sector. Christoph Lampert's group introduced ISTA's work on improving the trustworthiness of AI, followed by a visit to Gaia Novarino's lab focused on neurodevelopmental disorders such as epilepsy, intellectual disability, and autism.

At the newly opened VISTA Science Experience Center, Zaharieva and ISTA management met postdocs and PhD students, including Julia Gallenberger, Philippe Georg Dehio, and Roksolana Kobylinska. Their discussion emphasized ISTA's role in training early-career scientists and fostering interdisciplinary research. Commissioner Zaharieva stressed that Europe must tell a positive, forward-looking story rooted in its scientific excellence and research leadership to attract talent and build confidence.

Finally, a short walk across the bridge to the XISTA Science Park highlighted how ISTA connects frontier research with the innovation ecosystem through startup support, venture funding, mentoring, and partnerships.

112,658

Meals Served in 2025 of which 30,594 were vegan

41,000

m² Usable Space in 2025

ISTA Shuttle Buses

25

Trips per Day from Vienna to ISTA

Trips per Day from ISTA back to Vienna

900

Kilograms of Ground Coffee in 2025

1,270

Pizzas Consumed at Error Bar in 2025

FACULTY DIALOGUE

Bridging Minds: Two Paths, One Motivation

A transparent roundworm and a mouse are more alike than one might think. New faculty member Amelia Douglass met fellow neuroscientist and Dean of the Graduate School Mario de Bono at the VISTA Science Experience Center. They discussed their respective model organisms, brain research, artificial intelligence, mentoring young scientists, and the journeys their lives have taken so far.

Assistant Professor Amelia Douglass and Professor Mario de Bono meet for a chat at the VISTA Coffee Lab.

Amelia Douglass: Hi Mario. Isn't it great to have a new café at ISTA for a quick break and chat?

Mario de Bono: Absolutely, Amelia. If you could have coffee with anyone, past or present, who would it be?

Amelia: I'd choose Jane Goodall. She seems to have been a fascinating person who pioneered a whole line of research to understand humans, or where we came from. Her work on chimpanzees really got to the core of that, and that resonates with me. What about you?

Mario: Maybe Francis Crick. He was very sharp and well known for his work on DNA and the genetic code, but later became interested in behavior and consciousness. He's just someone whom I'd be interested in chatting with and discussing where we are with understanding how the brain works.

Amelia: The brain is such a complex puzzle. Nowadays in neuroscience, we're mapping out brain regions, trying to identify neurons, genes, and proteins. Sometimes we don't really know what to do with the information, or in some cases, I don't think we've noticed that the information is useful.

Mario: I agree. We have so many lines of research open to us, but we can get lost in the details because there is an awful lot of data that comes with these studies. I really hope we are not just "stamp collecting." I suspect not—we are drawing maps, whose utility will last long into the future.

Amelia: What do you think of integrating AI in that data hunt?

Mario: We're in the early days of using AI, but I am excited by the possibilities. The unaided human brain has a limited ability to digest and make sense of large amounts of information. I work on a one millimeter long, transparent roundworm called *C. elegans* that has exactly 302 neurons.

Its whole nervous system is mapped out, and we know all the connections each neuron makes. Despite this, understanding how the system works to generate the animal's behavior is unfinished business. Computational neuroscientists who come across the blueprint for the tiny worm's connectome get excited, thinking they could really solve this animal. However, they soon realize it's not trivial—it's very complex. It's similar to what is going on with the mouse brain, right?

Amelia: AI offers huge potential for finding meaning in these enormous data sets. Some of it even seems uninterpretable, at least to people without a computational background. It's not only understanding neural activity, but also things that the brain produces, like behavior. AI is beginning to help in making sense of the brain's output. For example, my research group aims to understand how the hypothalamus—a specific brain region—is organized to sense environmental challenges and control physical reactions. We try to get a holistic view of how the brain 'talks' to the internal organs to control the body in response to threats.

Mario: In my research group, we're investigating similar stress responses by using the *C. elegans* nervous system to study basic neural mechanisms and their roles in regulating behavior and physiology. Understanding how worms respond to stress is a key goal. Conceptually, this is a similar problem for worms and mice. Some molecules are even the same, such as dopamine or proteins like the NPY receptors that regulate feeding behavior. You explored feeding behavior in mice during your PhD, didn't you?

Amelia: I did. I started as a developmental biologist, but science sometimes takes you to unexpected places, so I ended up with a PhD looking at how feeding behaviors are regulated. I kept doing that during my postdoc at Harvard Medical School. However, related questions also fit under that umbrella. That's what sparked the switch to my current research question when I joined ISTA this year.

Mario: How do you find yourself after your first couple of months at ISTA?

Amelia: Great. I'm happy to be here. My lab is already finished. I just got the keys today. I feel like that's a big achievement. I just don't get enough exercise, as my office is right next to my lab.

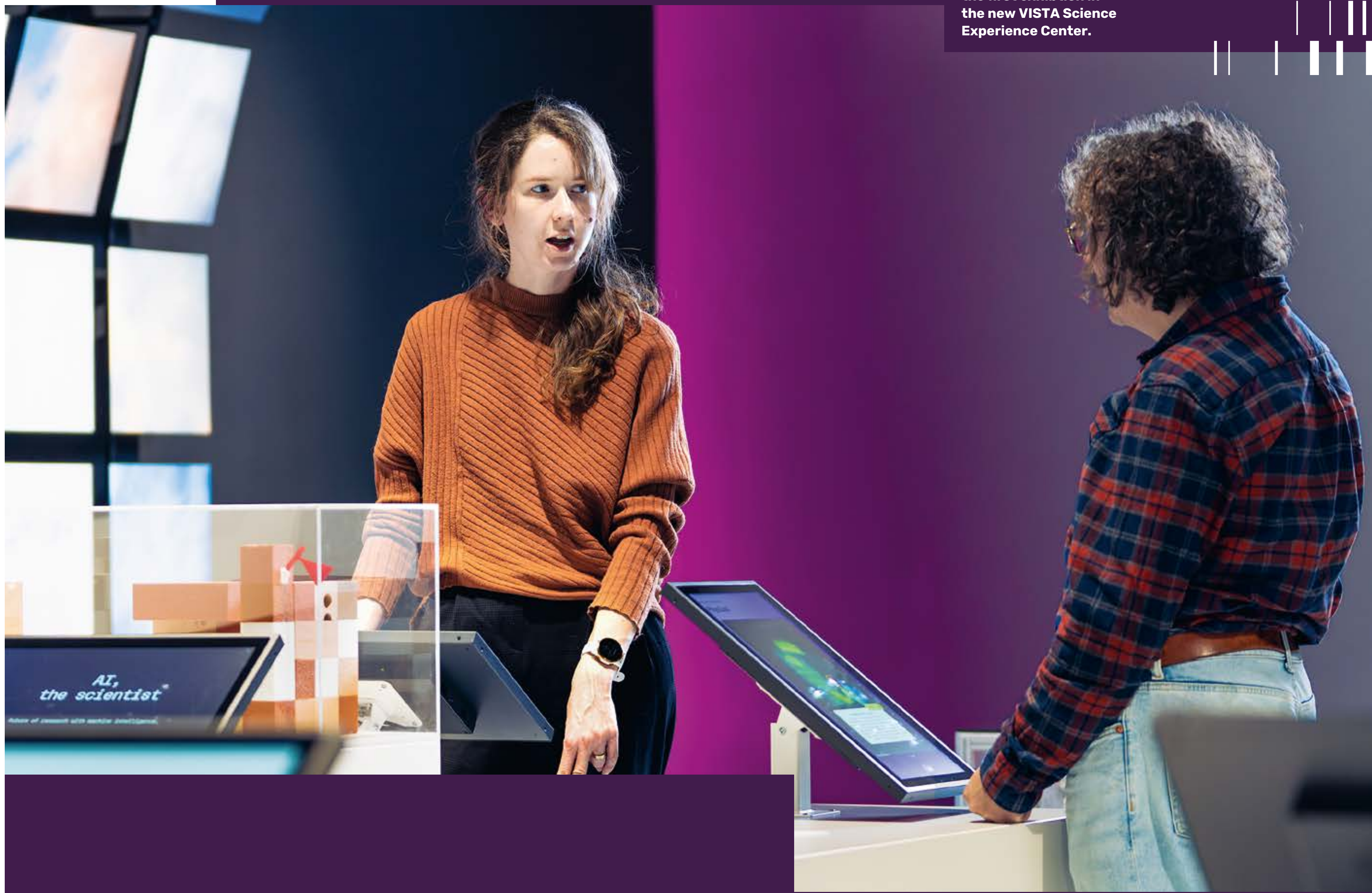
Mario: You could start cycling. Many people bike to ISTA.

Amelia: Cycling in this weather sounds daunting, though.

Mario: I cycle all year. If I didn't, I would just be too inactive. I did my PhD in Cambridge in the UK, which is very flat. I started biking to the lab then, and I've never really let go of the habit. It's a great way to clear the mind and get exercise.

"It's challenging but rewarding, and takes up about 40% of my time. It's a real opportunity to connect with colleagues and explore how we can further improve the Institute, especially as ISTA continues to grow."

Professor Mario de Bono on his new role as Dean of the Graduate School



The scientists explore "Science in the Making," the first exhibtion in the new VISTA Science Experience Center.

“Each of my career stages brought its stresses. Being in the moment certainly helps, and not worrying too much does not make you less productive.”

Assistant Professor Amelia Douglass advises the next generation of scientists

Mario de Bono and Amelia Douglass discuss mentoring the next generation of scientists and share the advice they would offer their younger selves.

Amelia: I can imagine. You’ve had quite a journey, from a Cambridge PhD to San Francisco, back to Cambridge, and now a professor at ISTA since 2019. This year, you became the Dean of the Graduate School, succeeding Eva Benková. How are you finding this new role?

Mario: It’s challenging but rewarding, and takes up about 40% of my time. It’s a real opportunity to connect with colleagues and explore how we can further improve the Institute, especially as ISTA continues to grow. We are focusing on refining our curriculum and encouraging interdisciplinary conversations. Discoveries are often made at the interface between disciplines. Inspiring scientists from different disciplines to talk to each other is non-trivial but pays dividends.

Amelia: Yes, my students were telling me about some of the courses they have, for instance, explaining their projects to people completely outside their field in short chalkboard talks. I think that’s really helpful for our students. I have experienced that challenge myself, especially when interviewing for faculty positions in front of non-neuroscientists. It was very hard to communicate because we just didn’t speak the same scientific language. I think having that training is great.

Mario: Exactly. Looking forward, our students not only stay in academia, but also go into all sorts of different jobs. We’re brainstorming how we can prepare them better for that, how we can give them opportunities by building bridges to companies, for example.

Amelia: Do you think having access to XISTA helps with the industry links?

Mario: Absolutely. We are figuring out ways to work with XISTA to leverage those links. Our economies are fueled by innovation, which depends on individuals thinking outside the box and taking risks. We want to encourage students to be creative both in and beyond their PhD projects.

Amelia: What’s the percentage of our students staying in academia and going to industry?

Mario: It’s about 50:50. So half of them will pursue careers outside academic science, and will help shape the industries of the future. Speaking of students, have you found your groove in leading a group of scientists?

Amelia: It’s the first research group I’m leading, so I’m finding my style. Generally, I think it’s very hard to motivate people if they’re not motivated themselves. Fortunately, the people I have now seem to be very passionate. In the future, it will really depend on what my students need from me. I’ve tried to keep that line of communication open. We also just had a workshop last week for new assistant professors about leadership and balancing mentoring with scientific progress, which I found useful.

Mario: It’s a continuous learning process and requires different approaches for different people.

Amelia: Definitely. If you could advise teenage Mario, what would you tell him?

Mario: I’d offer lots of advice. I’d still be a scientist because I really enjoy being one. I’d equip myself much better, however, by focusing much more on maths and computer programming. I’d really push myself beyond my comfort zone. In science, you constantly make choices of what to follow and what not to follow. Certainly, there are decisions that one could revisit, though the grass always seems greener on the other side. How about you?

Amelia: Similarly, I’d focus more on math and coding. I’d also tell myself, and of course, my teenage self wouldn’t listen, to enjoy yourself, despite how flippant it sounds. At every career stage, I’ve been worried about the next one. Academia is particularly tough in that sense. Throughout my PhD, I was concerned about completing my project with a publication and securing a postdoc position. While being a postdoc, I was already trying to become a group leader. Each of my career stages brought its stresses. Being in the moment certainly helps, and not worrying too much does not make you less productive.

Mario: You’re so right. I’m fortunate in being an optimist. I’ve always assumed that it would work out. It may be that I’ve been lucky in that regard. But I think a little bit of worrying keeps us sharp.

Amelia: Balance is key, you know, like Master Oogway in Kung Fu Panda said, “Yesterday is history, tomorrow is a mystery, but today is a gift. That’s why it’s called the present!”

Mario: Indeed. Thank you for this wonderful conversation.

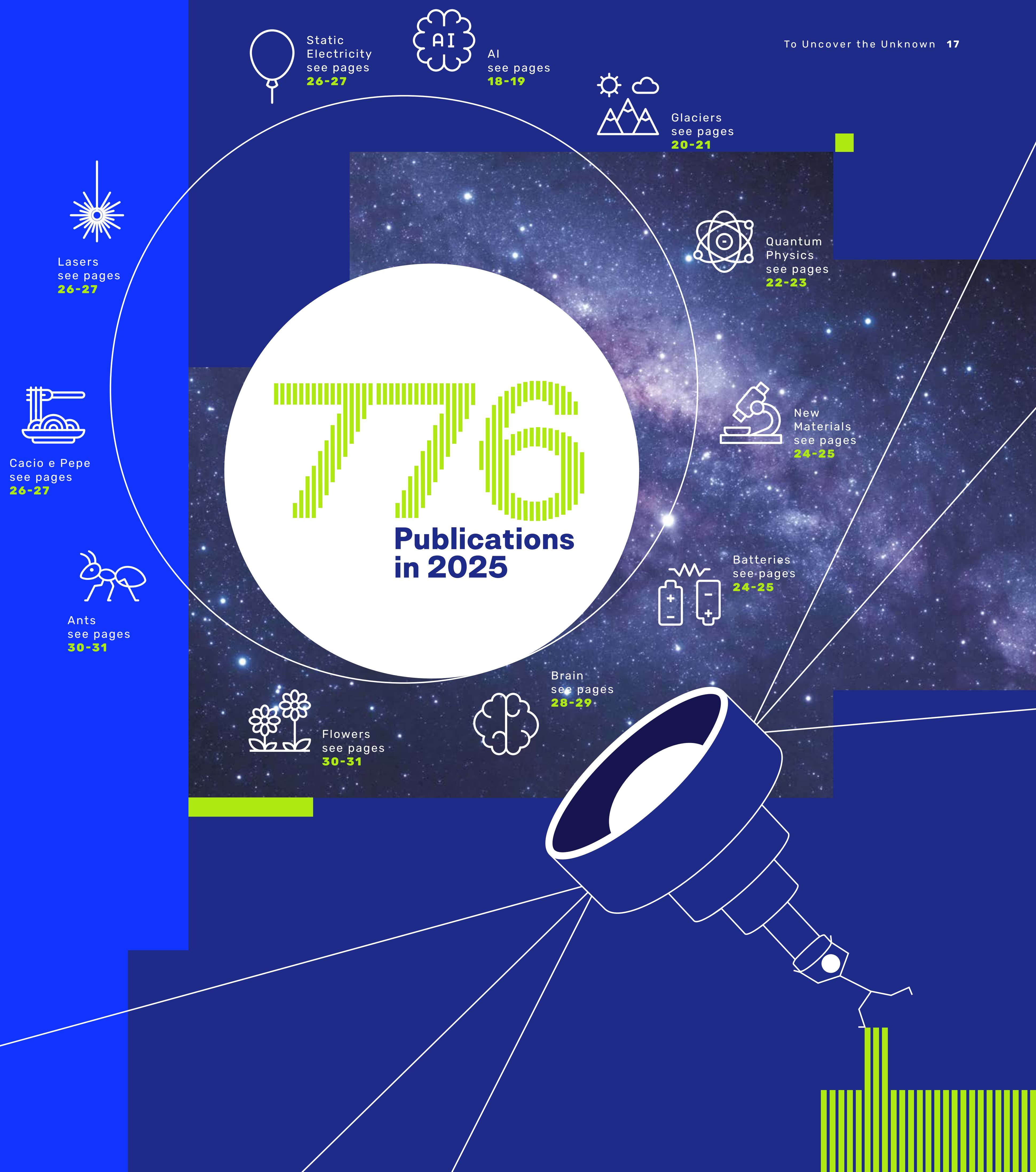
Amelia: Thank you, too. See you soon.

To Uncover the Unknown

Unfolding can hold various interpretations. From a scientific perspective, it is integral to uncovering the unknown. ISTA poses bold questions, pushes boundaries, and challenges the status quo. Its curiosity-driven inquiries pave the way to groundbreaking discoveries.

The year 2025 was filled with explorations into uncharted territories. The following pages offer a glimpse into ISTA's wide array of research.

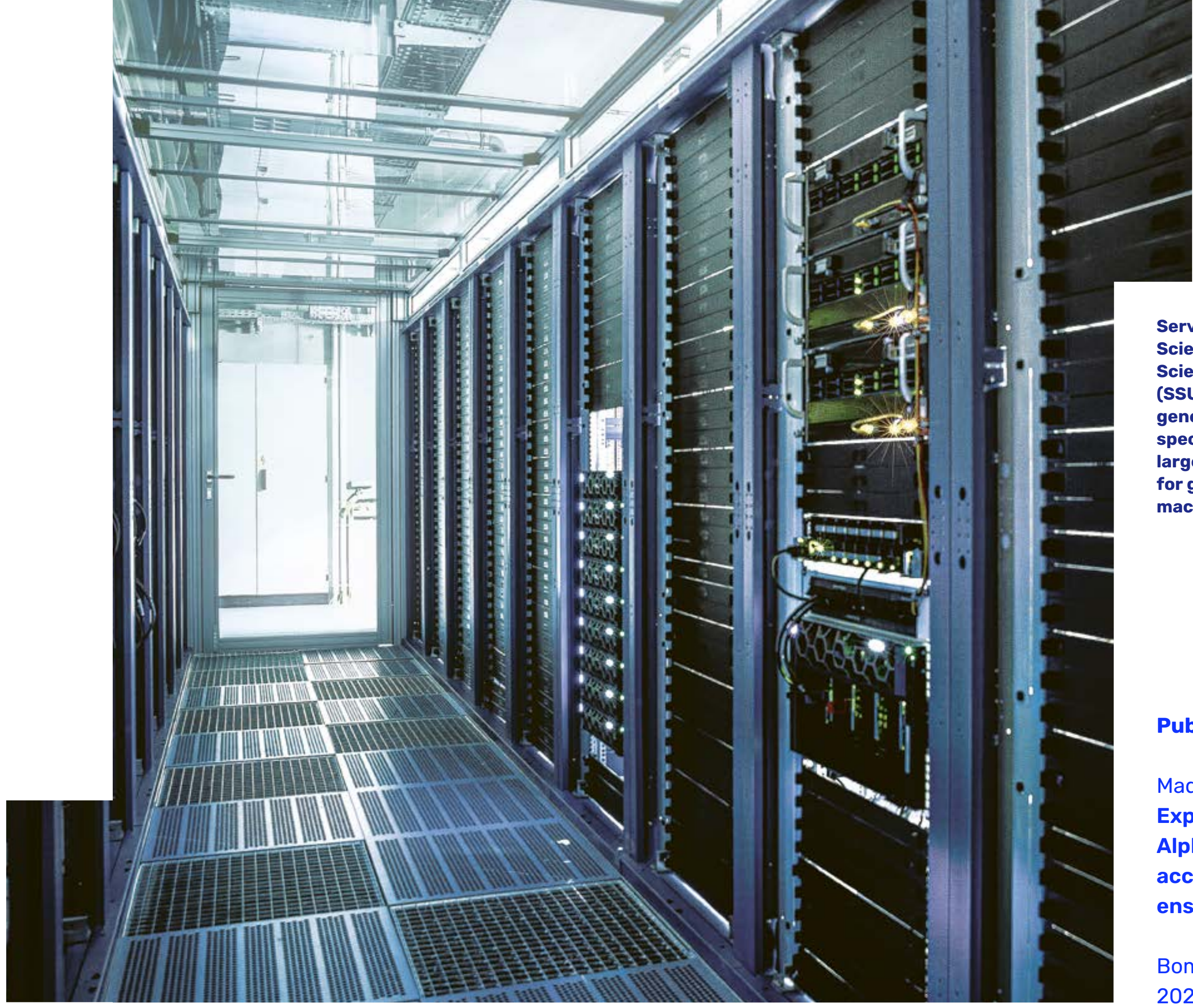
"Frontier research is defined by its deliberate engagement with the unknown. At ISTA, we bring this spirit to some of today's most pressing scientific challenges, including artificial intelligence, climate change, novel materials, quantum computation, and understanding the human brain. Breakthroughs in these fields depend on open, cross-disciplinary collaboration—an approach that is embedded by design in the way ISTA works." Martin Hetzer, President



RESEARCH HIGHLIGHTS

A Dynamic Hub for AI Research

At the forefront of AI research, ISTA scientists leverage techniques to advance protein structure prediction, data privacy, climate research, and microscopy while collaborating with global partners.



Server room of the new Science Computing Scientific Service Unit (SSU). The latest-generation GPU cluster specializes in training large language models for generative AI and machine learning.

PhD student Simone Bombari (left) and Professor Marco Mondelli (right) demonstrated that privacy does not come at an additional cost in larger deep learning training models.

Artificial intelligence has become an integral part of our daily lives and significantly aids scientific endeavors. At ISTA, researchers are diligently striving to further develop these technologies.

From structure prediction to data privacy

The 2024 Nobel Prize in Chemistry is a testament to the AlphaFold revolution in structural biology. This AI-based program accurately predicts a protein's 3D structure from its sequence. AlphaFold3 extends these predictions to protein complexes that involve DNA, RNA, ligands, and ions. But some important limitations persist: it tends to collapse inherently heterogeneous structures into a single, dominant conformation. It also does not account for experimental conditions that can locally alter the structure.

This year, researchers from the Bronstein and Schanda groups developed a method to 'guide' AlphaFold3 to match experimental data. "Our approach paves the way for future predictive models that are 'experimentally aware' and capture the ensemble nature of protein structures," says ISTA Professor Alex Bronstein.

Among this year's advancements in AI research, PhD student Simone Bombari and Professor Marco Mondelli sought to answer essential questions in deep learning and data privacy. Namely, can privacy be guaranteed as deep learning training models grow larger? And does guaranteed privacy come at a higher performance cost? Challenging common wisdom in the field, the team demonstrated that privacy does not 'cost' more when the training model incorporates more parameters.

Climate, microscopes, and formalizing (machine) learning

Multiple groups use AI to answer questions in various research areas and disciplines. In Earth sciences, the Pellicciotti and Muller groups develop climate models and reanalyze global data using AI techniques. Their work sheds light on glacier health and megadroughts (pp. 20-21), as well as atmosphere and ocean movements.

On the other hand, the Danzl group is advancing microscopy techniques that use AI in image analysis. This year, they developed LICONN in collaboration with Google Research, a method that reconstructs brain tissue by combining hydrogel tissue expansion with off-the-shelf light microscopes (pp. 28-29).

ISTA researchers further addressed research questions that could help advance our understanding of AI. Using amorphous solids as a model, scientists from the Goodrich group developed a practical tool for understanding and performing inverse design. By uncovering how amorphous solids learn nontrivial behaviors, their work is a concrete step toward formalizing learning in various systems. Applications include generative AI and machine learning (see pp. 24-25).

Collaborations and modern infrastructure

ISTA is a hub for AI and machine learning (ML) research in Austria, hosting the ELLIS Unit Vienna, a locally organized unit of the European Laboratory for Learning and Intelligent Systems. Led by ISTA Professor Christoph Lampert, it focuses on excellence in advancing ML foundations and applications in science, and organizes ELLIS talks and related events. The FWF Cluster of Excellence Bilateral AI, involving five ISTA groups, further strengthens a powerful research network in the field.

In 2025, Google began collaborating with ISTA to fund AI research projects, among others, and established a presence at the XISTA Science Park (pp. 34-35). ISTA Professor Monika Henzinger collaborated with Google researchers on a survey article on training large language models in a privacy-preserving manner. Additionally, Professor Dan Alistarh's AI startup, developed with colleagues from MIT, was acquired by Red Hat (pp. 34-35). Neural Magic tackles the rising energy and infrastructure costs of large language models (LLMs). Its software boosts generative AI performance while cutting both environmental and financial footprints.

Collectively, these advancements underscore ISTA's significant growth in AI research, with promising others continuing to unfold.

Publications:

Maddipatla A. et al. 2025. **Experiment-guided AlphaFold3 resolves accurate protein ensembles.** *bioRxiv.*

Bombari S. & Mondelli M. 2025. **Privacy for free in the overparameterized regime.** *PNAS.*

Pillutla K. et al. 2025. **Correlated Noise Mechanisms for Differentially Private Learning.** *arXiv.*

RESEARCH HIGHLIGHTS

Achille Jouberton walks with the field team towards the Kyzylsu Glacier on its true-left lateral moraine. Northwestern Pamir Mountains, central Tajikistan, September 2023.

A Fateful Century for Glaciers

In 2025, the UN championed the cause of glaciers with two declarations: the International Year of Glaciers' Preservation and World Day for Glaciers. At ISTA, research on these fragile water towers was prolific.

Publications:

Jouberton A. et al. 2025. **Snowfall decrease in recent years undermines glacier health and meltwater resources in the Northwestern Pamirs.** *Communications Earth & Environment.*

Shaw T. E. et al. 2025. **Mountain Glaciers will Recouple to Atmospheric Warming Over the 21st Century.** *Nature Climate Change.*

Ayala Á. et al. 2025. **Less water from glaciers during future megadroughts in the Southern Andes.** *Communications Earth & Environment.*

More than two billion people worldwide depend on snowmelt and glacier runoff for their water security. Glaciers are also the primary source of freshwater for ecosystems in semiarid regions, such as those found in Central Asia or the Southern Andes. During the increasingly frequent droughts, glaciers play a crucial role in locally mitigating the effects of snowfall shortages. But how long can they withstand the effects of human-caused climate change?

The tipping of the last resilient glaciers

The northwestern Pamir Mountains in Tajikistan have been home to some of the last stable or growing glaciers outside the polar regions. However, this region has also suffered from a dire lack of observational data for decades.

Researchers from Francesca Pellicciotti's group collaborated with scientists in Tajikistan, Switzerland, Austria, and France to establish their own climate stations on the benchmark catchment of the Kyzylsu Glacier to model its changes over more than two decades.

Tapado Glacier in an arid landscape of the Southern Andes, Chile. The sharp spikes of snow and ice are typical of dry mountain regions. Meltwater streams pour from the glacier.

"Whichever way we analyzed the model, we saw an important tipping point in 2018 at the latest. Since then, the glacier has started losing mass due to the decreased snowfall, rejoining the global trend," says the study's first author, Achille Jouberton, a PhD student in the Pellicciotti group.

The researchers used computational models driven by their new local observations. "But the challenge in the Pamir region is that there is almost no data at all," says Jouberton. "Our work is a first step in the right direction."

Apart from the relatively healthy glaciers in the Third Pole, what is the situation around the globe?

Destined to melt

While ambient temperatures have been increasing steadily worldwide, the near-surface temperatures of glaciers seem to be lagging behind. It turns out that glaciers are responding to climate change by cooling the air that comes in contact with their surfaces. But the question remains, "For how long?"

Seeking to examine this phenomenon, ISTA researchers have confirmed that glaciers are fighting a losing battle against climate change. They demonstrated that this reaction is likely to reach its peak in the 2030s. "The more the climate warms, the more it will trigger the glaciers to cool their own microclimate and local environments down valley," says postdoc Thomas Shaw, the study's lead author. "But this effect will not last long, and a trend shift will ensue before the middle of the century." From then on, the glaciers' melting and fragmentation will intensify, and their near-surface temperatures will rise more rapidly, hastening their decline.

On the other hand, the Pellicciotti group is keeping a close eye on a relatively new phenomenon that is impacting the glaciers' fragile equilibrium.

Cool winds flowing over the Tsanteleina Glacier in Italy, August 2015.

Will megadroughts vanquish the glaciers?

In Chile, fifteen years of severe and persistent drought have already passed, and the country seems left to bleed dry of its precious water resources. As surprising as this may sound, no one saw this coming. "The Chilean megadrought was never forecast in any climate model," says Pellicciotti. But climate scientists are increasingly warning that we have entered the age of megadroughts. Hence, the question emerges: Are we prepared for future climate disasters?

Together with international researchers, Pellicciotti modeled an audacious future scenario based on the ongoing Chilean megadrought. At the center of their climate analysis are the glaciers in the Southern Andes that are buffering the ongoing megadrought at the cost of their own survival. "We asked 'What would happen if a similar megadrought struck Chile at the end of the century?'"

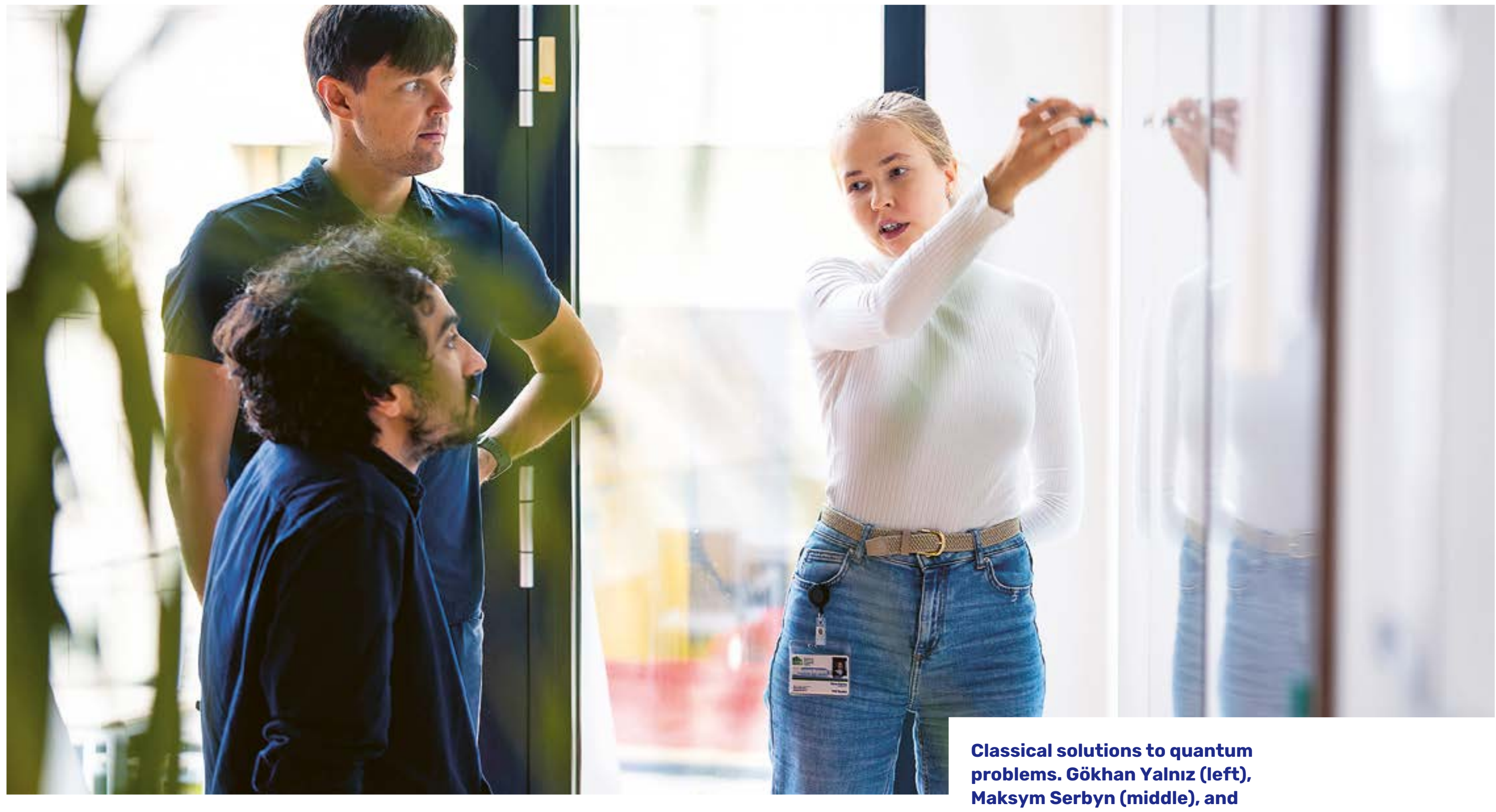
It turns out that what will be left of this region's largest 100 glaciers will only be able to contribute half of today's runoff meltwater during the dry summer months.

In light of all the evidence from Central Asia, the Southern Andes, and around the world, the researchers underline the need for coordinated global climate policies to develop effective water management strategies.

RESEARCH HIGHLIGHTS

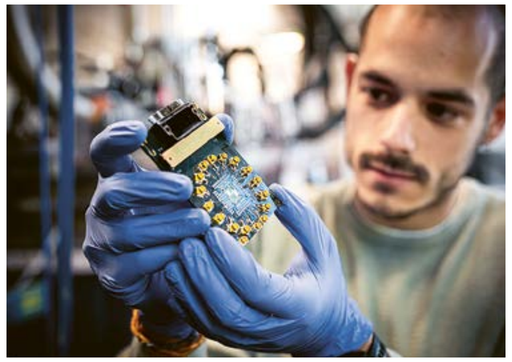
100 Years and 'Quanting'

To commemorate the 100th anniversary of a theory that changed physics, the UN declared 2025 the International Year of Quantum Science and Technology. We recap some of this year's advancements at ISTA.



Classical solutions to quantum problems. Gökhan Yalnız (left), Maksym Serbyn (middle), and Elena Petrova (right) found hidden quantum many-body scars with the help of classical equations of motion.

In 1925, a 23-year-old German physicist sought to address the fundamental difficulties in atomic theory that had plunged physics into a crisis at the start of the decade. Arguably, Werner Heisenberg's paper in *Zeitschrift für Physik* ushered in the modern age of quantum mechanics. One hundred years later, ISTA scientists are advancing various aspects of quantum research, ranging from theory to device implementations. The quantum science community at ISTA is also part of the FWF-funded research cluster "quantA," pushing the frontiers in this field.



Influencing the trace of 'missing electrons' in spin qubits. Jaime Saez-Mollejo, first author of the Katsaros group's paper, holds a chip made of the semiconductor germanium.

A sky full of (quantum) scars

A surprising quantum phenomenon that goes against the universe's drive for increased chaos might not be all too exotic. So far, quantum many-body scars were thought to exist only for specific models. In a theoretical framework, researchers from Maksym Serbyn's group demonstrated new forms of quantum scars that were likely overlooked due to their increased complexity. "Quantum many-body scars allow us to create complicated quantum states with little effort that could prove useful for quantum algorithms," says the first author and PhD student Aron Kerschbaumer. These scars could be an important resource for future quantum computation.

In another project, PhD student Elena Petrova and other quantum theorists from the Serbyn group teamed up with classical physicists from Björn Hof's group. Their goal? To systematically 'catch' the elusive quantum many-body scars with the help of classical physics. They developed an algorithm to find them using classical equations of motion. "Quantum theory and classical physics tick very differently. But we could link the two fields by using the classical periodic trajectories obtained from projecting the quantum systems," says Serbyn. With this work, the Serbyn and Hof groups collaborated across distant areas of physics that do not speak the same language. Serbyn also received an ERC Consolidator Grant.

The shadow of an electron

Quantum computers are bound to, one day, outperform classical computers in solving specific problems. However, achieving this goal is all but straightforward. Amid the race to develop and market practical quantum computers, researchers from Georgios Katsaros' group pay particular attention to the intriguing physics of special qubits—the fundamental units of quantum information—generated in the semiconductor germanium. By harnessing the response of these so-called hole spin qubits to magnetic and electric fields, they answer fundamental questions about the physics that could help advance quantum processors. "Finding the parameters that influence the spins' alignment will help us better control the quantum states in the qubits. Ultimately, this is what will allow them to perform quantum computation," says PhD graduate Jaime Saez-Mollejo, the study's first author. His work helps tune the 'shadows' of missing electrons.

Towards a future optics-based quantum internet?

Large-scale quantum computation will likely rely on distributed quantum computing across multiple processors and the development of a quantum internet. However, these approaches are based on superconducting qubits that use electrical signals at ultracold temperatures. This makes room-temperature connections problematic. This year, a team of physicists from Johannes Fink's group achieved a fully optical readout of superconducting qubits, pushing the technology beyond its current limitations. The key to this: an electro-optic transducer; a switch that can 'translate' the optical signal to a microwave frequency (an electrical signal that the qubits can understand). "This new approach might allow us to increase the number of qubits so they become useful for computation. It also lays the foundation for building a network of superconducting quantum computers connected via optical fibers at room temperature," says co-first author Georg Arnold, who received an Outstanding PhD Thesis Award this year.

A new ERC Proof of Concept grant will now help the Fink group commercialize their technology, taking the electro-optic transducer from a laboratory prototype to a plug-and-play device.

Publications:

Kerschbaumer A. et al. 2025. **Quantum Many-Body Scars beyond the PXP model in Rydberg simulators.** *Physical Review Letters.*

Petrova E. et al. 2025. **Finding periodic orbits in projected quantum many-body dynamics.** *PRX Quantum.*

Saez-Mollejo J. et al. 2025. **Exchange anisotropies in microwave-driven singlet-triplet qubits.** *Nature Communications.*

Arnold G. et al. 2025. **All-optical superconducting qubit readout.** *Nature Physics.*

ISTA researchers from the Ibáñez group 3D print high-performance, sustainable thermoelectric materials. Co-author and PhD student Abayomi Lawal operates the 3D printer.

RESEARCH HIGHLIGHTS

Surprising Properties of Materials

Beyond fabrication and industrial processes, materials may open our eyes to aspects of central importance to our world. In 2025, ISTA researchers used materials to answer questions that 'matter.'

In addition to fabricating materials of commercial interest, ISTA scientists have utilized materials to shed light on the fundamental chemistry of oxygen and gain insights into machine learning.

Cooling materials out of the 3D printer

Rapid, localized heat management is essential for electronic devices and has applications ranging from wearable materials to burn treatment. While thermoelectric materials convert temperature differences to electrical voltage and vice versa, their efficiency is often limited, and their production is costly and wasteful. Researchers from the group of Maria Ibáñez—Verbund Professor for Energy Sciences and Head of the Werner Siemens Thermoelectric Laboratory—utilized a 3D printing technique to fabricate high-performance thermoelectric materials, reducing production costs significantly. "With commercial-level performance, our work has the potential to extend beyond academia, holding practical relevance and attracting interest from industries seeking real-world applications," says Ibáñez.

Publications:

Xu S. et al. 2025. **Interfacial bonding enhances thermoelectric cooling in 3D-printed materials.** *Science.*

Mondal S. et al. 2025. **Marcus kinetics control singlet and triplet oxygen evolving from superoxide.** *Nature.*

Zu M. et al. 2025. **Fully independent response in disordered solids.** *Physical Review Letters.*

Cell damage and empty batteries: Taming the 'bad' oxygen

The group of Stefan Freunberger specializes in materials electrochemistry and focuses on applications in energy storage devices, such as rechargeable batteries. Research in this area can help scientists to uncover fundamental properties of molecules. In fact, the Freunberger group has unveiled pivotal insights into the redox chemistry of oxygen and reactive oxygen species (ROS). While some ROS play essential roles in cell signaling, the particularly harmful singlet oxygen damages cells and degrades batteries. For the first time, the team has uncovered a way to tune it.

Usually, molecular oxygen is the relatively unreactive dioxygen that we breathe (O_2), known by chemists as "triplet oxygen." However, it can also exist as the highly reactive "singlet oxygen," a very powerful and harmful ROS. "While superoxide can give rise to either singlet or triplet oxygen, we still did not know what exactly causes the 'bad' singlet oxygen to evolve and how it can be tuned," says Freunberger. It turns out that the pH drives this reaction: At a high (basic) pH, the driving force is low, and more 'good' triplet oxygen is produced. This is the scenario that plays out inside mitochondria, the 'powerhouse' inside each of our cells. However, if the environment shifts to an acidic (low) pH, the reaction's driving force will increase, and the 'bad' singlet oxygen quickly gains the upper hand.

The work could have broad applications, including in energy storage processes.

When materials 'learn'

Beyond intrinsic chemical and physical properties, materials can showcase surprising behaviors that shed light on much broader and more abstract systems, such as machine learning. "The major challenge is that we are still lacking a unified framework to describe learning systematically," says Carl Goodrich.
Modeling learning in a theoretical framework in disordered solids, researchers from the Goodrich group made surprising findings. "Before I joined the Goodrich group for my postdoc, I thought it was almost impossible to predict the behavior of disordered systems," says first author Mengjie Zu. "Working on this project, I realized that disordered systems have infinite potential in designing all sorts of properties."

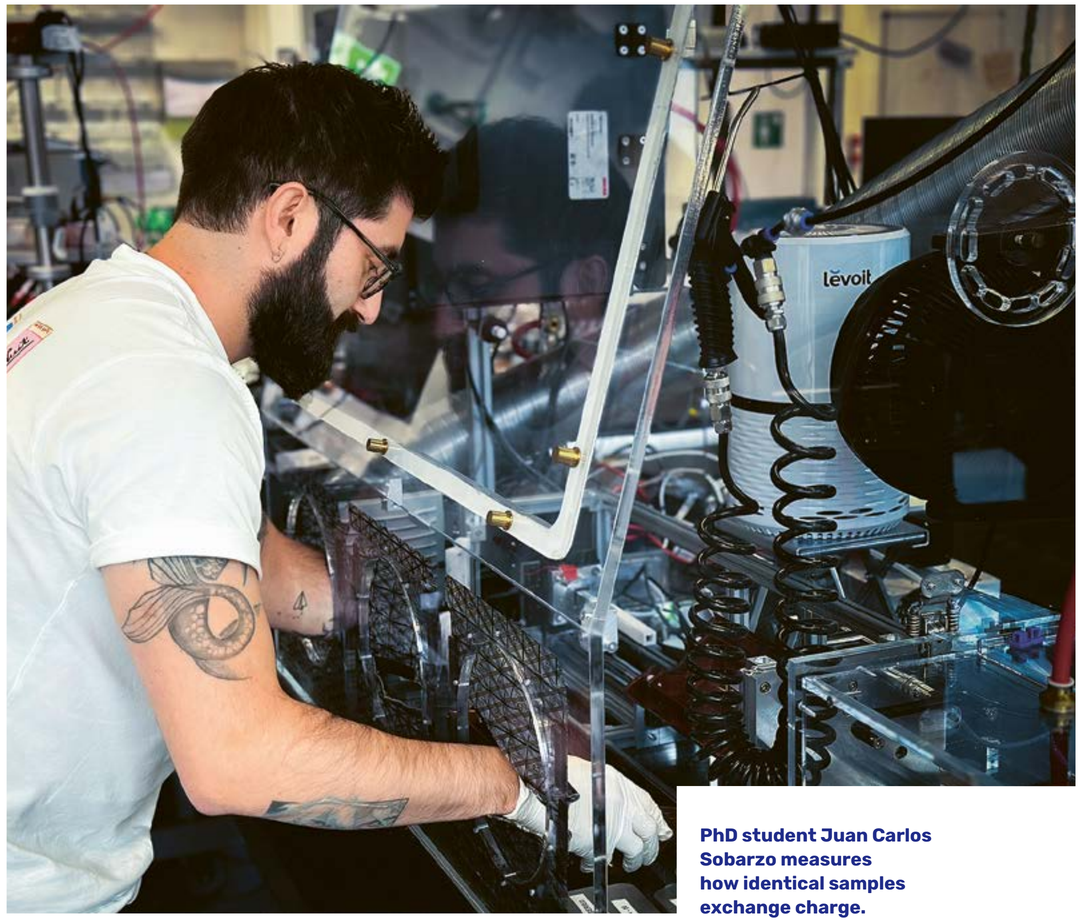
The team's interdisciplinary work creates a practical tool to understand and perform inverse design and is a concrete step toward formalizing learning in various systems.

ISTA scientists formalize how amorphous solids learn nontrivial behaviors. A highly simplified toy model of amorphous solids helps illustrate their work.

RESEARCH HIGHLIGHTS

Marvels of the Mundane

Curiosity drives scientists to reveal everyday wonders, from the static electricity that raises hair when touching a balloon to the spark of lightning and even the art of crafting cacio e pepe.



PhD student Juan Carlos Sobarzo measures how identical samples exchange charge.

Publications:

Sobarzo J.C. et al. 2025. **Spontaneous Self-Organization of Identical Materials into a Triboelectric Series.** *Nature.*

Stoellner et al. 2025 **Using optical tweezers to simultaneously trap, charge and measure the charge of a microparticle in air.** *Physical Review Letters.*

Bartolucci G. et al. 2025. **Phase behavior of Cacio e Pepe sauce.** *Physics of Fluids.*

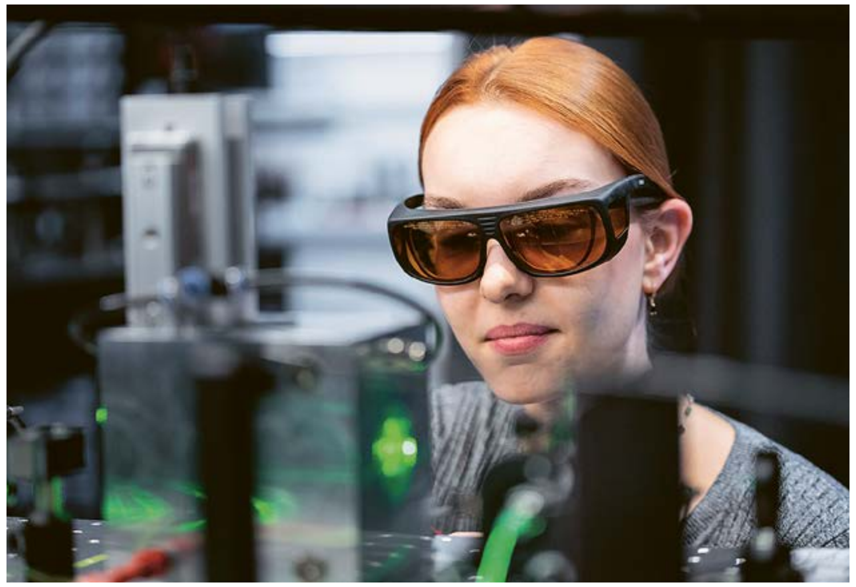
Children are full of questions. The world that unfolds before their eyes is a vast playground of mysteries that stimulates their scientific curiosity. What better way to run experiments in this limitless world of mysteries than through play?

For many, this passion never fades, persisting even into adulthood. Yet, some questions remain elusive and persist in marvels of the mundane: Why does my hair stand up when I rub a balloon on it? How is lightning sparked? Why does my cacio e pepe not taste as good as it does in Italy?

An electrifying turn in an age-old quest

"Rubbing a balloon on hair may seem simple, but it actually demonstrates an extremely complex scientific phenomenon," says Scott Waitukaitis, Assistant Professor at ISTA. Known since ancient Greek times, static electricity or "contact electrification" occurs when two electrically neutral materials transfer charge upon contact. While the mechanism for metals was described in the 1950s, insulators remained puzzling.

Physicists struggled to explain why even identical materials, like two balloons, exchange charge. Along with colleagues, Juan Carlos Sobarzo, a PhD student in the Waitukaitis group, has now uncovered a key piece of the puzzle that was missing for centuries. The entire contact history of an object affects how it will exchange charge in future contacts. In a new paper, they reveal that keeping track of prior contacts allows behavior to be predicted. "A sample with more contacts in its history will consistently charge negative against a sample with fewer contacts in its history," explains Sobarzo.



With protective eyewear, PhD student Andrea Stöllner takes a glimpse into the experimental chamber (in the foreground) where two laser beams trap a single particle.

Another phenomenon that might start to make more sense is cloud electrification and how lightning sparks.

Trapping particles to explain lightning

Investigating cloud electrification, scientists from the Waitukaitis and Muller groups developed a way to catch, hold, and electrically charge a single particle using a single laser beam. PhD student Andrea Stöllner, postdoc Isaac Lenton, and their colleagues used "optical tweezers" to catch silica particles as a substitute for cloud ice crystals.

Stöllner explains, "Our setup holds a single particle. Charging it with a laser through a 'two-photon process' kicks out an electron. This creates a positively charged particle, which occasionally releases charge in spontaneous bursts." These insights parallel charging in thunderstorm clouds, where colliding ice crystals get charged and electrify the cloud. The new setup allows a detailed examination of particle charging, suggesting the potential to create tiny lightning sparks.

While some researchers investigate lightning mechanisms, other scientists seek the perfectly creamy cacio e pepe sauce.

Perfecting cacio e pepe

Fabrizio Olmeda, a postdoc at ISTA in the Hannezo group, had had enough of random trial and error and approached the problem scientifically. Together with colleagues from the Max Planck Institute in Dresden, the University of Padua, and the University of Barcelona, he set out to uncover the secret of the perfect sauce so that it would turn out right every time.

Their study reveals why simply mixing the usual ingredients—Pecorino cheese, pasta water, pepper, and pasta—often results in a lumpy, mozzarella-like sauce. The starch in the pasta water is supposed to help emulsify and stabilize the sauce, but it is rarely enough on its own. When the temperature rises above 65 degrees Celsius, the cheese proteins denature and clump together, causing the mixture to break down. The researchers found that the key to the perfect sauce is the right amount of starch.

These investigations exemplify how scientific inquiry can bring clarity to even the most familiar aspects of life. As researchers try to decode the mysteries of the mundane, they remind us that simple questions can open doors to fascinating discoveries.

Imaging data and 3D renderings of a neuronal network. LICONN allows multi-color imaging, capturing the structure of brain cells and the location of specific molecules that enable cellular function.

RESEARCH HIGHLIGHTS

The Mind's Horizon

Hippocrates already suspected that the human brain was the center of intelligence. Today, in the 21st century, researchers, including those at ISTA, continue to uncover new insights into brain function.

In 2025, ISTA researchers focused on innovative new approaches to understand the brain, employing sleep studies, custom-built microscopes, new imaging technologies to reconstruct brain tissue, and brain-mimicking structures.

Sleep keeps our memories fresh
A good night's sleep helps animals retrieve information, a fact underscored by ISTA Professor Jozsef Csicsvari and ISTA alum Lars Bollmann in their latest publication. The scientists wirelessly measured neuronal activity patterns in rat brains for up to 20 hours of sleep, considerably extending previously reported measurement times.

"We showed that the neuronal assemblies in the early stages of sleep reflect recently learned spatial memories. However, as sleep progresses, neuronal activity patterns gradually transform into those seen later, when the rats awaken and remember the locations of their food rewards," says Csicsvari.

Like a Formula 1 on-board camera
ISTA Professor Maximilian Jösch and scientists Tomas Vega-Zuniga, Anton Sumser, and Olga Symonova have identified the "ventral lateral geniculate nucleus" (vLGN) in mice using a custom two-photon microscope with a virtual reality setup.

This particular brain region predicts and minimizes how movements distort the visual signal, helping us differentiate our own motion from the surrounding environment. It is similar to an on-board camera in a Formula 1 race car, which uses shorter exposure times to reduce blurriness resulting from the car's high speed.

"Image correction happens very early during visual processing—before the information is transmitted to other areas of the brain that are known to represent more complex visual features," says Jösch.

Zooming with a gel
Together with colleagues, ISTA Professor Johann Danzl and recent ISTA alumni Mojtaba R. Tavakoli and Julia Lyudchik introduced "LICONN," a new optical imaging technique for brain tissue developed with Google Research.

LICONN reconstructs intricate brain networks by piecing together neuronal processes and correctly linking each synaptic connection to its respective neuron. What stands out is that the image acquisition is done on a standard off-the-shelf optical microscope.

A special feature is that the brain tissue is embedded into a hydrogel—a three-dimensional polymer network—that takes up water and swells in a highly controlled manner. The gel elongates in size in every direction but maintains the relative spatial arrangements of the tissue's structures with extremely high fidelity, bringing the resolution to an extraordinarily high level (nanometer scale).

Besides microscopes, organoids have revolutionized science and medicine, aiding disease modeling, drug testing, and understanding developmental processes. While not exact replicas of human organs, they offer significant insights.

A new brain organoid model
Professor Sandra Siegert, PhD student Verena Schmied, and others present a new organoid model that, for the first time, includes microglia—special cells that scan the brain environment for improper brain connections as well as germs and initiate an anti-inflammatory response to remove them.

The organoid reveals details of the developing nervous system's response to viral infections, such as Rubella. Although mild in children and adults, Rubella poses a severe risk during pregnancy, potentially leading to fetal brain malformations and schizophrenia in adulthood.

"Our paper shows that it is critical to have microglia brain organoid models to mimic inflammatory reactions and their treatment. If microglia are missing, effects in the neuronal connection might be overlooked," summarizes Siegert. This model forms the basis for drug safety screening for pregnant people, who have hardly any drug options available.

From studies on sleep to innovative microscopy and organoids, these four publications expand our mind's horizon, unfolding new pathways for research and therapeutic exploration.

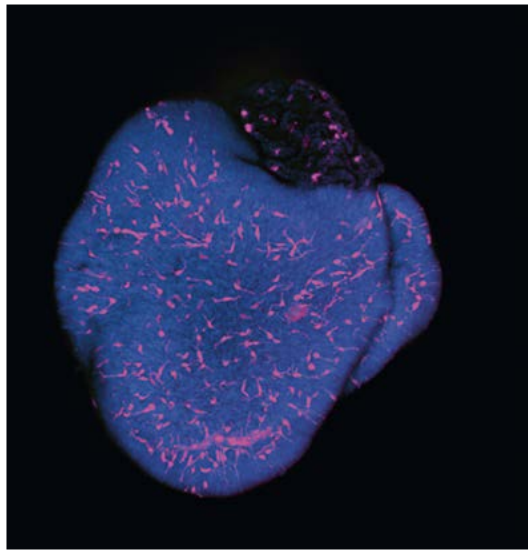
Publications:

Bollmann L. et al. 2025. **Sleep stages antagonistically modulate reactivation drift.** *Neuron.*

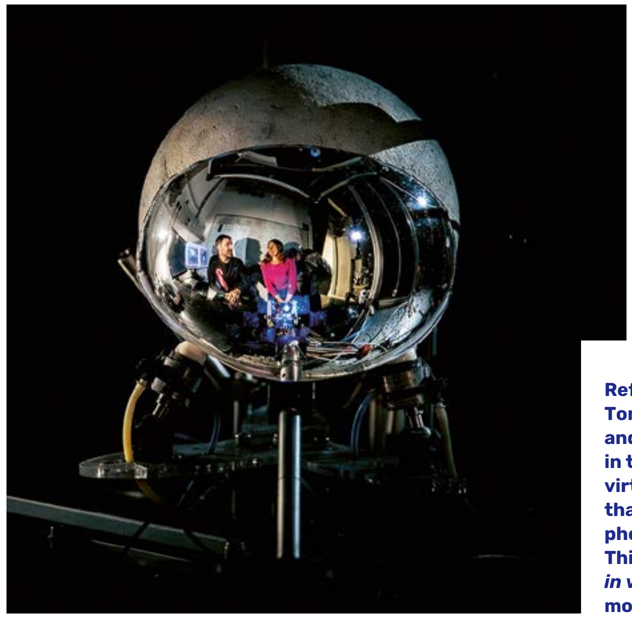
Vega-Zuniga T. et al. 2025. **A thalamic hub-and-spoke circuit enables visual perception during action by coordinating visuomotor dynamics.** *Nature Neuroscience.*

Tavakoli M. R. et al. 2025. **Light-microscopy based dense connectomic reconstruction of mammalian brain tissue.** *Nature.*

Schmied V. et al. 2025. **Microglia determine an immune-challenged environment and facilitate ibuprofen action in human retinal organoids.** *Journal of Neuroinflammation.*



Microglia (magenta) integrated into a retinal organoid. The neurons' cell nuclei are stained in blue.



Reflections of Tomas Vega-Zuniga and Olga Symonova in the mirror of the virtual reality setup that is part of a two-photon microscope. This system allows *in vivo* imaging of mouse brains.

RESEARCH HIGHLIGHTS

Flowers, Ants, and Evolution

Darwin's observations on the Beagle expedition laid the groundwork for the theory of evolution. Today, ISTA scientists are pushing the boundaries of evolutionary research even further.

Ant pupae signal their imminent death by incurable infection via changes in their odor, prompting workers to unpack them from their cocoon and disinfect them.

Publications:

Pal A. et al. 2025. **Genealogical Analysis of Replicate Flower Colour Hybrid Zones in Antirrhinum.** *Molecular Ecology.*

Walker J. et al. 2025. **Extensive N4 Cytosine Methylation is Essential for Marchantia Sperm Function.** *Cell.*

Dawson E. et al. 2025. **Altruistic disease signalling in ant colonies.** *Nature Communications.*

How do organisms develop traits that allow them to thrive in diverse environments? At ISTA, scientists are unlocking evolutionary mysteries through research on snapdragons, liverworts, and ants.

Unveiling snapdragon secrets
For nearly two decades, the research group of ISTA Professor Nick Barton has collected yellow and magenta-flowered snapdragons in the Pyrenees as well as their hybrids. The narrow "hybrid zones" that separate distinct populations offer a glimpse into speciation and evolution.

The scientists, including PhD student Arka Pal, explored how different varieties emerge from a common ancestor and separate over time. "When comparing two hybrid zones in the Pyrenees, we found very different patterns of divergence across the whole genome. Yet, differences in flower color were controlled by the same seven genes in both," explains Pal.

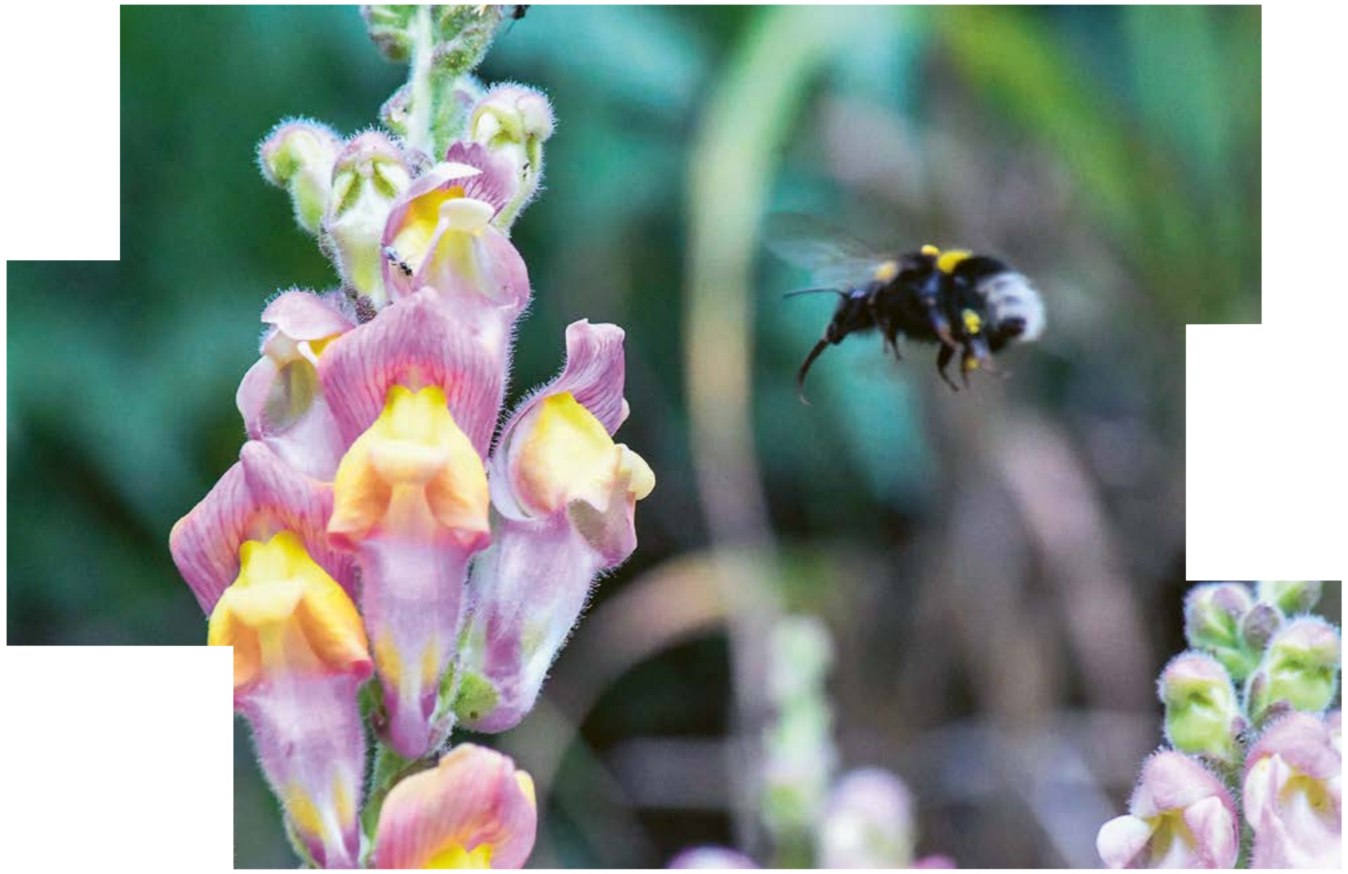
Pal and colleagues' study reveals that, despite the different genetic architecture of the two zones, the color genes share an evolutionary history. These genes help snapdragons remain distinct, even when they grow in the same environment, and share other genes across their extensive genome.

Significant evolutionary findings sometimes come from living fossils like the liverwort *Marchantia*—one of the oldest existing plant forms and probably the oldest one to colonize land.

From bacterial immunity to plant sex
Whereas other plants have evolved sexual reproduction independently of water, *Marchantia* still uses an ancestral form of reproduction. When raindrops splash on the surface of a male plant, it releases its sperm into the water, which swim to fertilize the nearby female plants. However, sperm maturation remains partly mysterious.

In a new study, Professor Xiaoqi Feng and her team demonstrate that a DNA marker called "4mC" is essential for sperm development and maturation in the liverworts. What makes this marker so fascinating is that, so far, it has been thought to exist only in microbes.

"Our work is the first to provide conclusive evidence of its existence in plants or animals," Feng explains.



Snapdragons in Spain's Pyrenees form colorful hybrids in narrow "hybrid zones," bridging between magenta and yellow populations.

A male liverwort. *Marchantia* is a key organism in plant evolution that uses an ancestral form of reproduction.

"The DNA marker that has found its way from bacteria to *Marchantia* is essential for the plants' sexual reproduction, specifically affecting sperm development in male specimens."

Similar to plants, ants have evolved remarkable systems to pass their genes to the next generation through altruistic self-sacrifice, ensuring the health and survival of their colony.

Ants signal deadly infection
A study by Professor Sylvia Cremer's research group and colleagues shows that terminally ill ant pupae actively emit an alarm signal that warns the colony of the contagion risk they are about to pose. Nearby workers subsequently unpack them from their cocoon and disinfect them, resulting in the pupa's own demise.

ISTA alum Erika Dawson sums up the main finding, "Altruistic behavior like this benefits the sacrificing ant indirectly. By warning the colony of their deadly infection, terminally ill individuals help the colony remain healthy and produce daughter colonies, which indirectly pass on the signaler's genes to the next generation." Only healthy colonies can produce new queens to establish future colonies. Thus, emitting a warning signal before death is a dying ant pupa's final opportunity to protect its kin, both present and future.

Why evolve such a complex warning system if sick animals could simply isolate? "Infectious ant workers practice 'social distancing,' and when they approach death, they leave the nest to die in isolation," explains Cremer. Yet, immobile ant brood lack this option. They thus rely on workers to remove them when incurably sick.

These findings reveal insights into the vibrant colors of mountain flowers, the reproduction of a living fossil, and the selfless behavior of social insects. Together, they underscore Mother Nature's development of unique and intricate systems.

To Start a Process

At the heart of uncovering the unknown, fundamental research relies on catalysts that drive progress and ignite new developments. ISTA strives to be a cohesive, inspired ecosystem, fueled by a shared passion for advancement and a collective ambition to elevate one another, creating something bigger than what could be achieved individually.

Delve into the Institute's technology transfer, Scientific Service Units, administrative efforts, and collaborations with industry and benefactors.

"Great achievements never happen in isolation. They require catalysts, enablers, and support systems. In the case of ISTA, the administrative units match the scientific ambition with excellent support. Our rapid expansion underscores this, with new infrastructure, recruits, and laboratory and office buildings paving the way for 150 research groups and over 2,000 employees by 2036." Georg Schneider, Managing Director

6
New XISTA Technologies Claimed

30
High-tech Startups Supported by XISTA

€ 5 MILLION
Verbund AG

€ 8 MILLION
Werner Siemens Foundation

€ 25 MILLION
Magdalena Walz

€ ~1 MILLION
Wicklow Capital

€ 20 MILLION
NOMIS Foundation

254
Administrative Staff
(including Construction & Maintenance)

269
Scientific Support

773
Scientists
(Professors, Postdoctoral Researchers, PhD Students, Scientific Interns, Staff Scientists)

TECHNOLOGY TRANSFER

Turning Discovery into Industry Impact

The XISTA ecosystem enables scientific ideas to develop into viable venture opportunities—for instance, through the development of new bacterial strains for more efficient bioprocessing.

ISTA and Google launched a research collaboration in June 2025, with the tech giant establishing a presence at the XISTA Science Park.

Having seen how bacterial instability disrupts biotech production, XISTA Fellow Alexander Pekarsky recognized the potential of ISTA research to reduce or even halt mutation rates. It spoke directly to an industry need: next-generation *E.coli* strains that could make biomanufacturing more resource-efficient.

XISTA—ISTA's platform for translating scientific discoveries into real-world solutions—provided the bridge between the research breakthrough and those positioned to advance it. Drawing on his industry experience, Pekarsky and business partner Stefan Kittler used the XISTA Fellowship to access the ISTA technology, generate proof-of-concept data, and shape the founding strategy for their BetterStrains project. Pekarsky, who spoke at XISTA's annual bigX event, personifies how innovation unfolds inside XISTA's ecosystem.

Across its three pillars—XISTA Innovation, XISTA Science Ventures, and the XISTA Science Park—founders gain the support, capital, and lab space needed to build and scale deep-tech companies. This integrated approach powered XISTA's progress throughout 2025, driving major research partnerships, a new program for the next generation of scientific entrepreneurs, and a slew of portfolio milestones.

XISTA added new roles in venture building, operations, intellectual property, and communications to enhance internal capacity for evaluating opportunities, supporting early business formation, and guiding technologies from discovery to market. Construction also began on a new building to expand lab space at the XISTA Science Park.

"At ISTA, curiosity-driven research is where ideas begin—and through XISTA, this curiosity can unfold into real-world impact. We accompany researchers from first discoveries, offering mentoring, funding, and space to help them progress from insight to application. In this way, XISTA turns scientific potential into meaningful innovations that strengthen the economy and benefit society in Austria, Europe, and globally." Monika Henzinger, Vice President for Technology Transfer

Google joins ecosystem
In 2025, a defining moment was the launch of a cooperation between ISTA and Google that spans work in AI, advanced algorithms, and neuro-imaging methods relevant to medical research. By establishing a presence at the XISTA Science Park, Google is now embedded in XISTA's research-to-innovation pipeline, strengthening the link between frontier science, industrial know-how, and future translational opportunities.

EIC Trusted Investors Network
XISTA further strengthened its position in the innovation community by joining the European Innovation Council (EIC) Trusted Investors Network, aligning with around 100 leading investors focused on scaling deep-tech ventures.

Wicklow Fellowship
In December, ISTA PhD student Jen Iofinova, who aims to develop private and personal AI that captures a user's own voice while keeping sensitive data secure on local devices, was named the first Translational Fellow supported by the Wicklow Foundation. Funded by a donation of more than one million euros from US-based Wicklow Capital (pp. 39-41), the fellowship gives researchers the time, mentorship, and financial support to explore the translational potential of their work. It also reflects strong external confidence in ISTA's scientific excellence and XISTA's tech transfer mission.

Portfolio highlights
Neural Magic, an AI startup with roots at ISTA and MIT, was acquired by US software company Red Hat, a leading provider of open-source solutions, becoming the first startup to collaborate with ISTA and successfully achieve a major exit. It demonstrates how fundamental research developed within ISTA's community can scale internationally and generate commercial impact.

Syntropic Medical moved forward with its non-invasive approach to treat major depressive disorder. Following the launch of its first in-patient study, the company received approval for a second, home-based feasibility trial in collaboration with NYU Langone Health in the US. It also announced its first peer-reviewed publication, marking an important step toward proving that 60 Hz light stimulation could offer safe and non-pharmacological treatment.

Ribbon Bio, the DNA synthesis company founded by ISTA alum Harold de Vladar, also opened its first commercial synthetic DNA production facility in Vienna, offering unprecedented accuracy and versatility for complex sequences.

SCIENTIFIC SERVICE UNITS

Catalyzing Innovation

ISTA is driving scientific excellence into the future with new facilities and equipment, empowering researchers with state-of-the-art resources for groundbreaking discoveries.

Neural bloom: a mouse retina imaged using a spinning-disk confocal microscope at the Imaging & Optics Facility—one of the Scientific Service Units at ISTA.

"As the Institute grows, so do the challenges. To address research needs, additional facilities have been created to ensure ISTA can offer the best possible support to the scientists. We look forward to further enhancing exchange and collaboration between the Scientific Service Units and the research groups." Georgios Katsaros, Vice President for Scientific Resources

The Scientific Service Units (SSUs) provide a solid foundation for research conducted at ISTA, helping to fuel its discoveries. In 2025, the Institute established two new SSUs, bringing the total number of its independent units to ten.

Ten SSUs support the growing Institute

Following the major 2024 upgrade in its computational capabilities to drive research in generative AI and machine learning, ISTA has now established the Scientific Computing Unit as its ninth SSU. "Launching scientific computing as a stand-alone SSU, separate from IT services, is a strategic development at our institute," says Roland Gansch, Head of the Scientific Service Units. Managing the new SSU is seasoned computer scientist Kristina Kapanova, who brings extensive expertise in high-performance computing from various HPC roles across Europe.

The new SSU finalized its investment in the MUSICA high-performance computing infrastructure, part of the Austrian Scientific Computing (ASC) network. Starting in 2026, 144 CPU nodes with 100% liquid cooling and 30 new B200 GPU nodes will become available for ISTA research groups.

2025 also marked the establishment of ISTA's tenth SSU: the Mass Spectrometry Facility was spun out from a team within the Lab Support Facility to form a stand-alone SSU. Martin Zehl, an analytical chemist who has worked as a scientist in Austria and Denmark, manages this unit. He has developed and applied mass spectrometric methods to tackle research questions in life sciences and chemistry, with a recent focus on bacterial secondary metabolites.

Constant modernization

The Institute's growth is reflected in the continued modernization of the facilities. Several SSUs have invested in cutting-edge equipment to boost their services and empower research at ISTA. These include a new metal 3D printer at the Miba Machine Shop and many other additions across the units.

The Nanofabrication Facility has installed a new laser writer and started offering atom probe tomography. The laser writer complements the finer electron-beam lithography, allowing physicists to 'write' larger structures on multiple layers. On the other hand, atom probe tomography is the only material analysis technique offering extensive capabilities for both 3D imaging and chemical composition measurements at the atomic scale.

Several new pieces of equipment were installed in the Imaging and Optics Facility, the most prominent being the stimulated emission depletion (STED) microscope. This super-resolution microscopy technique can overcome the diffraction limit of light microscopy, thereby increasing resolution. As of 2025, this addition has accelerated ISTA's super-resolution capabilities.

Furthermore, the Lab Support Facility has installed a new single-crystal X-ray diffraction system. This non-destructive analytical technique provides detailed information about the internal lattice of crystalline substances. The directly related single-crystal refinement technique helps scientists interpret and refine the X-ray data to obtain the crystal structure.

Investing in the future

Science never stands still, and neither do the constant development and optimization of all scientific services at ISTA. Looking ahead, several tenders for new equipment for 2026 have been finalized, totaling more than ten million euros.

These future developments include a 300-kiloelectron-volt electron microscope and a spectroscopic platform for the Electron Microscopy Facility. The Nanofabrication Facility will acquire state-of-the-art electron-beam lithography equipment. The Lab Support Facility will also offer surface plasmon resonance, and a cage and rack washer will be added to the Preclinical Facility.

"The SSUs play an instrumental role in the Institute's growth, helping our scientists reveal their full potential," says Gansch. "With our resources, modern equipment, and optimized processes, we will continue to empower research at ISTA to match competitive international standards."

Scientific Service Units at ISTA:

- Electron Microscopy Facility
- Imaging & Optics Facility
- Lab Support Facility
- Library
- Mass Spectrometry Facility
- Miba Machine Shop
- Nanofabrication Facility
- Nuclear Magnetic Resonance Facility
- Preclinical Facility
- Scientific Computing

ADMINISTRATION

Nurturing Growth

ISTA thrives with dedicated staff as co-architects of its success, while offering a vibrant working atmosphere.

At ISTA, research management is a distinct profession, where experts design and evolve conditions for excellent science and are co-architects of the Institute's success story. "The scientific process at our institute flourishes due to dedicated professionals who focus on creating an ideal environment," says Barbara Abraham, Deputy Managing Director and Head of Academic Affairs. "Our teams are crucial in shaping the Campus to reach its full potential."

The ArtLab 2025 showed how curiosity and creativity connect ISTA's community.

The administration oversees a wide array of essential functions, comprised of dedicated divisions such as Academic Affairs, Communications & Events, Construction & Maintenance, Finance, Human Resources, IT & Digital Transformation, and various units. This comprehensive structure underpins ISTA's research and academic efforts, allowing scientists to focus on their innovative work within a well-supported framework.

A place to grow
As new members join each year, ISTA is infused with fresh energy, innovative ideas, and diverse perspectives. From faculty, postdocs, and PhD students to professional staff, ISTA is committed to enabling all employees in achieving their goals, continuing their development, and advancing their careers.

Since its opening in 2009, the Institute has grown steadily, reaching 1,296 employees in 2025. To maintain connections in this expanding community, the Lunch Roulette initiative pairs employees in small groups, fostering engaging conversations between seasoned ISTA members and new joiners. This initiative is key to bridging the gap between long-term staff and new employees, facilitating open dialogue. Many ISTA employees have been with the Institute for over a decade. To honor their contributions, a celebration in 2025 highlighted their pivotal roles in shaping ISTA from a small team into a thriving community.

Beyond the workplace
ISTA offers a range of benefits to make it more than just a workplace, such as a gym, an Employee Assistance Program (EAP) providing confidential 24/7 counseling for employees and their household members, and a 50% subsidy on the "KlimaTicket Österreich" that continues through 2026. Additionally, various 'feel-good' events, improve connections among colleagues, such as the ArtLab, which allows participants to explore their creativity through art.

Furthermore, in 2025, the newly constructed employee kindergarten offers space for eight groups, fostering a supportive environment and nurturing curiosity from the start. This exemplifies ISTA's commitment to creating an environment where high-level research and personal life can sustainably coexist, enabling an international community to thrive.

EU Commissioner Ekaterina Zaharieva (middle) visits the Werner Siemens Thermoelectric Laboratory of Verbund Professor for Energy Sciences Maria Ibáñez (right).

SUPPORTERS

Advocates for Science

Balancing on one leg is tough; three are more stable. The same holds for ISTA's research funding, which rests on three complementary pillars: base funding, competitive public grants, and private funding. Together, they provide both stability and the flexibility required for curiosity-driven, high-risk, high-reward research.

Three complementary pillars of funding
The first pillar is the base funding provided by the Austrian Federal Government and the state of Lower Austria. With the current budget framework secured until 2036, this public commitment ensures long-term planning security for the Institute and its researchers.

The second pillar consists of competitive third-party funding from public research organizations. Roughly one-third of ISTA's budget is linked to the successful acquisition of such funds and the fulfillment of performance targets. These include grants from national and international agencies such as the Austrian Science Fund (FWF) and the European Research Council (ERC).

ISTA faculty members, have an overall ERC success rate of 46% (not including Proof-of-Concept Grants), underscoring the Institute's international scientific standing.

The third pillar is private funding, which includes both philanthropic contributions and foundation-based funding. Depending on their structure, these may take the form of donations or competitively awarded foundation grants. Together, these forms of support expand ISTA's ability to pursue bold, unconventional ideas that may not yet fit into standard funding schemes.

Long-term strategic partners and philanthropic engagement
The NOMIS Foundation is a long-standing strategic partner of ISTA. It supports the Institute through the ISTA-NOMIS Fellowships (p. 55) and grants to specific research projects. In 2025, NOMIS announced a landmark commitment: an additional 20 million euros in the form of a competitive foundation grant program, starting in 2026, dedicated to daring, out-of-the-box projects with the potential to open entirely new scientific directions.

In 2025, US philanthropist Daniel V. Tierney, founder of Wicklow Capital and a supporter of scientific advancement, contributed over one million euros to support a fellowship program at ISTA (p. 35). His engagement reflects a shared commitment to research excellence, interdisciplinarity, and innovation in knowledge transfer.

Other supporters include Verbund AG, which enabled the Verbund Professorship for Energy Science held by Maria Ibáñez through an original donation of five million euros. The Werner Siemens Foundation supports the Werner Siemens Thermoelectric Laboratory, led by Professor Ibáñez, through a dedicated multi-year commitment of an eight-million-euro grant. The Chan Zuckerberg Initiative collaborates with ISTA and Assistant Professor Francesco Locatello through its AI Residency Program to advance research on virtual cells as models for human health and disease.

The largest philanthropic contribution in ISTA's history is the bequest of Lower Austrian entrepreneur Magdalena Walz, who left the Institute 25 million euros in her will in 2021. The Magdalena Walz Professorship for Life Sciences, currently held by neuroscientist Peter Jonas, commemorates her exceptional commitment to advancing research at ISTA.

Together, public base funding, competitive research grants, and private funding form a robust and transparent three-pillar structure. This diversified foundation not only sustains ISTA's current excellence but also enables the Institute to pursue ambitious scientific visions and to continuously explore new frontiers.

"Public base funding provides a stable foundation and the capacity for long-term planning," says President Martin Hetzer. "Competitive research grants and private funding create the additional freedom needed to pursue unconventional ideas that may ultimately lead to breakthroughs. Outstanding science depends on the interplay of all three pillars to truly thrive."

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*Donors are recognized in chronological order of their initial engagement with ISTA.

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NOMIS FOUNDATION

WICKLOW CAPITAL

Verbund

WSS WERNER SIEMENS-STIFTUNG

Chan Zuckerberg Initiative

**Partners are presented to reflect the range and strategic depth of ISTA's collaborations.

To Continuously Develop

ISTA is youthful and energetic. These qualities are reflected in both its scientists and staff. One of ISTA's core missions is training the next generation of researchers, offering career opportunities at every level to help them follow their curiosity and fully realize their potential. This commitment to development extends to the Institute's infrastructure and outreach projects. As the Campus expands, the newly opened VISTA Science Experience Center marks a significant milestone.

Discover the ongoing evolution of the Institute's outreach, its Graduate School, postdoctoral community, and alumni network.

"This year was filled with inspiration. Watching our conversations with scientists turn into ideas, and those ideas solidify into real objects, was profoundly motivating—a reminder that science itself begins as a possibility before becoming a discovery."

Gaia Novarino, Executive Vice President

874 Institutional Media Clippings in 2025

325 Summer Camp Visitors

35 Neuroscience Academy Graduates

100,000 Online Student Viewings of the Christmas Science Show

5,563 Newsletter Subscriptions

2,518 Science Media Clippings in 2025

3,600 Visitors at VISTA Opening Festival

8 Science Grandmas

4 Journalists in Residence

2 Artists in Residence

VISTA

VISTA Opening Festival “Hello Science! Hello VISTA!”

VISTA

The VISTA Science Experience Center is embedded in the research campus and offers a glimpse into the inner workings of modern science.

Science in the Making

The VISTA Science Experience Center promotes dialogue between science and society. Its first exhibition offers a glimpse into how science unfolds in the 21st century.

The autumn air is crisp, yellow leaves blanket the green meadows. A short walk from the bus stop, along the ISTA campus, a spherical building emerges. At first glance, it appears to be an exorbitant shiny silver mushroom with a strikingly curved cap, but upon closer inspection, it is a place where science comes to life.

"We communicate science not as a collection of facts, but as a dynamic process shaped by questions, creativity, and collaboration. This creates a higher understanding of and trust in modern science," says Christian Bertsch, Head of Science Education at ISTA.

Welcome to the VISTA Science Experience Center

The doors open, revealing a bright, minimalistic foyer with Scandinavian décor. Multimedia installations arranged in a semicircle—rotating, screens—tell the story of the Campus, its research areas, and its community. The smell of freshly brewed coffee fills the air as visitors and researchers from the Institute gather at the VISTA Coffee Lab.

Everyone is welcome at the VISTA Science Experience Center, whether school classes, families, science enthusiasts, or those interested in culture. A group of people—five kids and four adults—bustles in front of the help desk. A science mediator welcomes the group and prepares them to dive into the world of science.

The exhibition

The visitors descend the spiral staircase, pass an auditorium and workshop spaces, and are guided directly to the heart of the visitor center: a 500 m² gallery space with 50 unique exhibits connecting art, science, and technology that bring the diversity and dynamism of science to life.

The main exhibition, "Science in the Making," debuted during a vibrant three-day opening festival in September 2025 under the motto "Hello Science! Hello VISTA!" The event offered special tours, talks and panel discussions, workshops, science slams, live music, DJ sets, and light installations to more than 3,600 visitors.

Upon entering the exhibition, the adults and children choose from five mood-descriptive stickers: curious, playful, critical, exact, and enduring—important scientist traits, according to the campus community. By choosing a sticker, the group realizes that they all have traits of a researcher. By a small intervention, they feel suddenly connected to scientists and science.

In the form of small computer games, they learn how to train AI through networks. They playfully explore how machine learning tests hypotheses, accelerates ideas, but also raises ethical questions. Is it really only humans doing research here, or are machines already involved?

At the "Data in the Wild" area, visitors learn how diverse data collection is: from botanical field studies in the Pyrenees to excursions to the glaciers in the Central Asian Pamir Mountains, to space, where satellites and telescopes are used to look into the cosmos. One step further, and they suddenly find themselves in a scientific laboratory, visiting a pink room used for plant breeding at ISTA. One highlight for the group is the installation Homo Insectus by the artist duo Laurent Mignonneau and Christa Sommerer. These pioneers in the field of art and science visualize the tension between humans and machines with an interface on which digital ants replicate the body of the person viewing it. One visitor snaps an artsy and antsy selfie.

For some questions, the science mediator starts a dialogue, rather than provide a clear-cut answer. Here and there, short video messages from students, postdocs, and professors greet the families and introduce them to their lives as researchers.

As the group strolls back to the foyer, their minds are visibly bustling—curiosity has undoubtedly sparked. They wind down the tour and step into the autumn air, ready to see science in a whole new light.

"Science in the Making" is the first exhibition at the VISTA Science Experience Center.

"We believe that understanding and trust are fostered through dialogue. People trust people, which is why facilitating direct encounters and dialogue between science and society is central to all VISTA activities."

Christian Bertsch, Head of Science Education

VISTA

From a Bold Idea to Reality

Professor Gaia Novarino shares the story of the VISTA Science Experience Center from concept to a collaborative space that transforms the public perception of science.

Gaia Novarino wears many hats: she is a professor of neuroscience specializing in autism, founder of the startup Neurolentech, the Executive Vice President of the Institute, and the Vice President for Science Education.

Gaia, the three-day opening festival of the VISTA Science Experience Center was a huge success. How did you feel during that weekend?
I was very emotional, especially on Friday, when we opened the doors to the public, and I saw the crowd. The excitement and joy I witnessed were deeply moving. I got to know many people during that weekend, and I was struck by their kindness and enthusiasm for engaging in discussions. This is exactly what we aim for, and it seemed like people were craving it.

What inspired the opening of the VISTA Science Experience Center?
The primary motivation was addressing how society often perceives scientists as an exclusive community, insular, or lobbying for specific interests. This perception has led to science skepticism, distrust, and misunderstanding. I believe it's partly our fault as scientists, because we haven't communicated effectively with the public. Taxpayers often question the relevance and benefits of scientific work in their everyday lives. Without effective communication, the public might not realize how much of their environment and advancements come from scientific research. The VISTA Science Experience Center aims to bridge this gap and change the notion that science is only for a select few.

What do you want people to feel after they leave this place?
Two things: first, it's important for everyone to grasp that at ISTA, we're not giving answers, we're in the process of exploring and comprehending the world around us. Understanding this distinction is crucial. Second, I want people to feel excited and intrigued, thinking, "Wow, this is really cool!" Together, these points highlight how fascinating the search for knowledge can be.

How did the VISTA Science Experience Center unfold?
The concept existed before I took on my role three years ago. Initially, it was supposed to be a visitor center—an entry point for people who visit the Campus. While features like an auditorium or a workshop room were planned, the details of an exhibition room and a café were not clearly defined. Appointing Christian Bertsch as Head of Science Education was an important step, as I believe hiring exceptional people is key, and we did a great job with that. Over the past few years, Christian, the Science Education Unit, and I visited similar initiatives to draw inspiration. Generally, most places are either standalone museums or partially integrated within a research institute. The VISTA Science Experience Center is unique as it is totally embedded into our campus, creating a vital space for dialogue. The whole process wasn't solely my doing; it resulted from a collective effort from our brilliant team and colleagues.

Have you experienced any challenges in your career as a women in STEM?
I've always perceived my career as relatively easy, though reflecting on it, I've faced challenges, such as cultural differences and communication styles. For example, my enthusiastic communication style is sometimes labeled as 'too emotional,' a common stereotype, particularly for women. For a long time, I accepted this perception, allowing others to use it to imply I lacked control. Now, I understand that emotions are integral to being human. They are instincts, like fear, which prompt us to escape danger. Embracing my emotions has become my strength, which is particularly evident when I communicate about science. This ability to connect with others emotionally contributes to my leadership style, creating a comfortable environment where we can openly discuss topics and draw energy from one another.

The official opening of the VISTA Science Experience Center.

The VISTA Science Experience Center at the ISTA campus is a place where exchange and encounters with science take center stage. Every exhibition visit is personally guided by dedicated science mediators and is free of charge. Moreover, VISTA provides an extensive array of workshops, talks, and "Meet a Scientist" sessions.

OUTREACH

The Journalists in Residence 2025. Jackie Snow (left), Clare Watson (middle left), Monika Mondal (middle right), and Georgia Guglielmi (right).

Scientific Discovery Meets Public Engagement

At ISTA, change goes beyond scientific advancement—it is about opening the doors of discovery to everyone.

"In an age of misinformation, bloated political claims, fake news, bots, and the lot, the Viennese antidote of exact thinking, methodological rigor, verification, and more is exactly what we need now."

With these words, British historian Richard Cockett addressed a packed Raiffeisen Lecture Hall during his ISTA lecture. His latest book, *Vienna: How the City of Ideas Created the Modern World*, traces Vienna's extraordinary intellectual impact in the twentieth century. Cockett—also Editor of *The Economist*—reflected on the city's legacy of ideas that shaped everyday life, from fitted kitchens and social housing, to the now-obvious habit of washing hands before meals. Why Vienna? Because it was a provocative blend of disciplines.

That same interdisciplinary spirit defines ISTA today. By fostering collaboration across fields, the Institute offers young scientists an environment that attracts talent from around the world. Yet progress in fundamental research cannot remain confined to laboratories. It needs to be shared, questioned, and discussed. Alongside Cockett, leading figures from disciplines such as astronomy and computer science have presented their work at the ISTA Lecture Series, translating cutting-edge research for a general audience and linking scientific discoveries to larger questions about the world we live in.

Research meets storytelling

Just as a book can draw readers into complex ideas, storytelling remains one of the most effective ways to engage the public with science. ISTA's Journalist in Residence program is built on this premise. It invites outstanding journalists from around the globe to spend time at the Institute, engage with researchers, and translate their work for a broader public—strengthening trust in science along the way. Now in its third year, the program has welcomed participants who have explored ISTA's laboratories and shared its research across diverse platforms, sometimes in unexpected forms. Artistic perspectives play a complementary role through the Artist in Residence program, demonstrating how science can resonate beyond traditional formats. Together, these initiatives have helped bring ISTA's research to international media outlets and exhibitions worldwide.

A multifaceted campus

Beyond residency programs, the Institute communicates its research through a wide range of channels, reaching audiences both nationally and internationally. Central to these efforts are stories that reveal the human side of science and challenge persistent stereotypes about who scientists are and how they work. One example is "I Am Many Versions of Myself," a photographic series created for ISTA's Quantum Year celebration in 2025, which explored the diverse lives and perspectives of the Institute's quantum scientists.

The Campus comes alive most visibly during Open Campus—ISTA's annual celebration of curiosity and community. Visitors of all ages wander through laboratories, meet researchers, and experience science up close—through live shows, family activities, science slams, and hands-on experiments that turn abstract ideas into tangible experiences.

"Ask the Science Grandma!"

When it comes to learning, few approaches rival the impact of hands-on discovery. Building model rockets with baking soda or extracting DNA from fruit transforms physics, chemistry, and biology into accessible and memorable activities. Launched in 2025, the Ask the Science Grandma program brings this spirit into schools and care centers. The initiative pairs children with women over 60, creating intergenerational workshops centered on interactive experiments. Children explore scientific concepts through practice, while the science grandmas take on a new role as educators—staying active after retirement and passing on curiosity, confidence, and knowledge.

Through these initiatives, driven by the Division of Communications, Events, and Science Education in close collaboration with the entire campus community, ISTA has become a place of active exchange—not only advancing scientific research, but also opening it up to society. By making science inclusive, creative, and accessible, the Institute invites a broad public to engage with research and to experience science as a shared endeavor.

The quidit states of a quantum scientist. Assistant Professor Kimberly Modic is a seeker—original, persistent, and grounded—and explores various perspectives to deepen our understanding in superconductivity.

GRADUATE SCHOOL

"Let Your Curiosity Guide You!"

The Graduate School at ISTA encourages students to evolve. Its vibrant community and support of interdisciplinary learning help PhD students grow and thrive, as they shape a bright future.

The Association for Unity, Representation and Advocacy of Students (AURAS) of 2025: Uday Ram Gubbala (left), Stavros Papadopoulos (middle left), Roksolana Kobylinska (middle right), Tanvi Madaan (right), and Wilfrid Jean Louis (in front).

As a young institute, ISTA is unfolding by developing new projects and buildings. It is a culture that ISTA's PhD students also embrace, as they evolve to realize their potential. In 2025, the Graduate School welcomed 79 PhD candidates from 32 countries, highlighting the Institute's growing global reputation as a hub for cutting-edge research.

President Martin Hetzer encourages the new cohort: "Let your curiosity guide you. Work with people who inspire you and lift you up. And if you are having fun—even when it's hard—you are probably doing it right."

Cultivating collaboration
Training the next generation of scientists is central to ISTA's mission. The Graduate School's rotation system, unusual among European institutions, allows candidates to explore three or more research groups in their first year. This fosters an interdisciplinary perspective and helps students identify questions that spark their interest.

As well as providing perspectives into different research areas, the first year allows student cohorts to get to know each other. ISTA's PhD program brings together each year's student intake, incorporating study track-specific courses and mandatory interdisciplinary communication training. Students with diverse backgrounds learn how to communicate across disciplines by working in small groups, explaining their research to students outside their field. The goal is to understand the limits of one's own discipline and to think beyond it. This strengthens the community and lays the foundation for future collaboration by provoking interdisciplinary thinking.

"Science is social in nature. One of its most enjoyable aspects is standing around a board with colleagues trying to make sense of a scientific problem. ISTA and the Graduate School seek to help PhD students unfold the relationships and skills that make those interactions possible. The philosophy we aspire to is one in which everyone mentors everyone else."
Mario de Bono, Dean of the Graduate School

"One of the best parts of my PhD has been the friendships I've built within my cohort," says Peipeng Lin, who is part of the Jonas group and studies how neurons communicate. "We celebrate each other's successes, and we are there to listen or offer a shoulder when things get rough. Many of my friends have since graduated and moved on, but I know these friendships will last a lifetime."

Providing a support system
The students are supported by world-class faculty, state-of-the-art facilities and equipment, skills training, attractive salaries, and dedicated staff. ISTA has no tuition fees. Beyond their research, they can unwind at ISTA-organized social events, such as the Spring Festival or ArtLab. The student association, AURAS, connects and represents students, ensuring everyone feels included, valued, and heard. And Vienna, with its many opportunities, and the beautiful Wienerwald, lies at the Institute's doorstep.

"The philosophy we aspire to is one in which everyone mentors everyone else," says new Dean of the Graduate School Mario de Bono. "Nature does not give up its secrets easily. However, the community at ISTA and the fantastic and long-term support we have should give students the confidence to tackle important and difficult problems."

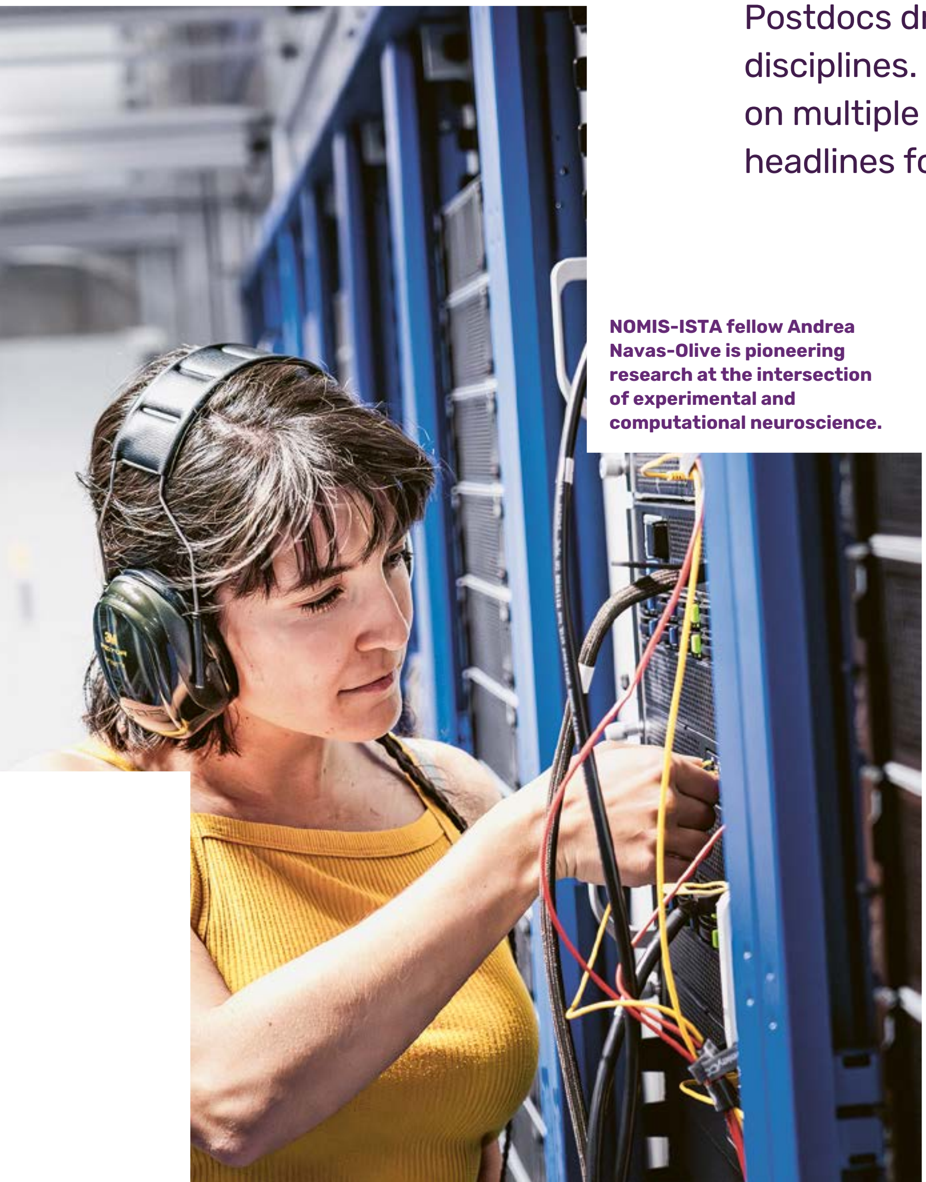
New beginnings
Once they finish their doctoral research, typically after five years, PhD students celebrate their achievements and creativity at a graduation ceremony. This year's event saw 60 students graduate, with five honored with the Outstanding PhD Award: Elias Frantar from the Alistarh group, Georg Arnold from the Fink group, Huihuang Chen from the Friml group, Joscha Henheik from the Erdős group, and Volker Karle from the Lemeshko group.

Graduation marks both a farewell and the beginning of exciting new careers in academia, industry, and other fields. ISTA's alumni program allows graduates to stay connected with their alma mater as their journey continues.

POSTDOCTORAL RESEARCHERS

Excelling Across Borders and Disciplines

Postdocs drive research and innovation across disciplines. In 2025, ISTA postdocs excelled on multiple fronts, some making global headlines for surprisingly delicious science.



NOMIS-ISTA fellow Andrea Navas-Olive is pioneering research at the intersection of experimental and computational neuroscience.

A mix of creativity, perseverance, precision, and fun helps curiosity-driven research unfold. ISTA postdocs masterfully demonstrate this interplay, supported by the Institute's various programs and activities.

Sustainable batteries and ISTA postdoc awards

This year, an ISTA postdoc was one of the three recipients of Austria's highest privately endowed funding for climate-relevant basic research. Rajesh B. Jethwa, postdoc in the Freunberger group, received the Zero Emissions Award from the alpha+ Foundation of the Austrian Science Fund (FWF) for his research into sustainable battery materials.

2025 also marked the first internal postdoc awards at ISTA, bestowed upon ISTA postdocs Shengduo Xu

Postdoc Rajesh B. Jethwa received a Zero Emissions Award from the Austrian Science Fund for investigating the use of organic structures as energy storage systems for batteries.

and Kirti Jain. Xu, who worked in the group of Maria Ibáñez—Verbund Professor for Energy Sciences and Head of the Werner Siemens Thermoelectric Laboratory—played a pivotal role in producing high-performance, sustainable cooling materials using an innovative 3D printing technique that cuts production costs (pp. 24–25). On the other hand, Jain, who conducted her research in Calin Guet's group, demonstrated that the function of multiple antibiotic resistance in the eponymous mar network—one of the best-studied gene regulatory networks in gut microbes—is, in fact, an auxiliary function.

Science with a global impact

The French Academy of Sciences recognized the contribution of Ziqiang Patrick Li, a postdoc in the Sixt group, for work performed before joining ISTA. Li was one of six scientists awarded a medal during the 20th "Grandes Avancées Françaises en Biologie" (Great French Advances in Biology) event in Paris in June. This earlier research, performed at the CNRS's Laboratory of Membrane Biogenesis (Bordeaux), elucidated how plant cells divide while staying connected through hundreds of tiny bridges.

Also, in 2025, an ISTA postdoc's scientifically perfect pasta sauce turned the heads of Italian nonnas and chefs alike, and earned him the Ig Nobel Prize of the hearts.

The Ig Nobel Prize honors research that first makes people laugh, then makes them think. Together with colleagues, ISTA physicist Fabrizio Olmeda, a postdoc in the Hannezo group, received the popular award for researching the secret of the perfect cacio e pepe sauce, a recipe notoriously difficult to nail (pp. 26–27).

Targeted programs and activities

Besides conducting research and gaining recognition, postdoc life at ISTA revolves around targeted fellowship programs and buzzes with activities and workshops. The NOMIS-ISTA Fellowship program supports applicants working at the intersection of two or more scientific disciplines and who show significant scientific leadership potential. On the other hand, the ISTA-Fellow program supports applicants whose proposed research and experience complement those of an existing ISTA research group.

In 2025, the first ISTA Women Postdoc Mentoring Program, rooted in the objectives of ISTA's Gender Equality Plan, was concluded successfully in November. The program aimed to offer training, reflection, exchange sessions, group coaching, and networking opportunities specifically tailored to women postdocs and the challenges they face.

Furthermore, ISTA participated in the Postdoc Appreciation Week for the first time, celebrating its postdoc community and recognizing its contributions. Also, the first Vienna Postdoc Career Day—a joint initiative with universities and research institutions from the Vienna region—included ISTA.

"Postdocs are an essential component of our ISTA community, driving research and innovation across disciplines," says Valentina Riva, Career Development Expert in the Postdoctoral Office. "Our programs and activities are targeted to support them and bring out their full potential at ISTA, while helping them grow their professional networks and acquire tools for their future career developments."

ALUMNI

One Community, Many Paths

Spread across five continents and over 40 countries, ISTA alumni are a diverse and innovative group making meaningful contributions in their fields and communities.

Fatemeh Mohammadi was a postdoc with the Uhler group* from 2014-2015.

Matyáš Fendrych was a postdoc with the Friml group from 2014-2017.

Catherine McKenzie completed her PhD at ISTA in 2018 with the Janovjak* and Jonas groups.

Walner Mendonça was a postdoc with the Kwan group from 2021-2022.

*The Uhler and Janovjak groups are no longer affiliated with ISTA.

Just over 15 years since its founding, 841 alumni represent ISTA globally. Whether they are chasing down the next big discovery or simply pursuing their passion, the work of ISTA alumni reflects back on the Institute as a place for world-class research and learning.

Committed to growth

Before arriving at ISTA in 2014 as a postdoc, Fatemeh Mohammadi had studied and worked in Iran, Sweden, Germany, and the USA. She later held positions at TU Berlin, Germany; the University of Bristol, UK; and Ghent University, Belgium before moving to KU Leuven, Belgium, where she is a full professor and leads one of the largest groups in applied algebraic geometry. She is also the principal investigator of more than 5.5 million euros in major grants. Her international path reflects deliberate choices about where her work could grow most strongly. She appreciates environments that are internationally-minded and open to new perspectives. "I chose places where interdisciplinary thinking and fresh ideas were truly valued. As a scientist, it strengthened my belief that good ideas know no borders."

Proud of his team

Matyáš Fendrych received the ISTA Alumni Award in 2025, presented each year to an alum to honor their outstanding achievements. As a postdoc at ISTA, he worked to establish the vertical microscope and root microfluidics, both of which are still used by colleagues in his former group. Today, he leads a group at the Institute of Experimental Botany at the Czech Academy of Sciences in Prague, where he is happy to bring back some of the knowledge and skills he acquired at ISTA and from his other positions abroad to his home country. While he is heavily involved in the group's research, he takes pride in the accomplishments of his colleagues. "It's great when it's your postdocs and students that make these discoveries. These are the 'wow' moments that really make the job worth it for me."

Passionate about the future

For another alum, her commitment to the future of her field is a driving force. After completing her PhD at ISTA and a postdoc at the Interdisciplinary Institute for Neuro-Science, France, Catherine McKenzie now works as a Discovery Scientist at the Neuroscience and Rare Diseases Discovery and Translational Area at Roche in Switzerland. "I'm extremely passionate about offering the best possible therapeutics for patients with devastating neurological disorders, which is why I am highly invested in working with gene therapy to be a therapeutic modality that people are willing to embrace as a path to recovery and continued high quality of life." In her work, she identifies causal dysfunctional genes and replaces them with healthy ones with the goal of treating neurological disorders that have no other treatment. She never set out with the goal of working specifically in academia or industry, but things fell into place as a result of following what excited her. "It was always about what set my brain on fire and choosing that over and over again."

Dedicated to sharing 'magical' math

What originally attracted Walner Mendonça to combinatorics—an area of discrete mathematics focused on combinations and arrangements of finite structures—was how questions were like complicated puzzles. "The problems are easy to understand, but the solutions can be really hard, and the techniques can feel almost like magic." After completing a postdoc at ISTA, he is now an assistant professor at Universidade Federal do Ceará in Brazil and is dedicated to bringing more people into the field. "I work with other combinatorics professors from around Brazil to put on a yearly conference in different cities to attract more researchers and students into the field." Students traveling from further distances can receive financial support to help them attend the conference. "I love academia a lot and really hope that more will see combinatorics as a field they can pursue and enjoy."

PHOTOSTORY

To Become Visible

Welcome to "To Become Visible," a photostory that delves into the minds of ISTA scientists through a lens that merges their personas with vivid imagery of their research.

The following portraits artistically blend the scientists' faces with the captivating images of their research. Each photograph captures the dynamic energy of minds in motion, showcasing the diversity of scientific fields—be it the the beauty of snapdragons, the complexities of microscopical technology, sweeping mountain ranges, the intricate 3D folding of proteins, or the fascinating world of matter at the nanoscale.

Get ready to see science from a new perspective, where the boundaries of thought dissolve, and the power of discovery unfolds before your eyes.

Daria Shipilina

Postdoc in the Barton group

It is hard to imagine Daria without nature, whether she is on a field trip to discover painted lady butterflies or collecting snapdragons in the Pyrenees. The researcher is fascinated not only by their external beauty, but also by their intrinsic attributes, which she explores through genetic analyses. The varying colors of the snapdragons, in particular, remain a scientific mystery. The portrait was created in collaboration with Process Studio. Their screen grab of a snapdragon originates from the video installation "The Hybrid Zone," which is featured in the exhibition "Science in the Making" at the VISTA Science Experience Center.

Michaela Jovic
PhD student in the Heisenberg group

The Stellaris microscope, or "Stella" as Michaela affectionately calls it, is the indispensable partner in crime for the PhD student in her everyday lab work. With this tool, the scientist examines sea squirt embryos at high resolution, capturing the moment in their development when one cell becomes two—as life begins to unfold.

Thomas Shaw
Postdoc in the Pellicciotti group

When asked which fascination came first, the mountains or research, Thomas takes a moment to ponder. What he knows for certain is his deep love for both. Eagerly, he awaits his next adventure to the world's mountain regions, where he collects data to input into atmospheric model simulations, trying to understand the cooling effect of glaciers.

Florian Praetorius

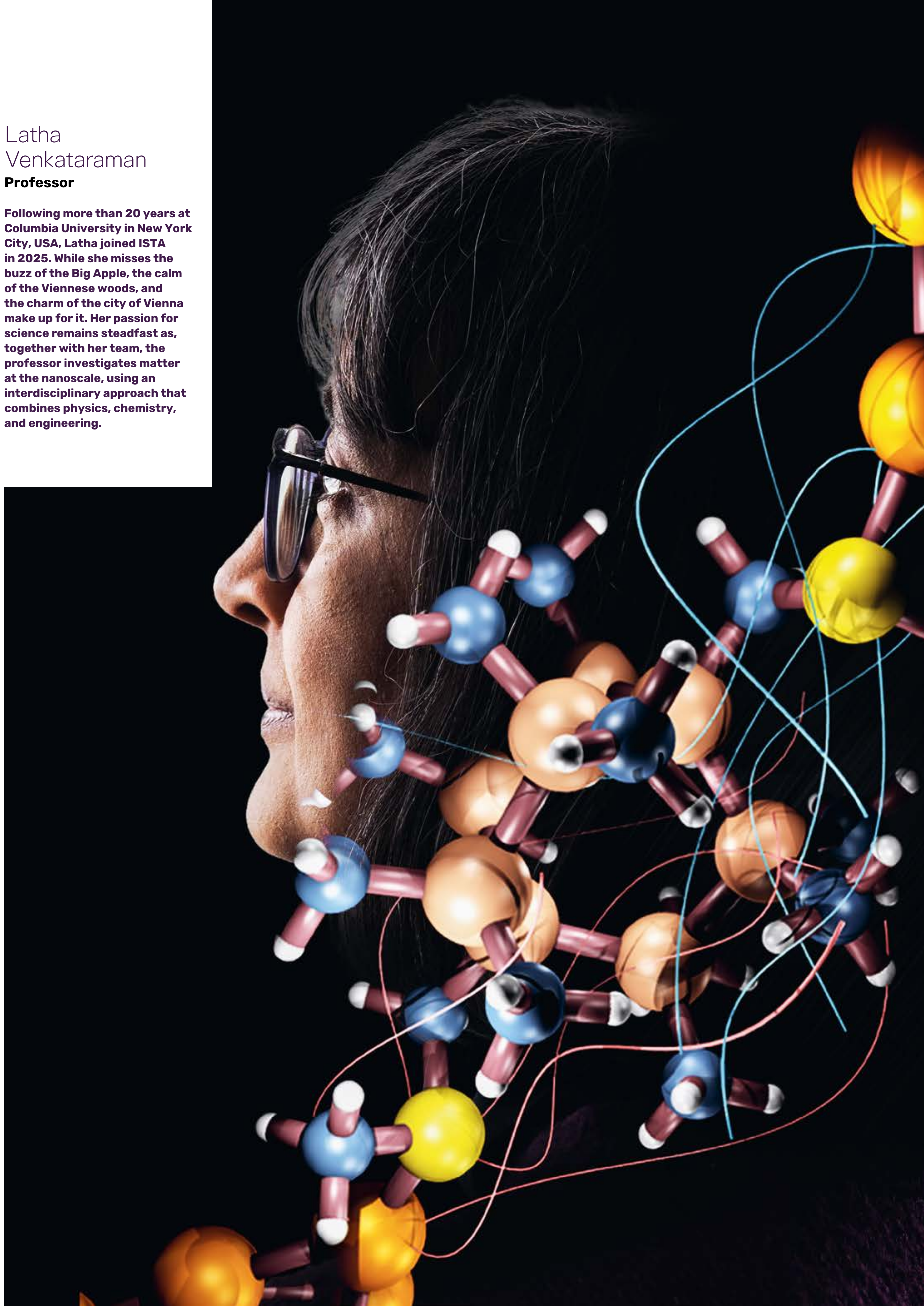
Assistant Professor

Florian quite literally runs a protein factory. With his team, the assistant professor folds novel proteins with properties not found in nature. The design of the molecules is done using computers and deep-learning tools. The proteins are then produced by bacteria, which synthesize them according to the DNA blueprints provided by the researchers.

Latha Venkataraman

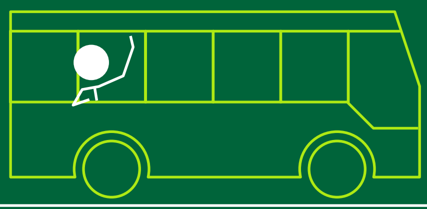
Professor

Following more than 20 years at Columbia University in New York City, USA, Latha joined ISTA in 2025. While she misses the buzz of the Big Apple, the calm of the Viennese woods, and the charm of the city of Vienna make up for it. Her passion for science remains steadfast as, together with her team, the professor investigates matter at the nanoscale, using an interdisciplinary approach that combines physics, chemistry, and engineering.



To Inspire Discovery

To truly thrive, it is essential to have the right individuals who can inspire the next generation to leverage science as a remedy for today's challenges. Discover ISTA's faculty, staff scientists, and incoming new professors who are setting the tone for interdisciplinary research.



"At ISTA, we believe that talent unfolds when people are seen—not only for past achievements but for future growth. This year, I've seen researchers and staff step into new roles, take initiative, and surprise even themselves. There is plenty of room on this campus to grow—intellectually and literally—and it's a joy to watch potential come to life."

Barbara Abraham, Deputy Managing Director and Head of Academic Affairs

New Research Groups

ISTA welcomes nine professors who who will join the Institute in 2026. These exceptional researchers will play a pivotal role in advancing the Institute's vision of hosting 150 research groups by 2036.

In 2026, nine new professors with diverse backgrounds and research fields spanning biochemistry, chemistry, earth science, mathematics, and physics will enrich the Institute. Supported by various scientific services that ISTA is offering to all its researchers, they will follow their curiosity to wherever it takes them. To create and disseminate knowledge and unfold science to new directions, ISTA considers equity, diversity, and inclusion to be essential. ISTA recognizes that despite the even distribution of talent, many groups are still poorly represented in leading-edge research. The Institute strives for a diverse community, actively encourages applications from women faculty, and sets measures to minimize bias in hiring decisions.

Xujia Chen

Geometric Topology of Manifolds
[Mathematics]

Manifolds are central objects studied in geometry and topology. They are models of the space-time in which we live, and are the foundational concept in many physical theories. On the other hand, the data cloud in an experiment can form the shape of a manifold. Thus, studying the properties of this manifold will provide information on the nature of the data.

Xujia Chen studies various questions related to manifolds and general topological spaces, mostly involving moduli spaces. In addition, she studies some manifold "invariants"—simpler quantities extracted from a manifold, such as numbers or groups—defined by counting points in configuration spaces that satisfy certain conditions, as well as the algebraic structures related to configuration spaces.

Following her undergraduate studies in mathematics at the University of Science and Technology of China, Chen earned her PhD in mathematics from Stony Brook University, USA, in 2021. Between 2021 and 2023, she was a Junior Fellow at Harvard University, USA, before moving to the Max Planck Institute for Mathematics in Bonn, Germany, as a postdoctoral fellow.

Xujia Chen will join ISTA in January 2026.

Simone Fatichi

Environmental Biophysics and Ecohydrology
[Earth Science]

Simone Fatichi conducts research in hydrology, biogeosciences, and climate change. His work explores how global environmental change impacts water and soil resources, vegetation, the carbon cycle, and ecosystem services in both natural and urban environments.

Fatichi earned his PhD in 2010 through a joint program between the University of Florence, Italy, and TU Braunschweig, Germany. He was a postdoctoral fellow in the Department of Civil and Environmental Engineering at the University of Florence, until 2011. Following this, he joined the Institute of Environmental Engineering at ETH Zurich, Switzerland, as a research associate and lecturer, where he remained until 2020. He then transitioned to the National University of Singapore's Department of Civil and Environmental Engineering as an associate professor and was promoted to full professor in 2024.

Simone Fatichi will join ISTA in September 2026.

Carla Fernández-Rico

Soft and Biofabricated Materials
[Physics]

A look at nature shows that soft materials can exhibit stunning structural complexity across scales, without specialized machinery. Materials like structurally colored bird feathers emerge through bottom-up processes such as self-assembly, phase separation, and growth. Built from abundant resources under ambient conditions, they show remarkable functional properties. Yet, creating similarly-architected materials in the lab—at scale, reproducibly, and sustainably—remains a major challenge.

Carla Fernández-Rico's research explores how structural hierarchy can emerge in soft and biofabricated systems using principles from soft matter physics, materials science, and biology. Her lab aims to develop fundamental insights and general rules for sustainable material design.

Following her undergraduate studies at the Universitat Autònoma de Barcelona, Spain and master's at Utrecht University, the Netherlands, Fernández-Rico completed her PhD in physical chemistry at the University of Oxford, UK in 2021. She later joined ETH Zurich as a Postdoctoral Fellow at the Department of Materials, where she has led an SNSF (Swiss National Science Foundation) Ambizione Group since 2024.

Carla Fernández-Rico will join ISTA in September 2026.

Vivian Kuperberg

Primes, Polynomials, and Patterns
[Mathematics]

Prime numbers are fundamental objects in modern mathematics, used throughout number theory and in applications such as encryption systems. They exhibit a striking dichotomy: they are defined very precisely, and demonstrate algebraic properties, and yet in many ways their distribution throughout the integers appears random.

Vivian Kuperberg seeks to understand how prime numbers "look random"—and how they do not—using analytic, probabilistic, and combinatorial methods. She examines the properties of randomly generated sequences that can model primes fairly precisely. In addition, she utilizes techniques such as sieve methods, analytic tools, and methods from additive combinatorics or algebraic geometry. She also investigates other arithmetic sequences or analogs of the prime numbers in different settings.

Kuperberg earned her PhD from Stanford University, USA, in 2022. She was a National Science Foundation Postdoctoral Scholar at Tel Aviv University, Israel, from 2022 to 2023, before moving to ETH Zurich, Switzerland, as a Hermann Weyl Instructor.

Vivian Kuperberg will join ISTA in September 2026.

Julia Reisenbauer

Biocatalysis and Protein Engineering
[Biochemistry, Chemistry]

Enzymes—nature's catalysts—are remarkable molecular machines that enable the formation and breakdown of complex molecules and materials. Advances in protein engineering have unlocked their potential as highly efficient, robust, and versatile tools for synthetic chemistry. Through experimental techniques such as directed evolution and computational methods like machine learning, enzymes can be designed to perform non-natural chemical reactions with remarkable precision and selectivity.

Julia Reisenbauer focuses on repurposing the unique reactivity of enzymes to unlock entirely new chemical pathways. By combining the strengths of enzymes with the deep knowledge of classical organic chemistry, she aims to achieve chemical transformations that were previously inaccessible.

Reisenbauer completed her PhD at ETH Zurich, Switzerland, in 2023. She was then a postdoctoral researcher with an SNSF Postdoc Mobility fellowship at Caltech, USA, until 2025.

Julia Reisenbauer will join ISTA in February 2026.

Charles Roques-Carmes

Nanophotonics and Light-Matter Interaction
[Physics]

When confined to the nanoscale, photons behave in unusual and intriguing ways, leading to transformative applications in quantum technologies, biosensing, advanced microscopy, and next-generation communication technologies. These novel behaviors arise from subwavelength light confinement and fundamental quantum optical interactions that dominate at these scales.

The past decade has witnessed tremendous progress in nanophotonics and light-matter interactions. Charles Roques-Carmes seeks to observe, understand, engineer, and harness these new regimes of nanoscale light-matter interactions. His approach leverages advanced theoretical frameworks and state-of-the-art experimental methods, including ultrafast electron microscopy, X-ray imaging, and quantum sensing.

Following his undergraduate studies and first master's in physics at the Ecole Polytechnique, Palaiseau, France, Roques-Carmes earned a second master's in 2018 and a PhD in 2022 in electrical engineering and computer science from the Massachusetts Institute of Technology (MIT), USA. Currently, he is a Science Fellow at Stanford University, USA.

Charles Roques-Carmes will join ISTA in June 2026.

Friedrich Stricker

Photoresponsive Adaptive Molecules & Materials
[Chemistry]

Friedrich Stricker explores how molecular structure and chemical reactivity can be harnessed to engineer functional materials that respond, adapt, and evolve. His research operates at the interface of organic chemistry and materials science, seeking to translate molecular-level processes into macroscopic function. He aims to build adaptive material systems in which chemical reactivity, molecular organization, and structural design are 'knit' together to produce predictable, coordinated changes in, for example, mechanical properties.

Following his PhD from the University of California, Santa Barbara, USA, Stricker was a Walter Benjamin Fellow at Harvard University's School of Engineering and Applied Sciences from 2022 to 2025. He is currently a Walter Benjamin Return Fellow at the Max Planck Institute of Colloids and Interfaces, Germany.

Friedrich Stricker will join ISTA in August 2026.

Monica Visan

Partial Differential Equations
[Mathematics]

Monica Visan's research primarily centers on mathematical physics, with a particular emphasis on nonlinear dispersive partial differential equations (PDEs). She is recognized for her work on dispersive equations at scaling-critical regularity and for introducing the method of commuting flows to obtain optimal well-posedness results for completely integrable systems.

Following her undergraduate studies in mathematics at the University of Bucharest, Romania, Visan completed her PhD in 2006 at the University of California, Los Angeles (UCLA), USA. Until 2008, she was a scholar at the School of Mathematics of the Institute for Advanced Study (IAS), USA. She then served as an Assistant Professor at the University of Chicago, USA until 2009. In 2009, she was appointed Assistant Professor at UCLA and subsequently promoted to Associate Professor in 2011 and Professor in 2014.

Monica Visan will join ISTA in September 2026.

Yuval Wigderson

Extremal Combinatorics and Ramsey Theory
[Mathematics]

Extremal combinatorics studies the size and structure of discrete objects subject to natural constraints. These can include sets of integers, collections of points and lines in a plane, linear spaces of matrices, and graphs.

While many fundamental problems in extremal combinatorics remain open, the field has seen considerable progress in the past few decades. Many of the most exciting developments have utilized ideas from a wide array of other fields, including algebra, ergodic theory, functional analysis, number theory, probability, theoretical computer science, and topology. This has led to a rich interplay between these fields and extremal combinatorics. By incorporating ideas from various fields, Yuval Wigderson seeks to answer fundamental questions about the structure of discrete objects as well as order and chaos within large systems.

After completing his PhD in 2022 at Stanford University, USA, Wigderson was a postdoc at Tel Aviv University, Israel. Since 2023, he has been a Junior Fellow at the Institute for Theoretical Studies, ETH Zurich, Switzerland.

Yuval Wigderson will join ISTA in September 2026.

Faculty

Annually, around six new professors and assistant professors are appointed exclusively on the basis of research promise and excellence. Each of them heads their own research group. Throughout 2025, the Campus was home to 87 groups. While clear lines between disciplines do not reflect the interwoven nature of scientific inquiry, ISTA's breadth of faculty expertise can be grouped into three major areas: life sciences, mathematical and physical sciences, and information and system sciences. Research groups at ISTA may attribute themselves to more fine-grained disciplines. However, many also help unfold new research fields or actively contribute to blurring the lines between traditional disciplines.

Faculty calls have always been independent of fields; yet, recruiting acknowledges the positive effect of clusters within fields. They enable discourse and exchange, which is beneficial to developing innovative ideas. By 2036, the Institute will host around 150 research groups, further expanding its research spectrum with outstanding applicants who bring new perspectives.

Dan Alistarh

Deep Algorithms and Systems Lab (DASLab)
[Computer Science, Data Science]

Artificial Intelligence has made massive progress over the past decade, with breakthroughs across several applications and tasks. Yet, the sustainability of this pace of progress is in question: the computation required to train and deploy state-of-the-art AI models has been rising exponentially, potentially hindering innovation and leading to inequalities in terms of expertise and economic benefits.

The Alistarh group works to remove these barriers to the democratization of AI by creating training and inference algorithms that are significantly more efficient than conventional ones. For this, we develop new algorithms for learning over compressed (e.g., sparse or quantized) representations, as well as efficient systems implementations that can leverage compression gains in practice.

Current projects: Efficient Training and Inference for Massive AI Models; Large-scale distributed machine learning; Adaptive concurrent data structures; Fundamental limits of distributed computation

Career: since 2022 Professor, ISTA ■ 2017-2022 Assistant Professor, ISTA ■ 2016-2017 "Ambizione" Fellow, Computer Science Department, ETH Zurich, Switzerland ■ 2014-2016 Researcher, Microsoft Research and Morgan Fellow, University of Cambridge, UK ■ 2012-2013 Postdoc, Massachusetts Institute of Technology, Cambridge, USA ■ 2012 PhD, EPFL, Lausanne, Switzerland

Zhanybek Alpichshev

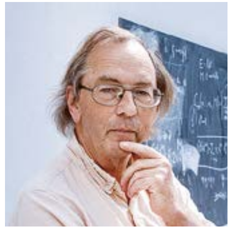
Condensed Matter and Ultrafast Optics
[Physics]

To understand a complex system, it is often useful to bring it out of equilibrium: the recovery dynamics will reveal a great deal about its inner workings. The Alpichshev group uses ultrafast optical methods to understand the physical mechanisms underlying some of the extremely complicated phenomena in many-body physics.

A key problem in modern physics is to understand the behavior of a large number of strongly interacting particles. Such systems often feature unique properties such as high-temperature superconductivity, but the origin of these behaviors is unclear. The main difficulty is that these "strongly correlated" properties arise in the context of a large number of competing phases, which makes it difficult to determine the role of each factor. The Alpichshev group circumvents this problem by using ultrashort laser pulses to selectively perturb and probe the individual degrees of freedom in a strongly correlated material and study the system in the resulting transient state. This information can be used to reconstruct the microscopic mechanisms behind complex phenomena.

Current projects: Nonlinear optical spectroscopy of hybrid lead halide perovskites; 2D THz spectroscopy of correlated systems; Ultrafast dissipative processes in correlated electron systems below Planckian level

Career: since 2018 Assistant Professor, ISTA ■ 2017-2018 Visiting Scientist, Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany ■ 2012-2017 Postdoctoral Associate, Massachusetts Institute of Technology, Cambridge, MA, USA ■ 2012 PhD, Stanford University, Stanford, USA



Nick Barton

Evolutionary Genetics
[Data Science, Evolution & Ecology, Mathematics]

The Barton group develops mathematical models to probe fundamental issues in evolution. For example, how do new species form, what limits adaptation, and what shapes the genetic system?

Nick Barton and his group study diverse topics in evolutionary genetics. The main focus of their work is the effects of natural selection on many genes and the evolution of populations that are distributed across space. They develop statistical models for the evolution of complex traits, which depend on the combined effects of very many genes. Working with other groups at ISTA, they study the evolution of gene regulation, using a thermodynamic model of transcription factor binding. A substantial component of the group's work is a long-term study of the hybrid zone between two populations of snapdragons *(Antirrhinum)* that differ in flower color. This combines detailed field observation with genetic data to estimate population structure and fitness variation over multiple scales and serves as a test-bed for developing ways to infer selection and demography from genetic data.

Current projects: Evolution of complex traits; Analysis of selection experiments; Understanding genealogies in space and at multiple loci; Inference from DNA sequence; Speciation and hybridization in *Antirrhinum*

Career: since 2008 Professor, ISTA ■ 2015-2021 Dean of the Graduate School, ISTA ■ 1990-2008 Reader and Professor, University of Edinburgh, UK ■ 1982-1990 Lecturer and Reader, University College London, UK ■ 1980-1982 Demonstrator, Cambridge University, UK ■ 1979 PhD, University of East Anglia, Norwich, UK

Denitsa Baykusheva

Ultrafast Quantum Spectroscopy
[Chemistry, Physics]

In certain materials, quantum mechanical properties manifest themselves over a wide range of energy and length scales, giving rise to macroscopic phenomena such as superconductivity or spin liquidity. These phases can be manipulated by external stimuli. Ultrashort laser pulses have emerged as a new method to control these quantum phases, making the stabilization of transient states that lack an equilibrium counterpart possible. However, ultrafast light-matter interactions have mostly been seen from a "semiclassical perspective," combining quantum matter treatment with a classical view of the electromagnetic field.

The Baykusheva group aims to bridge the gap and bring ultrafast spectroscopy to the fully quantum regime. Their goal is to create spectroscopic tools that can also characterize and manipulate the quantum aspects of light fields. The ability to map photon correlations onto matter and vice versa holds the promise of uncovering new aspects of light-matter interactions, potentially leading to the discovery of new functionalities.

Current projects: Strong-field quantum optics and spectroscopy; New pathways towards intense quantum light; Ultrafast quantum sensing using solid-state spins

Career: since 2024 Assistant Professor, ISTA ■ 2020-2023 Postdoctoral Scholar, Department of Physics, Harvard University, USA ■ 2018-2020 Postdoctoral Scholar, Stanford PULSE Institute, SLAC National Laboratory, USA ■ 2018 PhD, ETH Zurich, Switzerland

Eva Benková

Plant Developmental Biology [Cell Biology]

Plant hormones "set in motion" myriad physiological processes that influence and modulate each other in an intricate network of interactions. The Benková group seeks to untangle this network and understand its molecular basis.

Local heterogeneities in water and nutrient availability, and sudden changes in temperature, light, or other stressors trigger dramatic changes in plant growth and development. Multiple hormonal signaling cascades interconnected into complex networks act as translators of these exogenous signals in plant adaptive responses. The Benková group focuses on how the hormonal networks are established, maintained, and modulated to control specific developmental outputs. Recently, they located several convergence points integrating different hormonal inputs. Importantly, some of these identified components exceed their function in the hormonal cross-talk and provide functional links with pathways mediating the perception of environmental stimuli.

Current projects: Convergence of hormonal pathways on transport-dependent auxin distribution; Identification of hormonal cross-talk components by genetic approaches; Hormonal crosstalk-driven nutrient-dependent root development

Career: 2021-2025 Dean of the Graduate School, ISTA ■ Since 2016 Professor, ISTA ■ 2013-2016 Assistant Professor, ISTA ■ 2011-2013 Group Leader, Central European Institute of Technology, Brno, Czech Republic ■ 2007-2013 Group Leader, Flanders Institute for Biotechnology, Ghent, Belgium ■ 2003-2007 Habilitation position, University of Tübingen, Germany ■ 2001-2003 Postdoc, Centre for Plant Molecular Biology, Tübingen, Germany ■ 1998-2001 Postdoc, Max Planck Institute for Plant Breeding, Cologne, Germany ■ 1998 PhD, Institute of Biophysics of the Academy of Sciences of the Czech Republic, Brno, Czech Republic

Carrie Bernecky

RNA-Based Gene Regulation [Biochemistry]

The regulated expression of genetic material is one of the most basic processes of a cell, affecting everything from organism development to environmental response. Through structural studies of the involved complexes, the Bernecky group works to unravel the gene expression regulatory networks that employ RNA as an intermediate.

RNA is an important focal point for the regulation of gene expression. Both protein-coding and noncoding RNAs are integral components of diverse regulatory pathways and often act together with protein cofactors. Despite their importance, an understanding of the mechanisms of action of the involved RNA-protein complexes is lacking. Many of these RNA-containing complexes are flexible, modular, and lowly abundant. For such challenging targets, cryo-electron microscopy has emerged as a particularly powerful tool for the determination of near-atomic structures while simultaneously providing insight into their dynamics. Using this and related methods, the Bernecky group aims to understand how RNA-protein complexes assemble and regulate cellular RNA metabolism.

Current projects: Molecular basis of transcriptional regulation; Assembly and import of RNA polymerase II; RNA recognition in innate immunity

Career: since 2018 Assistant Professor, ISTA ■ 2011-2017 Postdoc, Ludwig Maximilian University Munich and Max Planck Institute for Biophysical Chemistry, Göttingen, Germany ■ 2010-2011 Postdoc, University of Colorado Boulder, USA ■ 2010 PhD, University of Colorado Boulder, USA

Bernd Bickel

Computer Graphics and Digital Fabrication [Computer Science, Data Science]

We are currently witnessing the emergence of novel, computer-controlled output devices that provide revolutionary possibilities for fabricating complex, functional, multi-material objects and metamaterials with stunning optical and mechanical properties.

Bernd Bickel is a computer scientist interested in computer graphics and its overlap with animation, biomechanics, material science, and digital fabrication. His group seeks to push the boundaries of how functional digital models can be efficiently created, simulated, and reproduced. Given the digital nature of the process, three factors play a central role: computational models and efficient representations that facilitate intuitive design, accurate and fast simulation techniques, and intuitive authoring tools for physically realizable objects and materials. Accordingly, the work of the Bickel group focuses on two closely related challenges: developing novel modeling and simulation methods, and investigating efficient representation and editing algorithms for materials and functional objects.

Current projects: Computational synthesis of metamaterials; Soft robotics; Interactive design systems; Design of cyber-physical systems

Career: since 2024 Professor, ETH Zurich, Switzerland ■ 2020-2025 Professor, ISTA ■ 2021-2024 Vice President for Technology Transfer, ISTA ■ 2015-2020 Assistant Professor, ISTA ■ 2012-2014 Research Scientist and Research Group Leader, Disney Research Zurich, Switzerland ■ 2011-2012 Visiting Professor, TU Berlin, Germany ■ 2011-2012 Postdoc, Disney Research Zurich, Switzerland ■ 2010 PhD, ETH Zurich, Switzerland

Jack Bravo

Bacterial Immune Systems [Biochemistry, Cell Biology]

Bacteria are major causative agents of disease in humans. In addition, bacteria are under immense evolutionary pressure from their viral predators—bacteriophages—and have consequently developed numerous sophisticated immune systems to provide immunity. Recent technical breakthroughs have led to the discovery of over 200 previously undetected bacterial immune systems involved in anti-phage defense, antibiotic resistance, and bacterial pathogenesis. Notably, these novel systems represent an untapped treasure trove of tools for precision biotechnology, akin to CRISPR.

The Bravo group is particularly interested in understanding how these diverse bacterial immune systems can identify an intruder's nucleic acids from their own. They use a combination of structural biology (e.g., cryo-electron microscopy), biochemistry, biophysics, and microbiology to decipher the molecular mechanisms that underpin immunity. Their ultimate goal will be to harness that knowledge to turn these immune response types of machinery into potent tools for genome editing and diagnostics.

Current projects: Mechanistic bacterial immunity; Nucleoprotein complexes; Kinetics-guided structural biology

Career: since 2024 Assistant Professor, ISTA ■ 2020-2024 Postdoc, University of Texas at Austin, USA ■ 2019 Postdoc, Cambridge University, UK ■ 2019 PhD, University of Leeds, Leeds, UK

Alexander Bronstein

Bronstein Group [Biochemistry, Computer Science, Data Science]

The rapid advances in machine learning have revolutionized nearly every domain of science and engineering. The Bronstein group develops computational data-driven methods to tackle complex challenges in natural and life sciences and engineering.

One key research area is computational imaging, which allows to capture data that may not be human-readable but contains all the information needed for advanced algorithms to reconstruct a meaningful image. The Bronstein group was among the pioneers in using machine-learning techniques to co-design the hardware and software components of imaging systems, optimizing them for specific tasks. They have successfully applied these methods across diverse imaging modalities and are now expanding into molecular imaging.

Their second core focus is structural biology, where they leverage machine learning to model, analyze, and design protein structures, dynamics, and functions. They are especially interested in the structural implications of synonymous genetic coding in proteins—an area that challenges long-held dogmas in molecular biology.

Current projects: Learning molecular imaging pipeline; Protein generative modeling; Structural implications of synonymous genetic coding

Career: since 2024 Professor, ISTA ■ Since 2021 Dan Broida Academic Chair, Technion, Israel ■ Since 2016 Associate Professor, then Professor, Technion, Israel ■ 2015-2023 Cofounder and Chief Scientist, Videocites ■ 2012-2021 Senior Research Scientist, then Principal Engineer, Intel ■ 2010-2016 Assistant Professor then Associate Professor, Tel Aviv University, Israel ■ 2007 PhD, Technion, Israel

Tim Browning

Analytic Number Theory and Its Interfaces [Mathematics]

What is the connection between adding and multiplying whole numbers? This is a surprisingly deep question with several interpretations. One natural extension studies the sequence of integers that arise as solutions to a polynomial equation with integer coefficients, i.e., a Diophantine equation. The Browning group works on understanding such sequences, using a blend of analytic, geometric, and algebraic methods.

Low-dimensional Diophantine equations have been heavily used in cryptography, but the properties of higher-dimensional Diophantine equations remain largely mysterious. Hilbert's 10th problem asks for an algorithm to decide if a given Diophantine equation has integer solutions. Mathematical logic has revealed this to be an impossible dream, but does such a procedure exist if we just seek rational solutions? Moreover, when solutions are known to exist, there are deep conjectures that connect their spacing to the intrinsic geometry of the equation. The Browning group is involved in actively expanding the available toolkit for studying these problems and their generalizations.

Current projects: Moduli spaces of rational curves; Rational points on Fano varieties; Arithmetic statistics; Hardy-Littlewood circle method; Sieve theory and divisibility sequences

Career: since 2018 Professor, ISTA ■ 2012-2019 Professor, University of Bristol, UK ■ 2008-2012 Reader, University of Bristol, UK ■ 2005-2008 Lecturer, University of Bristol, UK ■ 2002-2005 Postdoctoral Research Fellow, University of Oxford, UK ■ 2001-2002 Postdoctoral Research Fellow, Université de Paris-Sud, Orsay, France ■ 2002 PhD, Magdalen College, University of Oxford, UK

Lisa Bugnet

Asterics – Asteroseismology & Stellar Dynamics [Astronomy, Data Science, Physics]

Understanding the internal processes of stars is essential for accurately characterizing them, which in turn provides critical insights into a wide range of astronomical objects—from exoplanets to entire galaxies. Recent advances in asteroseismology, a branch of stellar physics that analyzes the oscillations of stars, have opened up questions about our understanding of stellar evolution, which can reshape our understanding of ages in the universe. Magnetic fields are largely excluded from stellar evolution models due to a lack of observation and theoretical prescriptions. Specialized in Magneto-asteroseismology, the Bugnet group aims to understand the magnetic evolution of stars and their dynamic processes. Research in the group combines theory of waves in plasma, stellar evolution models, and observational analyses of asteroseismology data to better understand stellar magnetic fields, which shed light on the evolution of stars like the Sun.

Current Projects: Detection and characterization of magnetic fields inside stars with asteroseismology; Signatures of magnetic fields in convective cores; Magnetic fields in radiative interiors from the red giant branch to the white dwarf stage; Magnetic field survival and evolution; Effect of magnetism on angular momentum transport in stellar interiors

Career: Since 2023 Assistant Professor, ISTA ■ 2020-2022 Flatiron Research Fellow, Flatiron Institute, Simons Foundation, New York, USA ■ 2020 PhD, The French Alternative Energies and Atomic Energy Commission (CEA), Université Paris-Cité, Paris, France

Ilaria Caiazzo

Stars and Compact Objects [Astronomy]

Stellar astrophysics is experiencing an exciting era. The advent of high-cadence time domain surveys like Gaia, ZTF, and the Vera Rubin Observatory is revolutionizing the landscape of stellar studies by allowing the exploration of the dynamic sky. Additionally, space missions such as the James Webb Space Telescope, renowned for its unprecedented sensitivity in the infrared, are opening new windows on the skies above us.

The Caiazzo group takes advantage of these rich datasets to study stars and their remnants at their last stage of life (e.g., white dwarfs and neutron stars) and to explore their evolution. The group is interested in understanding their physical properties, as they encompass extremes that cannot ever be achieved on Earth—from gravitation to density and magnetic fields. The group combines observation, analysis of large datasets, and theoretical work to tackle open questions about stars and their remnants.

Current projects: Role of magnetic fields in stellar evolution and impact on the structure and evolution of white dwarfs and neutron stars; Stellar remnants and the physics of the last stages of a star's life; Major evolutionary paths of stars in binaries and progenitors of type Ia supernovae

Career: since 2024 Assistant Professor, ISTA ■ 2019-2024 Burke-Sherman Fairchild Postdoctoral Fellow in theoretical astrophysics, Caltech, USA ■ 2019 PhD, University of British Columbia, Canada

Krishnendu Chatterjee

Computer-Aided Verification, Game Theory [Computer Science]

Life is a game—at least in theory. Game theory has implications for the verification of the correctness of computer hardware and software, but also in biological applications, such as evolutionary game theory. The Chatterjee group works on the theoretical foundations of game theory, addressing central questions in computer science.

Game theory studies interactive problems in decision-making, and can be used to study problems in fields from logic to biology. The Chatterjee group is interested in the theoretical foundations of game theory, its application in formal verification, and evolutionary game theory. Game theory in formal verification involves the algorithmic analysis of various forms of games played on graphs, where the graph models a reactive system. This framework allows for the effective analysis of many important questions and helps to develop robust systems. The Chatterjee group also works on algorithmic aspects of evolutionary game theory on graphs, where the graph models a population structure. Here, their goals are to better understand games and to develop new algorithms.

Current projects: Quantitative verification; Stochastic game theory; Modern graph algorithms for verification problems; Evolutionary game theory

Career: since 2014 Professor, ISTA ■ 2009-2014 Assistant Professor, ISTA ■ 2008-2009 Postdoc, University of California, Santa Cruz, USA ■ 2007 PhD, University of California, Berkeley, USA

Sylvia Cremer

Social Immunity [Evolution & Ecology]

Social insects fight disease as a collective. Together, they prevent and treat infections and alter their social behaviors to prevent epidemics. The Cremer group uses ants as a model to study how collective protection arises at the colony level from the interplay between individual immunity and cooperative actions.

Social immunity acts at all stages of disease: even before infection, ants are able to detect pathogen presence, such as infectious fungal spores that they then actively remove from their contaminated colony members. After this intense sanitary care phase, the colony shows social distancing to limit the spread of disease. If ants nevertheless fall sick, they actively alert their colony members by changing their body odor, thereby triggering infection treatment. To study social immunity over the course of disease, the Cremer group combines methods like observation of hygiene behavior, chemical analysis of signs of disease, and automated network analysis of ant colonies, where each ant is individually-marked with a tag resembling a QR code.

Current projects: Pathogen spread and disease prevention in social insects; Epidemiology along social interaction networks; Collective disease resistance and tolerance; Pathogen detection, disease signaling, and infection treatment

Career: since 2015 Professor, ISTA ■ 2010-2015 Assistant Professor, ISTA ■ 2010 Habilitation, University of Regensburg, Germany ■ 2006-2010 Group Leader, University of Regensburg, Germany ■ 2006 Junior Fellow, Institute of Advanced Studies, Berlin, Germany ■ 2002-2006 Postdoc, University of Copenhagen, Denmark ■ 2002 PhD, University of Regensburg, Germany

Jozsef Csicsvari

Systems Neuroscience [Neuroscience]

Memory formation is crucial for learning. This process of encoding, storing, and ultimately recalling memories involves complex interactions between various brain regions and neurons in embedded circuits that form complex codes to encode these memory traces. The Csicsvari group studies how learning is implemented in the brain.

During learning, new memories are acquired and then consolidated to ensure their successful later recall. The Csicsvari group focuses on understanding how learning leads to memory formation in neuronal circuits by investigating the neuronal system mechanisms of memory formation and stabilization. The researchers also investigate the mnemonic role of neuronal populations and their interactions in brain areas involved in spatial memory processing. The group seeks to understand how neuronal circuits process information and form spatial memories by recording the activity of many neurons in different brain regions during spatial learning tasks and sleep. Using optogenetic methods, the researchers selectively manipulate neuronal activity in different brain areas.

Current projects: Oscillatory interactions in working memory; Role of hippocampal formation in spatial learning; Activation of brain structures using light-sensitive channels to study memory formation

Career: since 2011 Professor, ISTA ■ 2003-2011 MRC Senior Scientist (tenure-track and tenured), MRC Anatomical Neuropharmacology Unit, University of Oxford, UK ■ 1999-2002 Postdoctoral Fellow then Research Associate, Center for Behavioral and Molecular Neuroscience, Rutgers University, New Brunswick, USA ■ 1999 PhD, Rutgers University, New Brunswick, USA

Johann Danzl

High-Resolution Optical Imaging for Biology [Cell Biology, Data Science, Neuroscience, Physics]

How can we decode the molecular and cellular architecture of biological systems? How can we analyze biological tissues across spatial scales? The central aim of the Danzl group, an interdisciplinary team of physicists, biologists, computer scientists, and neuroscientists, is to develop optical imaging technologies that allow addressing problems of biological and medical relevance in unprecedented ways.

The Danzl group explores and extends the possibilities of optical imaging, reaching from the organ level to the subcellular nanometer range, at much better resolution than the limits of classical light microscopy. The group has recently developed light microscopy-based connectomics (LICONN), a technique based on expansion microscopy. LICONN allows visualization of cellular constituents of brain tissue with high enough resolution to distinguish individual synaptic connections, using standard high-speed light microscopes. This and related technologies serve as a platform for multimodal mapping of the brain and other tissues, integrating nanoscale structural information with the molecular makeup and functional characteristics of individual (sub)cellular components.

To develop their technologies, the group employs an integrated multidisciplinary approach spanning from optical physics and advanced data analysis to biological applications.

Current projects: Synapse-level reconstruction of brain tissue; Optical imaging of cell and tissue ultrastructure; Multimodal mapping of biological tissues

Career: since 2025 Professor, ISTA ■ 2017-2025 Assistant Professor, ISTA ■ 2012-2016 Postdoc, Department of NanoBiophotonics, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany ■ 2010-2011 Postdoc, Institute for Experimental Physics, University of Innsbruck, Austria ■ 2010 PhD (physics), University of Innsbruck, Austria ■ 2005 MD, Medical University of Innsbruck, Austria

Mario de Bono

Genes, Circuits, and Behavior [Biochemistry, Cell Biology, Neuroscience]

Neurons are highly specialized cells, and many fundamental questions about their organization, function, quality control, and plasticity remain unaddressed. The de Bono group seeks to discover and then dissect basic molecular mechanisms that underpin the functions of neurons and neural circuits.

The group initiates many of its studies in the roundworm *C. elegans.* This animal's relative simplicity provides special opportunities to understand behavior in cellular and molecular terms. The worm's rich behavioral repertoire provides readouts of neuron and circuit functions. Each of its neurons can be identified and visualized *in vivo,* and selectively manipulated using transgenes. Neural activity can be monitored in behaving animals using genetically encoded sensors. Powerful genetics and advanced genomic resources make high-throughput forward genetics and single-neuron profiling possible. Genetics is complemented by biochemistry and *in vivo* microscopy to get at molecular mechanisms that are usually conserved from worm to human. The group aims to take discoveries made in the worm into mammalian models.

Current projects: How to switch between global animal states; *In vivo* biochemistry at single-cell resolution; Neuroimmune signaling; Quality control at the endoplasmic reticulum; Gap junction structure and function; Evolution of behavior; Control of aging

Career: since 2025 Dean of the Graduate School, ISTA ■ Since 2019 Professor, ISTA ■ 1999–2019 Programme Leader, MRC Laboratory of Molecular Biology, Cambridge, UK ■ 1995–1999 Postdoc, UCSF, San Francisco, USA ■ 1995 PhD, University of Cambridge, UK

Amelia Douglass

The Neurobiology of Homeostasis [Neuroscience]

Throughout their life, organisms face threats to their homeostasis—a steady internal bodily state. These threats include predators, extreme temperatures, pathogens, and food scarcity. To ensure survival in the face of these challenges, the brain must trigger the appropriate behavioral and physiological (cardiovascular, respiratory, and thermogenic) responses to maintain homeostasis. How the brain coordinates these diverse adaptations in parallel is an open question.

The Douglass group investigates this question by focusing on the hypothalamus—a central hub that sits at the interface between the brain and the body. Through communication with the autonomic nervous system, endocrine system, and pre-motor brain areas, the hypothalamus maintains homeostasis in the face of changing external stimuli and internal states.

Using mice as a model organism, the Douglass group performs *in vivo* imaging, manipulations of neural activity, and detailed behavioral and physiological recordings to decipher the organization, function, and dynamic modulation of the brain's threat-responsive circuitry.

Current projects: Representation of homeostatic challenges in the hypothalamus; Anatomical organization of threat-responsive circuitry; Modulation of homeostatic responses on fast and slow timescales; Long-term maintenance of homeostasis by the circadian timing system

Career: since 2025 Assistant Professor, ISTA ■ 2017–2025 Postdoc, Beth Israel Deaconess Medical Center, Harvard Medical School, USA ■ 2017 PhD, Max Planck Institute of Neurobiology and Ludwig Maximilian University, Germany

Herbert Edelsbrunner

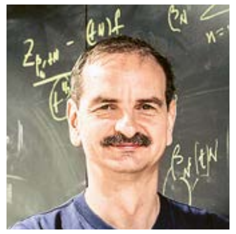
Discrete and Computational Geometry, Topological Data Analysis [Computer Science, Mathematics]

Understanding the world in terms of patterns and relations is the undercurrent in computational geometry and topology, the broad research area of the Edelsbrunner group.

While geometry measures shapes, topology focuses on how shapes are connected. There are, however, deep connections, such as Crofton's formula in integral geometry, which blur the difference. The Edelsbrunner group approaches the subject from both a mathematical and computational point of view, keeping connections to applications in the sciences in mind. Candidate areas for fruitful collaborations include phenotypical approaches in biology and neuroscience and, more generally, data analysis.

Current projects: Discretization in geometry and dynamics; Topological data analysis

Career: since 2009 Professor, ISTA ■ 2004–2012 Professor of Mathematics, Duke University, Durham, USA ■ 1999–2012 Arts and Sciences Professor for Computer Science, Duke University, Durham, USA ■ 1996–2013 Founder, Principal, and Director, Raindrop Geomagic ■ 1985–1999 Assistant, Associate, and Full Professor, University of Illinois, Urbana-Champaign, USA ■ 1981–1985 Assistant, Graz University of Technology, Austria ■ 1982 PhD, Graz University of Technology, Austria



László Erdős

Mathematics of Disordered Quantum Systems and Matrices [Mathematics, Physics]

How do energy levels of large quantum systems behave? What do the eigenvalues of a typical large matrix look like? Surprisingly, these very different questions have the same answer!

Large complex systems tend to develop universal patterns that represent their essential characteristics. A pioneering vision of Eugene Wigner was that the distribution of the gaps between energy levels of complicated quantum systems depends only on the basic symmetry of the model and is otherwise independent of the physical details. However, this has never been rigorously proved for any realistic physical system. The Erdős group took up the challenge to verify Wigner's vision with full mathematical rigor. Starting from the simplest model, a large random matrix with independent identically distributed entries, the group can now deal with arbitrary distributions and even matrices with correlated entries. The mathematics developed along the way will extend the scope of random matrix theory and will likely be used in many applications beyond quantum physics.

Current projects: Self-consistent resolvent equation and application in random matrices; Next order correction in the form factor for Wigner matrices; Local spectral universality for random band matrices; Spectral statistics of random matrices with correlated entries; Quantum spin glasses

Career: since 2013 Professor, ISTA ■ 2003–2013 Chair of Applied Mathematics (C4/W3), Ludwig Maximilian University of Munich, Germany ■ 1998–2003 Assistant, Associate, Full Professor, Georgia Institute of Technology, Atlanta, USA ■ 1995–1998 Courant Instructor/Assistant Professor, Courant Institute, New York University, USA ■ 1994–1995 Postdoc, ETH Zurich, Switzerland ■ 1994 PhD, Princeton University, USA

Xiaoqi Feng

Reproductive Genetics and Epigenetics [Cell Biology]

Epigenetics is the study of changes in how genes are expressed, without changes in the underlying genome. Understanding germlines, the cells that pass down the genetic information from one generation to the next, is essential for understanding epigenetics because they mediate inheritance and undergo large-scale epigenetic changes.

Plant germlines are particularly well-suited to study the core principles of epigenetics and sexual reproduction. They are also of enormous practical significance because they produce the seeds that comprise most of the world's staple food.

The Feng group seeks to understand the molecular mechanisms and biological functions of plant germline epigenetic changes, as well as how environment-induced epigenetic memories are transmitted and/or erased, among other open questions.

Through addressing these questions, the Feng group hopes to provide deep insights into epigenetic mechanisms and germline functions and reveal core principles governing epigenetic regulation of sexual reproduction in eukaryotes.

Current projects: DNA methylation reprogramming in land plants; Chromatin configuration in plant germlines; Epigenetic inheritance and resetting across generations; Mechanisms underlying thermal sensitivity of male reproduction

Career: Since 2025 Professor, ISTA ■ 2023–2025 Assistant Professor, ISTA ■ 2014–2022 Group Leader (2014–2019, tenure-track; 2019–2022, tenured), John Innes Centre, Norwich, UK ■ 2011–2014 Postdoctoral Fellow, University of California, Berkeley, USA ■ 2010 PhD, University of Oxford, UK

Johannes Fink

Quantum Integrated Devices [Physics]

The Fink group's research is positioned between quantum optics and mesoscopic condensed matter physics. The team studies quantum physics in electrical, mechanical, and optical chip-based devices with the goal of advancing quantum technology for simulation, communication, metrology, and sensing.

One of the Fink group's goals is to develop a router that converts a microwave photon to an optical photon with near-unity efficiency. With such devices, the researchers seek to perform quantum communication between superconducting circuits via robust fiber optic links at room temperature. Another focus area of the team is to develop new qubit-encoding concepts that offer intrinsic protection from noisy environments. The group has observed fluxon lifetimes of more than three hours in a recently demonstrated superconducting qubit and is exploring new concepts of dynamical control to implement nanosecond timescale quantum gates in such circuits.

Current projects: Circuit and waveguide quantum electrodynamics; Quantum electro- and optomechanics; Quantum electro-optics and microwave photonics; Hardware-protected qubits; Multi-qubit quantum electrodynamics; Resonant nonlinear optics

Career: since 2021 Professor, ISTA ■ 2016–2021 Assistant Professor, ISTA ■ 2015–2016 Senior Staff Scientist, California Institute of Technology, Pasadena, USA ■ 2012–2015 IQIM Postdoctoral Research Scholar, California Institute of Technology, Pasadena, USA ■ 2011–2012 Postdoctoral Research Fellow, ETH Zurich, Switzerland ■ 2010 PhD, ETH Zurich, Switzerland

Julian Fischer

Theory of Partial Differential Equations, Applied and Numerical Analysis [Mathematics]

Diverse phenomena such as the motion of fluids or elastic objects, the evolution of interfaces, or the physics of quantum mechanical particles are described accurately by partial differential equations. The Fischer group works on the mathematical analysis of partial differential equations that arise in the sciences, also connecting to areas like numerical analysis or probability.

Partial differential equations are a fundamental tool for the description of many phenomena in the sciences. The Fischer group works on the mathematical aspects of partial differential equations. One of the group's main themes is the mathematical justification of model simplifications. For example, an elastic material with a highly heterogeneous small-scale structure may be approximated as a homogeneous material, or a fluid with low compressibility as ideally incompressible. To justify such approximations, the group derives rigorous estimates for the approximation error. The techniques they employ connect the analysis of PDEs with adjacent mathematical areas like numerical analysis and probability.

Current projects: Effective behavior of random materials; Evolution of interfaces in fluid mechanics and solids; Fluctuating hydrodynamics and SPDEs; Entropy-dissipative PDEs

Career: since 2022 Professor, ISTA ■ 2017-2022 Assistant Professor, ISTA ■ 2014-2016 Postdoc, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany ■ 2013-2014 Postdoc, University of Zurich, Switzerland ■ 2013 PhD, University of Erlangen-Nürnberg, Germany

Stefan Freunberger

Materials Electrochemistry [Chemistry, Physics]

Life uses electron transfer reactions to—among other things—store or retrieve energy and produce useful chemicals and materials. The Freunberger group works on electrochemical materials sciences with broadly similar goals.

The group's primary research interest lies in the fundamental science of electron- and ion-conducting and redox-active materials (inorganic, organic, and polymeric) as well as their mutual interactions in the working environment of electrochemical devices. They focus on energy storage devices such as rechargeable batteries, and their results find use in clean, efficient, and sustainable energy sources. The foundations of the group's research are: the synthesis of new conducting and redox-active materials; a fundamental understanding of charge carrier transport and electrochemical reactions; advanced physicochemical and spectroscopic investigations to understand the mutual behavior of the materials in their working environment; surface and interface processes; and the application in electrochemical devices.

Current projects: Oxygen redox chemistry and singlet oxygen; Sulphur electrochemistry; Organic electrode materials; Non-aqueous electrolytes and interphases; Organic mixed conductors; Electrosynthesis; Operando spectroscopy

Career: since 2025 Professor, ISTA ■ 2020-2025 Assistant Professor, ISTA ■ 2012-2020 Researcher and Group Leader, TU Graz, Austria ■ 2014 Visiting Professor, University of Montpellier, France ■ 2008-2012 Postdoc and Early Career Fellow, University of St Andrews, UK ■ 2007 PhD, ETH Zurich, Switzerland

Jiří Friml

Developmental and Cell Biology of Plants [Cell Biology]

When conditions get tough, animals typically fight or flee, but plants are rooted in their environment and have thus become remarkably adaptable. The Friml group investigates the mechanisms underlying plants' adaptability during embryonic and postembryonic development.

Plants are highly adaptive and able to modify development and physiology to environmental changes; they can easily regulate growth, initiate new organs, or regenerate tissues. Many of these developmental events are mediated by the plant hormone auxin. The Friml group investigates the unique properties of auxin transport and signaling, which can integrate both environmental and endogenous signals. Employing methods ranging from molecular physiology to biochemistry, the group focuses on auxin transport, cell polarity, and non-transcriptional mechanisms of signaling; in particular, the role of cyclic nucleotides as second messengers. The researchers gain insights into the mechanisms governing plant development and have shown how signals from the environment are integrated into plant signaling and result in changes to plant growth and development.

Current projects: Auxin signaling; Second messengers in plant signaling; Auxin transport; Cell polarity and polar targeting; Endocytosis and recycling

Career: since 2013 Professor, ISTA ■ 2007-2012 Full Professor, University of Ghent, Belgium ■ 2006 Full Professor, University of Göttingen, Germany ■ 2002-2005 Group Leader, Habilitation, University of Tübingen, Germany ■ 2002 PhD, Masaryk University, Brno, Czech Republic ■ 2000 PhD, University of Cologne, Germany

Carl Goodrich

Theoretical and Computational Soft Matter [Physics]

The Goodrich group is interested in how vast design spaces appearing in many soft matter systems give rise to rich, emergent, and controllable behavior. Such design spaces enable emergent complexity in machine learning and evolution, but how can they be exploited in material systems to rationally design and create new technologies?

We aim to uncover general physical principles that govern structure, dynamics, and physical learning in systems ranging from disordered solids to programmable nanomaterials. By identifying universal mechanisms that generalize across specific materials or scales, we hope to advance both fundamental physics and the rational engineering of complex matter, enabling new forms of self-assembly, adaptability, and biomimetic functionality in real materials and devices.

Our approach is to combine computational and theoretical tools to discover basic soft matter principles that could one day lead to new functional materials as well as deepen our understanding of complex matter. We also develop and apply new methodologies such as differentiable molecular dynamics and gradient-based optimization over path ensembles, allowing us to directly connect microscopic dynamics to emergent behavior and design objectives. Current efforts span programmable self-assembly, inverse design in disordered systems, physical learning, and functional nanomachines. Together, these threads aim to build a unified framework for understanding and engineering matter that can organize, compute, and act with purpose.

Current projects: Self-assembly of disordered materials; Kinetic/functional assembly; Differentiable physics models; Hierarchical self-assembly

Career: since 2020 Assistant Professor, ISTA ■ 2015-2020 Postdoc, Harvard University, Cambridge, USA ■ 2015 PhD, University of Pennsylvania, Philadelphia, USA

Ylva Götberg

Massive Binary Stars [Astronomy, Physics]

Stars more massive than 8 times the mass of the Sun are rare, but important for the evolution of our Universe. Massive stars emit highly energetic ionizing radiation, have strong stellar winds, and explode in violent supernovae, thus acting as both the mechanical engines and the chemical factories that drive galaxy evolution.

Only in the last decade has it become clear that the standard, single stellar evolution representation for massive stars is incorrect. Instead, massive stars orbit a companion star so closely that interaction is inevitable as the stars evolve and swell. The binary interaction is typically dramatic: the stars transfer mass, engulf their companion, or even merge. One of the most common outcomes is stars stripped of their hydrogen-rich envelopes. The Götberg group pursues theoretical, computational, and observational work related to the first set of observed intermediate-mass stripped stars that they recently discovered.

Current projects: Evolutionary pathways leading to envelope-stripping in massive binary stars; Observational searches for helium stars stripped in binaries; Characterization of post-interaction binary stars; Physical processes operating in the interiors of massive stars; Ionizing radiation and feedback from massive interacting binaries; The origin of helium-ionizing radiation

Career: Since 2023 Assistant Professor, ISTA ■ 2020-2023 NASA Hubble Postdoctoral Fellow, Carnegie Institution for Science, Pasadena, USA ■ 2019-2020 Alvin E. Nashman Postdoctoral Fellow, Carnegie Institution for Science, Pasadena, USA ■ 2019 PhD, University of Amsterdam, Amsterdam, The Netherlands

Călin Guet

Systems and Synthetic Biology of Genetic Networks [Cell Biology, Data Science, Evolution & Ecology]

Living systems are characterized by connections and interactions across many scales—from genes to organelles, from cells to ecologies—as parts of networks. What basic rules, if any, do these networks follow? The Guet group studies the molecular biology and evolution of gene regulatory networks by analyzing both natural and synthetic networks.

Genes and proteins constitute themselves into bio-molecular networks in cells. These genetic networks are engaged in a constant process of decision-making and computation from timescales of a few seconds to the time it takes a cell to divide and beyond. By studying existing networks and constructing synthetic networks in living cells, the group works to understand how molecular mechanisms interact with evolutionary forces that ultimately shape each other. They use a variety of classical and modern experimental techniques that enable them to construct any imaginable network in living bacteria and thus study the network dynamics from the single-cell level all the way to the level of small ecologies, in which bacteria interact with bacteriophages.

Current projects: Information processing and evolution of complex promoters; Single-cell biology of multidrug resistance; Biology, ecology, and evolutionary dynamics of restriction-modification systems

Career: since 2018 Professor, ISTA ■ 2011-2018 Assistant Professor, ISTA ■ 2009-2010 Postdoc, Harvard University, Cambridge, USA ■ 2005-2008 Postdoc, The University of Chicago, USA ■ 2004 PhD, Princeton University, USA

Zoltán Haiman

Black Hole Astrophysics and Cosmology
[Astronomy, Data Science, Physics]

Over the past decades, it has become clear that most galaxies host a massive black hole at their center, ranging from a million to a billion solar masses. These black holes significantly influence galaxy formation with their radiation and jets, but their origin is unknown.

Existing since the early universe, black holes likely predate galaxies. As galaxies grow through mergers, black holes also merge, emitting gravitational waves. Galaxies and black holes evolve amid cosmic acceleration, hinting at dark energy or other physics affecting structure formation. Zoltán Haiman's group explores these phenomena through theoretical modeling, numerical simulations, and interpretation of observations, including machine learning.

Current projects: Massive 'seed' black holes in the early universe: formation & diagnostics; Modeling the mergers of black holes with circumbinary gas; Electromagnetic spectral and time-domain signatures of accreting binary black holes; Modeling the population of stellar-mass objects embedded in the gaseous accretion disks of active galactic nuclei; Weak lensing cosmology: developing statistics & mitigating systematic errors

Career: Since 2025 Professor, ISTA ■ 2022-2024 Professor, Department of Physics, Columbia University, USA ■ 2013-2024 Professor, Department of Astronomy, Columbia University, USA ■ 2002-2013 Assistant Professor, then Associate Professor, Department of Astronomy, Columbia University, USA ■ 1999-2002 Hubble Fellow, Princeton University, USA ■ 1998 PhD, Harvard University, USA

Edouard Hannezo

Physical Principles in Biological Systems
[Cell Biology, Data Science, Physics]

During embryo development, cells must 'know' how to behave at the right place and at the right time. The Hannezo group applies methods from theoretical physics to understand how these robust choices occur.

The Hannezo group is particularly interested in design principles and processes of self-organization in biology at various scales and in close collaboration with cell and developmental biologists. Their methods include tools from solid and fluid mechanics, statistical physics, and soft matter approaches. Examples of problems that the group is working on—at three different scales—include: (1) How do cytoskeletal elements, which generate forces within cells, self-organize to produce complex spatiotemporal patterns? (2) How do cells concomitantly acquire identities and shape a tissue during development? (3) How does complex tissue architecture derive from simple self-organizing principles, for instance, during branching morphogenesis—in organs, such as the kidneys, mammary glands, pancreas, and prostate—as a prototypical example?

Current projects: Stochastic branching in mammalian organs; Active fluids and cell cytoskeleton; Models of fate choices of stem cells during homeostasis and embryo development

Career: since 2022 Professor, ISTA ■ 2017-2022 Assistant Professor, ISTA ■ 2015-2017 Sir Henry Wellcome Postdoctoral Fellow, Gurdon Institute, Cambridge, UK ■ 2015-2017 Junior Research Fellow, Trinity College, University of Cambridge, UK ■ 2014 Postdoc, Institut Curie, Paris, France ■ 2014 PhD, Institut Curie and Université Pierre et Marie Curie, Paris, France

Tamás Hausel

Geometry and Its Interfaces
[Mathematics]

How can we understand spaces too large for traditional analysis? Combining ideas from representation theory and combinatorics, the Hausel group develops tools to study the topology of spaces arising from string theory and quantum field theory.

Suppose you have many particles, and consider the space of all the ways each particle can move between two points. Now, play the same game with more complicated objects, such as vector fields. The resulting spaces, too large to analyze, can be simplified along structural symmetries. This gives rise to moduli spaces that are finite-dimensional, but non-compact—again, defying traditional methods. The Hausel group studies the topology, geometry, and arithmetic of these moduli spaces. One question is the number of high-dimensional holes in the spaces. Using methods from representation theory and combinatorics, the team can give results and conjectures that have previously been described by physicists and number theorists in other terms, thus connecting a wide variety of fields and ideas.

Current projects: Geometry, topology, and arithmetic of moduli spaces arising in supersymmetric quantum field theories, integrable systems, and the Langlands program; Paradigmatically commutative approach to geometric representation theory of compact, real, and quantum Lie groups via scheme theoretical equivariant topology

Career: since 2016 Professor, ISTA ■ 2012-2016 Professor and Chair of Geometry, EPFL, Lausanne, Switzerland ■ 2007-2012 Tutorial Fellow, Wadham College, Oxford, UK ■ 2005-2012 Royal Society University Research Fellow and Lecturer, University of Oxford, UK ■ 2002-2010 Assistant, Associate Professor, University of Texas, Austin, USA ■ 1999-2002 Miller Research Fellow, University of California, Berkeley, USA ■ 1998-1999 Member, Institute for Advanced Study, Princeton, USA ■ 1998 PhD, Trinity College, University of Cambridge, UK

Carl-Philipp Heisenberg

Morphogenesis in Development
[Cell Biology]

The elaborate shapes of multicellular organisms—the orchid blossom, the lobster's claw—all start off from a simple bunch of cells. This transformation is a common and fundamental principle in cell and developmental biology and the focus of the Heisenberg group's work.

To gain insights into the critical processes in which the developing organism takes shape, the Heisenberg group focuses on gastrulation in zebrafish and ascidians, a process in which a seemingly unstructured blastula is transformed into an organized embryo. The group uses a transdisciplinary approach, employing a combination of genetic, cell biological, biochemical, and biophysical tools. Using these, the group addresses how the interplay between the physical processes driving cell and tissue morphogenesis and the gene regulatory pathways determining cell fate specification control gastrulation. Insights derived from this work may ultimately have implications for the study of wound healing and cancer biology, as immune and cancer cells share many morphogenetic properties of embryonic cells.

Current projects: Cell adhesion; Actomyosin contraction; Cell and tissue morphogenesis; Cell polarization and migration

Career: since 2010 Professor, ISTA ■ 2001-2010 Group Leader, Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany ■ 1997-2000 Postdoc, University College London, UK ■ 1996 PhD, Max Planck Institute of Developmental Biology, Tübingen, Germany

Monika Henzinger

Algorithms
[Computer Science]

The research field of efficient algorithms and data structures seeks to understand how to save computing resources, both by designing better algorithms and by proving bounds on the limits of possible savings. Differential privacy, on the other hand, seeks to design and analyze algorithms that compute statistics over datasets while preserving the privacy of each individual data item.

The M. Henzinger group is interested in developing algorithms by pursuing two research directions:

(1) Efficient algorithms, especially in settings where the input changes incrementally. This applies to problems such as maintaining clusters—sets of points that are close to each other—in changing point sets as well as maintaining properties in networks that are incrementally modified.

(2) Responsible computing, especially differential privacy. Differential privacy is a way to share information about data (such as information about individuals) while disturbing the results enough to protect the privacy of the individuals. The M. Henzinger group studies differential privacy specifically in the context of dynamically changing inputs and in settings where the data is distributed over many users or databases.

Current projects: Efficient combinatorial algorithms and data structures, especially in settings where the input changes incrementally; Responsible computing, especially differential privacy

Career: since 2024 Vice President for Technology Transfer, ISTA ■ Since 2023 Professor, ISTA ■ 2009-2023 Professor, University of Vienna, Austria ■ 2005-2009 Professor, EPFL, Lausanne, Switzerland ■ 1999-2005 Director of Research, Google ■ 1996-1999 Research staff, Digital Equipment Corporation ■ 1993-1996 Assistant Professor, Cornell University, Ithaca, USA ■ 1993 PhD Princeton University, USA

Thomas A. Henzinger

Design and Verification of Concurrent and Embedded Systems
[Computer Science]

Humans and computers are similar: While the interaction between two actors may be simple, every additional actor complicates matters. The T. Henzinger group builds the mathematical foundations for designing complex software systems.

Software is among the most complicated artifacts we create, making software bugs unavoidable. The T. Henzinger group addresses the challenge of reducing software bugs in concurrent and embedded systems. The former consists of parallel processes that interact with one another. Because of the large number of possible interactions between parallel processes, concurrent software is particularly error-prone, and sometimes bugs show up after years of flawless operation. Embedded systems interact with the physical world; an additional challenge for them is to react to inputs at the right times. The group develops mathematical methods and computational tools for improving the reliability of concurrent and embedded software.

Current projects: Modeling, analysis, and synthesis of autonomous agents and cyber-physical systems; Quantitative model checking; Monitoring the safety, security, and fairness of software; Trustworthy AI; Formal methods for quantum computing

Career: since 2009 Professor, ISTA ■ 2009-2022 President, ISTA ■ 2004-2009 Professor, EPFL, Lausanne, Switzerland ■ 1999-2000 Director, Max Planck Institute for Computer Science, Saarbrücken, Germany ■ 1996-2004 Assistant, Associate, and Full Professor, University of California, Berkeley, USA ■ 1992-1995 Assistant Professor, Cornell University, Ithaca, USA ■ 1991 Postdoc, Université Joseph Fourier, Grenoble, France ■ 1991 PhD, Stanford University, Palo Alto, USA

Martin Hetzer

Protein Homeostasis and Aging
[Cell Biology, Neuroscience]

Old age is the major risk factor for the development of neurodegenerative diseases such as Alzheimer's disease. The Hetzer group researches the impact of cumulative changes during adulthood on health and disease development, focusing on cell maintenance and repair mechanisms.

The group is particularly interested in understanding how non-dividing cells, such as neurons, function throughout a lifetime and how cells lose control over the quality and integrity of proteins and important cell structures during aging. The ultimate goal is to utilize these mechanisms to delay the age-related decline of organs with limited cell renewal, such as the brain, pancreas, and heart.

The Hetzer group applies genomics, proteomics, and advanced imaging techniques to investigate how adult tissues are maintained and repaired, and why long-lived cells fail to work properly as a cell ages. The group's work on long-lived proteins (LLPs) in the nucleus, which exhibit no or very little protein turnover in the adult brain, could have major implications in preventing and treating disorders like Alzheimer's disease.

Current projects: Investigating a possible link between protein longevity and the maximal lifespan of an organism

Career: since 2023 Professor/President, ISTA ■ 2016-2022 Senior Vice President, Salk Institute in San Diego, California, USA ■ 2011-2022 Professor, Salk Institute in San Diego, California, USA ■ 2004-2011 Assistant Professor, Salk Institute in San Diego, California, USA ■ 1997-2003 Postdoc, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany ■ 1997 PhD, University of Vienna, Austria

Simon Hippenmeyer

Genetic Dissection of Cerebral Cortex Development
[Cell Biology, Neuroscience]

The human cerebral cortex—the seat of our cognitive abilities—is composed of an enormous number and diversity of neurons and glial cells. How the cortex arises from neural stem cells is an unsolved but fundamental question in neuroscience. In the pursuit of mechanistic insights, the Hippenmeyer group genetically dissects corticogenesis at unprecedented single-cell resolution using the unique MADM (Mosaic Analysis with Double Markers) technology.

The Hippenmeyer group's current objectives are to establish a definitive quantitative and mechanistic model of cortical neural stem cell lineage progression, to dissect the cellular and molecular mechanisms generating cell-type diversity, and to determine the role of genomic imprinting, an epigenetic phenomenon, in cortex development. In a broader context, the group's research has the ultimate goal of advancing the general understanding of brain function and why human brain development is so sensitive to the disruption of particular signaling pathways in pathological neurodevelopmental diseases and psychiatric disorders.

Current projects: Determine neuronal lineages by clonal analysis; Mechanisms generating cell-type diversity; Probing genomic imprinting in cortex development

Career: since 2019 Professor, ISTA ■ 2012-2019 Assistant Professor, ISTA ■ 2011-2012 Research Associate, Stanford University, Palo Alto, USA ■ 2006-2011 Postdoc, Stanford University, Palo Alto, USA ■ 2004-2006 Postdoc, University of Basel and Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland ■ 2004 PhD, University of Basel, Switzerland

Björn Hof

Nonlinear Dynamics and Turbulence
[Physics]

Most fluid flows of practical interest are turbulent, yet our understanding of this phenomenon is limited. The Hof group seeks to gain insight into the nature of turbulence and the dynamics of complex fluids.

Flows in oceans, around vehicles, and through pipelines are all highly turbulent. Despite its ubiquity, insights into the nature of turbulence are very limited. To obtain a fundamental understanding of the origin and the principles underlying it, the Hof group investigates turbulence when it first arises from smooth, laminar flow. The group combines detailed laboratory experiments with highly resolved computer simulations and applies methods from nonlinear dynamics and statistical physics, enabling them to decipher key aspects of the transition from smooth to turbulent flow and identify universal features shared with disordered systems in other areas of physics. The group actively develops methods to control turbulent flow. In addition, the group investigates instabilities in fluids with more complex properties, such as dense suspensions of particles and polymer solutions.

Current projects: Revisiting the turbulence problem using statistical mechanics; Transition from laminar to turbulent flow; Dynamics of complex fluids; Control of fully turbulent flows; Instabilities in cardiovascular flows

Career: since 2013 Professor, ISTA ■ 2007-2013 Research Group Leader, Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany ■ 2005-2007 Lecturer, University of Manchester, UK ■ 2003-2005 Research Associate, Delft University of Technology, The Netherlands ■ 2001 PhD, University of Manchester, UK

Onur Hosten

Quantum Sensing With Atoms and Light
[Physics]

The Hosten group aims to develop innovative techniques to control quantum properties of atomic, optical, and mechanical systems with an eye towards applications in the domain of quantum-enabled technologies and precision sensing, as well as in fundamental science.

The group's research focuses on developing new sensing methods that gainfully utilize quantum mechanical phenomena. By manipulating the collective properties of cold atomic ensembles in optical cavities, or mechanical systems coupled to optical cavities, they seek to investigate and gainfully utilize concepts of quantum entanglement, quantum measurement, and light-assisted atomic interactions to develop new sensing techniques, e.g., for force or acceleration sensing, or making ultra-precise clocks, while gaining insight into fundamental aspects of quantum mechanics. Using these sensors, the long-term goal is to explore challenging experimental questions such as the interplay between quantum mechanics and gravity and the nature of dark matter.

Current projects: Motionally entangled atoms in optical cavities; Milligram-scale oscillators in the quantum regime; Laser technologies for precision sensing; Hybrid atomic-mechanical systems; Gravity at the milligram scale

Career: since 2018 Assistant Professor, ISTA ■ 2015-2017 Research Associate, Stanford University, Palo Alto, USA ■ 2010-2015 Postdoc, Stanford University, Palo Alto, USA ■ 2010 PhD, University of Illinois at Urbana-Champaign, USA

Maria Ibáñez

Inorganic Materials From Nano to Macro Scales
[Chemistry, Physics]

The development of materials is limited by our ability to control the defects at multi-length scales. One potential solution investigated by the Ibáñez group is by using nanoparticle (NP)-based precursors that undergo predictable transformations into polycrystalline solids dictated by the specific, tunable features of the NP's inorganic core, the surrounding surface species, and the NP array configuration.

In particular, the Ibáñez group works on developing new synthetic methods for complex NPs, unravels the role of native or post-synthetically added surface species, investigates means for their organization, and explores the chemical transformations that the NP undergoes to yield macroscopic solids.

Broadening the use of NPs, the group also aims to provide high-efficiency, cost-effective thermoelectric materials. To accelerate their discovery and optimization, we built the Werner Siemens Thermoelectric Laboratory, where high-throughput techniques are employed.

Current projects: Synthesis of novel nanocrystals; Unravelling of nanocrystal surface chemistry; Nanocrystals assembly, consolidation, and sintering; Transport properties of nanocrystal-based solids; Synthesis of thermoelectric nanomaterials

Career: since 2022 Verbund Professor for Energy Sciences, ISTA ■ Since 2020 Head of the Werner Siemens Thermoelectric Laboratory, ISTA ■ 2018-2022 Assistant Professor, ISTA ■ 2014-2018 Research Fellow, ETH Zurich, Switzerland ■ 2013-2014 Research Fellow, Catalonia Institute of Energy Research (IREC), Barcelona, Spain ■ 2013 Visiting Researcher, Northwestern University, Evanston, USA ■ 2013 PhD, University of Barcelona, Spain

Peter Jonas

Cellular Neuroscience
[Neuroscience]

Synapses enable communication between neurons in the brain. The Jonas group investigates how signals pass through these vital interfaces—a significant undertaking in the field of neuroscience.

Understanding the function of the brain is a major challenge in the 21st century. The human brain comprises approximately 100 billion neurons, which communicate through about 10,000 synapses per cell. Excitatory synapses use glutamate as a transmitter, whereas inhibitory synapses release Gamma-Aminobutyric acid (GABA). The group addresses two major questions: What are the biophysical signaling and plasticity mechanisms at glutamatergic and GABAergic synapses in the cortex? How do specific synaptic properties generate higher network functions? The group combines nanophysiology, presynaptic patch-clamp and multi-cell recording, two-photon Ca^{2+} imaging, optogenetics, functional anatomy, *in vivo* recording, and modeling. The main focus is on hippocampal mossy fiber synapses and output synapses of parvalbumin-expressing GABAergic interneurons.

Current projects: Biophysical mechanisms of synaptic plasticity at hippocampal mossy fiber synapses; Structural changes underlying transmission and plasticity at central synapses; Analysis of neuronal coding *in vivo* and in realistic network models; Engram formation in hippocampal CA3 recurrent networks

Career: since 2022 Magdalena Walz Professor for Life Sciences, ISTA ■ since 2010 Professor, ISTA ■ 1995-2010 Professor of Physiology and Department Head, University of Freiburg, Germany ■ 1994-1995 Associate Professor, Technical University of Munich, Germany ■ 1990-1994 Senior Postdoc, Max Planck Institute for Medical Research, Heidelberg, Germany ■ 1988-1989 Postdoc, University of Giessen, Germany ■ 1987 MD, University of Giessen, Germany

Maximilian Jösch

Neuroethology
[Neuroscience]

The Jösch group is interested in understanding how the brain processes visual information at different stages and how emerging computations influence behaviors. Using molecular and physiological approaches, they monitor brain activity during animal behavior to reveal the principles and motifs of neuronal computation.

Two different model organisms, the mouse and the fruit fly *(Drosophila melanogaster)* are used in parallel to gather a general, cross-phyla understanding of computational principles. Using a combination of awake-behaving imaging, electrophysiological, and behavioral approaches in mice, the group studies the mechanisms used by the nervous system to send behaviorally relevant information from the eye to the brain, e.g., to detect a red apple in green foliage. With the fly, similar experimental approaches, combined with targeted genetic manipulations, are used to obtain a comprehensive understanding of the cellular basis of network computations, with an emphasis on course control.

Current projects: Dynamics of visual spatial attention; State-dependent modulation of sensory information; Efferent copies and inhibitory long-range communication in visuomotor processing; Comprehensive mapping of behavioral repertoires directed by defined neural circuits; Neuromodulation of visuomotor transformations; The role of inhibitory feedback in visual sensing

Career: since 2025 Professor, ISTA ■ 2017-2024 Assistant Professor, ISTA ■ 2010-2016 Postdoc and Research Associate, Harvard University, Cambridge, USA ■ 2009 PhD, Max Planck Institute of Neurobiology, Martinsried, Germany

Vadim Kaloshin

Dynamical Systems, Celestial Mechanics, and Spectral Rigidity
[Mathematics]

We achieved considerable progress in studying spectral rigidity and integrability for billiards. Motivated by a famous question: "Can you hear the shape of a drum?", we helped prove the Lyapunov rigidity for expanding circle maps satisfying the sparsity condition. We also helped construct drums for which there are silent elements of the Laplace spectrum.

On the other hand, we studied the existence of locally integral billiards near the period two orbit and the analyticity of the conjugacy map to its Birkhoff normal form. Remarkably, we proved that such a conjugacy map is not analytic, but only Gerver. Furthermore, we established a diamond KAM theorem and investigated the existence of mushroom KAM tori in the absence of Kolmogorov nondegeneracy. We are also advancing in the construction of isospectral deformations preserving a countable collection of spectral data.

Besides, we extended our previous results to symplectic billiards and are performing a deep analysis of geodesic flows on tori having degenerate behavior with the potential to build a counter-example to a well-known Ivrii conjecture.

Current projects: Spectral rigidity for chaotic geodesic flows; Rigidity of planar convex domains; Rational caustics of domains with constant width

Career: since 2021 Professor, ISTA ■ 2007-2021 The Brin Chair in Mathematics, University of Maryland, College Park, USA ■ 2008-2011 Distinguished Professor of Mathematics, The Pennsylvania State University, State College, USA ■ 2002-2006 Associate Professor (tenure-track and tenured), California Institute of Technology, Pasadena, USA ■ 2002-2004 Member of the Institute of Advanced Study, Princeton University, USA ■ 2001-2002 C.L.E. Moore Instructor, Massachusetts Institute of Technology, Cambridge, USA ■ 2001 PhD Princeton University, USA

Georgios Katsaros

Nanoelectronics
[Physics]

It is impossible to picture modern life without the large number of microelectronic applications that surround us—a development made possible by the invention of the transistor in the 50s. This—at the time—a few centimeters large device and product of scientific curiosity, led to a technological revolution. Now, the size of a transistor has shrunk below 7nm, where quantum physics comes into play. The Katsaros group investigates semiconductor nanodevices and studies quantum effects when these devices are cooled to -273.14°C.

The spin degree of freedom can be used to create a two-level system, a quantum bit or "qubit." While in classic computers, a bit can be in only one of two states, zero or one, in the quantum world, a qubit can be both zero and one at the same time. The group aims to create such spin qubits in Germanium and to understand whether protected qubits—qubits immune to environmental perturbations—can be realized in hybrid semiconductor-superconductor systems. While the group's research is focused on realizing different types of qubits, the focus is also on studying new fundamental physics emerging in semiconductor nanodevices.

Current projects: Hybrid semiconductor-superconductor quantum devices; Hole spin orbit qubits in Ge quantum wells; High impedance circuit quantum electrodynamics with hole spins

Career: since 2024 Vice President for Scientific Resources, ISTA ■ Since 2022 Professor, ISTA ■ 2016-2022 Assistant Professor, ISTA ■ 2012-2016 Group Leader, Johannes Kepler University, Linz, Austria ■ 2011-2012 Group Leader, Leibniz Institute for Solid State and Materials Research, Dresden, Germany ■ 2006-2010 Postdoc, CEA, Grenoble, France ■ 2006 PhD, Max Planck Institute for Solid State Research, Stuttgart, Germany

Anna Kicheva

Tissue Growth and Developmental Pattern Formation
[Cell Biology, Neuroscience]

Developing organs reliably attain their correct sizes and spatial arrangement of cell types. This reproducibility results from molecular, cellular, and mechanical feedback controlling tissue development. The Kicheva group focuses on the developing vertebrate spinal cord to study these feedback forms and their emergent properties. Their research combines quantitative experimentation and theoretical frameworks to understand regulatory mechanisms across scales.

Organ development is controlled by signaling molecules called morphogens. In the spinal cord, morphogens determine what type of neuron a neural progenitor cell will become. They also control tissue growth by influencing the decisions of cells to divide or exit the cell cycle. The Kicheva group seeks to understand how morphogen signaling is controlled and interpreted to determine precise cell fate patterning and tissue growth in the developing spinal cord. They combine quantitative *in vivo* analysis of the mouse and chick neural tube with *in vitro* assays based on organoids, stem cell differentiation, and embryonic explants. They develop biophysical models to guide experimental design and the interpretation of data.

Current projects: Morphogen gradient formation; Integration of multiple morphogen inputs; Control of tissue growth

Career: since 2024 Professor, ISTA ■ 2015-2024 Assistant Professor, ISTA ■ 2008-2015 Postdoc, National Institute for Medical Research, The Francis Crick Institute, UK ■ 2008 PhD, University of Geneva, Switzerland, and Max Planck Institute of Cell Biology and Genetics, Dresden, Germany

Rafal Klajn

Colloidal and Supramolecular Chemistry
[Chemistry]

Life is possible thanks to a diverse repertoire of weak noncovalent interactions, which allow cells, tissues, and organisms to grow and adapt to external cues. In sharp contrast, most man-made materials are held together by strong interactions, and they lack the ability to reconfigure themselves. The Klajn group seeks to understand the principles of self-assembly at the molecular and nanoscale levels and adapt them to develop novel synthetic assemblies and, ultimately, stimuli-responsive materials.

Self-assembly is a powerful tool for constructing hierarchical materials with multiple layers of organization. For example, we rely on weak metal–ligand and van der Waals interactions to organize single layers of organic molecules on the surfaces of nanometer-sized noble-metal crystals. These surface-decorated nanocrystals are programmed to self-assemble into higher-order crystals (supracrystals) by means of electrostatic interactions to ultimately afford materials of macroscopic dimensions. We are particularly interested in building blocks responsive to external stimuli, such as light and magnetic fields. In the long run, this research might lead to new energy-efficient and environmentally friendly materials.

Current projects: Self-assembly of novel metal–organic architectures; Photoresponsive supramolecular assemblies; Supercharged nanoparticles and their self-assembly; Chemical reactivity in confined spaces

Career: Since 2023 Professor, ISTA ■ 2020-2023 Professor, Weizmann Institute of Science, Israel ■ 2016-2020 Associate Professor, Weizmann Institute of Science, Israel ■ 2009-2015 Assistant Professor, Weizmann Institute of Science, Israel ■ 2009 PhD, Northwestern University, USA

Vladimir Kolmogorov

Discrete Optimization
[Computer Science]

When we step out into the street, we automatically judge the distance and speed of cars. For computers, estimating the depth of objects in an image requires complex computations. A popular approach for tackling this problem is to use discrete optimization algorithms—the research focus of the Kolmogorov group.

Vladimir Kolmogorov's group works primarily on discrete and combinatorial optimization. They developed several efficient algorithms well known in the community, such as the "Boykov-Kolmogorov" maximum flow algorithm, the "Blossom V" algorithm for computing a minimum cost perfect matching in a graph, and the "TRW-S" algorithm for MAP-MRF inference in graphical models. The group has investigated complexity classifications of Valued Constraint Satisfaction Problems (VCSPs) and their variants, and contributed to resolving a major open problem in the area. More recent work addressed the Sparsest Cut problem, packing trees in graphs, practical algorithms for computing the Gomory-Hu tree, and some topics outside discrete optimization. These include the Lovász Local Lemma, estimating parameters of Gibbs distributions, and certifying solutions of SDPs. In the past, the Kolmogorov group worked on applications of discrete optimization in computer vision, such as stereo reconstruction and image segmentation.

Current projects: Inference in graphical models; Combinatorial optimization problems; Theory of discrete optimization

Career: since 2014 Professor, ISTA ■ 2011-2014 Assistant Professor, ISTA ■ 2005-2011 Lecturer, University College London, UK ■ 2003-2005 Assistant Researcher, Microsoft Research, Cambridge, UK ■ 2003 PhD, Cornell University, Ithaca, USA

Matthew Kwan

Combinatorics and Probability
[Computer Science, Mathematics]

Combinatorics is the area of mathematics concerned with finite structures and their properties. This subject is enormously diverse and has connections to many different areas of science: for example, objects of study include networks, sets of integers, error-correcting codes, voting systems, and arrangements of points in space.

Kwan's group studies a wide range of combinatorial questions, with a particular focus on the interplay between combinatorics and probability. On the one hand, surprisingly often it is possible to use techniques or intuition from probability theory to resolve seemingly non-probabilistic problems in combinatorics (this is the so-called probabilistic method, pioneered by Paul Erdős). On the other hand, combinatorial techniques are of fundamental importance in probability theory, and there are many fascinating questions to ask about random combinatorial structures and processes.

Current Projects: Random graphs; Random matrices; Extremal combinatorics; Ramsey theory; Combinatorial design theory; Probabilistic inequalities; Connections to theoretical computer science

Career: since 2021 Assistant Professor, ISTA ■ 2018–2021 Szegő Assistant Professor, Stanford University, Palo Alto, USA ■ 2018 DSc, ETH Zurich, Switzerland

Christoph Lampert

Machine Learning and Computer Vision
[Computer Science, Data Science]

The Lampert group performs research on how to make artificial intelligence methods more trustworthy. It investigates questions like: Can we understand not only what modern machine learning systems are doing, but also why? Can we give guarantees for their behavior? Can we build systems that learn and one day might become intelligent without sacrificing our rights to data protection and privacy?

Computers are becoming increasingly powerful at processing data, and they have learned to perform many tasks that were thought beyond their reach, such as making successful financial investments, diagnosing cancer from medical images, and even driving cars in traffic. So why don't we rely on them as financial advisors, oncologists, and chauffeurs? It is likely because we do not trust computers enough to let them operate important systems autonomously and outside of our control. Besides theoretical research, the group applies its results to applications in computer vision, such as image understanding, where the goal is to develop automatic systems that can analyze the contents of natural images.

Current projects: Trustworthy machine learning; Transfer and lifelong learning; Theory of deep learning

Career: since 2015 Professor, ISTA ■ 2010–2015 Assistant Professor, ISTA ■ 2007–2010 Senior Research Scientist, Max Planck Institute for Biological Cybernetics, Tübingen, Germany ■ 2004–2007 Senior Researcher, German Research Center for Artificial Intelligence, Kaiserslautern, Germany ■ 2003 PhD, University of Bonn, Germany

Mikhail Lemeshko

Theoretical Atomic, Molecular, and Optical Physics
[Physics]

"The whole is greater than the sum of its parts." Aristotle's saying holds true in many systems studied in quantum physics. Mikhail Lemeshko investigates how macroscopic quantum phenomena emerge in ensembles of atoms and molecules.

Most polyatomic systems in physics, chemistry, and biology are strongly correlated: their complex behavior cannot be deduced from their individual components. Despite considerable effort, understanding strongly correlated many-body systems still presents a formidable challenge. For instance, given a single atom of a certain kind, it is hard to predict the properties of the resulting bulk material. The Lemeshko group studies how many-particle quantum phenomena emerge in ensembles of atoms and molecules, and in so doing, answers questions such as: How many particles are sufficient for a given property to emerge? How does an external environment modify the properties of quantum systems? The group's theoretical efforts aim to explain experiments on cold molecules and ultra-cold quantum gases, as well as to predict novel, previously unobserved phenomena.

Current projects: Understanding angular momentum properties of quantum many-particle systems; Studying open quantum systems and understanding how dissipation acts at the microscopic scale; Many-body physics of ultra-cold quantum gases; Developing techniques to manipulate atoms, molecules, and interactions between them with electromagnetic fields

Career: since 2019 Professor, ISTA ■ 2014–2019 Assistant Professor, ISTA ■ 2011–2014 ITAMP Postdoctoral Fellow, Harvard University, Cambridge, USA ■ 2011 PhD, Fritz Haber Institute of the Max Planck Society, Berlin, Germany

Julian Léonard

Quantum Optics
[Physics]

Studying the quantum world of small particles and the forces that govern their behavior has proven difficult for even our most powerful supercomputers. The Léonard group seeks to gain insight into this world by studying quantum optical systems built of individually controlled atoms and photons. This could help improve materials and develop applications in quantum computing and quantum information processing.

Using arrangements of laser beams, the group cools dilute atomic gases to nanokelvin temperatures, near absolute zero. The experimental control achieved over these ultracold atoms is unique within experimental physics: it is possible to control their motional and electronic states, to arrange them in programmable patterns, and tune their interaction strength. The Léonard group combines the tools of atomic and optical physics to trap ultracold atoms in tailored optical potentials, such as optical tweezer arrays and optical lattices. This allows them to reach single-particle quantum control and readout of large numbers of atoms, providing a path for scalable quantum computing and simulation.

Current projects: Many-body cavity quantum electrodynamics; Quantum simulation with optical lattices; Quantum technologies with optical fibers

Career: since 2024 Assistant Professor, ISTA ■ 2021–2024 Assistant Professor, TU Wien, Austria ■ 2017–2021 Postdoctoral Research Fellow, Harvard University, Cambridge, USA ■ 2017 PhD, ETH Zürich, Switzerland

Francesco Locatello

Causal Learning and Artificial Intelligence
[Computer Science, Data Science]

Modern machine learning is still limited to a superficial description of reality that only holds when the experimental conditions are fixed. It largely ignores interventions in the world, domain shifts, and temporal structure. The Locatello group focuses on learning causal representations and causal models from data to address these issues. Through rigorous theory and scalable algorithms, they enable AI agents to understand cause-and-effect relationships, the effect of interventions, and distribution changes underlying the data they encounter.

Advances in causal learning have promising applications in machine learning and artificial intelligence, including robustness, explainability, and fairness in recognition, reasoning, and planning tasks. Most importantly, their impact extends to discovering new scientific knowledge from massive amounts of data and serving as the interface between people and complex systems for decision-making. The Locatello group aims to solve open problems in machine learning and enable new applications in the sciences.

Current projects: Causal discovery; Causal representation learning; Dynamical systems; Visual reasoning; Deep learning methods; AI for science

Career: since 2023 Assistant Professor, ISTA ■ 2020–2023 Senior Applied Scientist, Amazon Web Services ■ 2020 PhD, ETH Zurich (Max Planck–ETH Center for Learning Systems), Switzerland

Martin Loose

Self-Organization of Protein Systems
[Biochemistry, Cell Biology]

How are nanometer-sized proteins able to perform complex cellular functions on a much larger scale? The Loose group seeks to understand how proteins self-organize into dynamic spatiotemporal patterns using an *in vitro* reconstitution approach.

Dynamic protein assemblies play a central role in organizing cells in space and time. They emerge from complex interactions among many cellular components, yet a mechanistic understanding of how these interactions give rise to large-scale, dynamic organization is often still lacking. In the Loose group, we combine protein biochemistry, biomimetic membrane systems, quantitative fluorescence microscopy, and image analysis to uncover the emergent properties of biochemical networks that underlie cellular organization.

Our research focuses on three interconnected areas: bacterial cell division, where we dissect how the FtsZ cytoskeleton and its regulators generate the dynamic Z-ring; regulatory networks of small GTPases, where we rebuild minimal Rab signaling circuits to understand how membrane identities emerge and are maintained; and the diversification of protein systems during evolution. By bridging bacterial and eukaryotic systems, integrating structural and evolutionary approaches, and combining experiments with theory, our work aims to identify universal design principles of protein self-organization that govern cellular organization across evolution.

Current projects: Self-organization of the bacterial cell division machinery; Emergent properties of small GTPase networks

Career: since 2021 Professor, ISTA ■ 2015–2021 Assistant Professor, ISTA ■ 2011–2014 Departmental Fellow, Harvard Medical School, Boston, USA ■ 2010–2011 Postdoc, TU Dresden and Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany ■ 2010 PhD, TU Dresden and MPI of Molecular Cell Biology and Genetics, Germany

Jan Maas

Stochastic Analysis
[Mathematics]

Airplane turbulence and stock rate fluctuations are examples of highly irregular real-world phenomena subject to randomness, noise, or uncertainty. Mathematician Jan Maas develops new methods for the study of such random processes in science and engineering.

Random processes are often so irregular that existing mathematical methods are insufficient to describe them accurately. The Maas group combines ideas from probability theory, mathematical analysis, and geometry to gain insights into the complex behavior of these processes. Recent work was inspired by optimal transport, which deals with the optimal allocation of resources. The Maas group applies these techniques to diverse problems involving complex networks, chemical reaction systems, and quantum mechanics. Another focus is stochastic partial differential equations, which are commonly used to model high-dimensional random systems, such as bacterial colony growth and weather forecasting. The group develops robust mathematical methods to study these equations, which is expected to lead to new insights into the underlying models.

Current projects: Optimal transport on random networks; Rates of convergence for evolutionary dynamics; Entropy inequalities and dissipative quantum systems

Career: since 2020 Professor, ISTA ■ 2014-2020 Assistant Professor, ISTA ■ 2009-2014 Postdoc, University of Bonn, Germany ■ 2009 Postdoc, University of Warwick, UK ■ 2009 PhD, Delft University of Technology, The Netherlands

Jorryt Matthee

Astrophysics of Galaxies
[Astronomy, Data Science, Physics]

Galaxies are the largest bound structures in our Universe and consist of gas, stars, planets, black holes, and dark matter. The astrophysical processes that occur in galaxies have happened to every atom in our body and therefore teach us about our cosmic origins.

Galaxies form following the collapse of small perturbations in the initial density distribution that formed in the Big Bang. While the physics of gravitational collapse is well understood, the finer details of many galactic processes, such as the formation of stars, supernova explosions, and the growth of supermassive black holes, are poorly understood—even though they have a significant impact on the fate of galaxies as well as the stars and planets within them.

The Matthee group investigates the physical mechanisms that determine how galaxies and their constituents form and evolve using observations of the very distant Universe. They use observations from some of the largest telescopes on Earth and in space. They look inside distant galaxies and probe the properties of the young massive stars and their impact on interstellar gas clouds.

Current Projects: Galaxies as tracers and agents of cosmic reionization; The properties of the first stars and black holes in the first galaxies

Career: Since 2023 Assistant Professor, ISTA ■ 2018-2023 Postdoctoral researcher (Zwicky Fellow), ETH Zurich, Switzerland ■ 2018 PhD, Leiden University, The Netherlands

Alicia Michael

Genome Regulation and Biological Timekeeping
[Biochemistry, Cell Biology, Chemistry]

Circadian rhythms sync physiology and behavior to the daily light-dark cycle. Disruption in these rhythms in mammals, caused by external factors or genetics, is linked to diseases like diabetes, cardiovascular issues, aging, and cancer. In humans, almost every cell bears an internal 24-hour molecular clock, directing vital processes including DNA organization, gene activity, and cellular functions.

The Michael group utilizes the circadian systems to unravel the fundamental principles of gene regulation and gain insights into how cells keep time. They look at how genes and large molecular structures are arranged within the nucleus of cells and are eager to understand how this architecture affects the environmentally sensitive on/off switching of genes. The group employs various techniques ranging from biochemistry, chemical biology, and genomics to cryo-electron microscopy (cryo-EM).

Current projects: Deciphering how transcription factors interface with the histone code; Examining the molecular coordination of the chromatin landscape at a core clock gene; Probing chromatin structure at high resolution within green algae

Career: since 2024 Assistant Professor, ISTA ■ 2023-2024 Postdoc, Biozentrum of the University of Basel, Switzerland ■ 2017-2022 Postdoc, Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland ■ 2017 PhD, University of California, Santa Cruz, USA

Kimberly Modic

Thermodynamics of Quantum Materials at the Microscale
[Physics]

From the stone tools of the Stone Age to the semiconductor devices of our modern information age, societies are defined by their materials. The next generation of materials, such as superconductors and spin liquids, will exploit the quantum mechanical nature of matter and drive future technologies, such as quantum computation.

The Modic group designs and builds experiments to enhance our understanding of quantum materials and discover new ways to harness their power. They specialize in techniques that study the response of materials to strong magnetic fields, which can simplify complex material problems. Magnetic fields can be used to reduce the degrees of freedom that electrons can explore, or they can force materials to choose between a metallic or a superconducting state. These experiments provide guidance to construct theories of existing quantum materials and aid in the design of new technologies.

Current projects: Identifying new phases of matter in topological semimetals; Determining broken symmetries in high-temperature superconductors; Exploring the dynamics of spin liquid excitations

Career: since 2020 Assistant Professor, ISTA ■ 2016-2019 Postdoc, Physics of Microstructured Quantum Matter, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany ■ 2012-2016 Graduate Research Assistant, Pulsed Field Facility, National High Magnetic Field Laboratory, Los Alamos, USA ■ 2015 PhD, University of Texas, Austin, USA

Marco Mondelli

Data Science, Machine Learning, and Information Theory
[Computer Science, Data Science]

We are at the center of a revolution in information technology, with data being the most valuable commodity. Exploiting this exploding number of data sets requires addressing complex inference problems, and the Mondelli group works to develop mathematically principled solutions.

Inference problems arise in a variety of fields and applications; the Mondelli group focuses on two areas. In wireless communications, the goal is—given a transmission channel—to send information encoded as a message while optimizing certain metrics, such as complexity or bandwidth. In machine learning, the goal is to understand how many samples convey sufficient information to perform a certain task and to identify the optimal ways to utilize such samples. The Mondelli group is inspired by information theory, which leads to the investigation of fundamental questions: What is the minimal amount of information necessary to solve an assigned inference problem? Given this minimal amount of information, is it possible to design a low-complexity algorithm? What are the tradeoffs between the parameters at play?

Current projects: Fundamental limits and efficient algorithms for deep learning; Non-convex optimization in high-dimensions; Optimal code design for short block lengths

Career: since 2025 Professor, ISTA ■ 2019-2025 Assistant Professor, ISTA ■ 2017-2019 Postdoc, Stanford University, Palo Alto, USA ■ 2018 Research Fellow, Simons Institute for the Theory of Computing, Berkeley, USA ■ 2016 PhD, EPFL, Lausanne, Switzerland

Caroline Muller

Atmosphere and Ocean Dynamics
[Data Science, Earth Science]

What is the response of the hydrological cycle to global warming? What are the physical processes responsible for the organization of tropical clouds? And what is the contribution of internal waves to ocean mixing? These are just a few of the questions the Muller group is trying to answer.

The research activities of the Muller group lie in the fields of geophysical fluid dynamics and climate science. The team is particularly interested in processes that are too small in space and time to be explicitly resolved in the coarse-resolution Global Climate Models (GCMs) used for climate prediction. Important examples are internal waves in the ocean and clouds in the atmosphere. These small-scale processes need to be parametrized—that is, modeled with simple equations—in GCMs in order to improve current model projections of climate change. The group's overall goal is to improve our fundamental understanding of these small-scale processes of our climate, using theoretical and numerical tools, as well as *in situ* and satellite measurements.

Current Projects: New theoretical perspectives on self-aggregation of clouds; Tropical energetics in a warming climate; Tropical cyclone formation and intensification; Ocean-atmosphere interactions

Career: since 2024 Professor, ISTA ■ 2021-2024 Assistant Professor, ISTA ■ 2015-2021 CNRS researcher and Lecturer at École Normale Supérieure, Paris, France ■ 2012-2015 CNRS researcher, École Polytechnique, Paris, France ■ 2010-2012 Research Scholar, Princeton University/GFDL, Princeton, USA ■ 2008-2010 Postdoc, Massachusetts Institute of Technology, Cambridge, USA ■ 2008 PhD, New York University, Courant Institute of Mathematical Sciences, New York, USA

Gaia Novarino

Genetic and Molecular Basis of Neurodevelopmental Disorders
[Neuroscience]

Gaia Novarino studies the genes underlying inherited forms of neurodevelopmental disorders such as epilepsy, intellectual disability, and autism. Neurodevelopmental disorders affect millions of people and are often refractory to treatment. Her group employs various techniques—from molecular biology to behavior—to identify common pathophysiological mechanisms underlying this group of disorders.

Neurodevelopmental disorders are caused by mutations in a plethora of genes, whose role in the brain is mostly unknown. Identifying the molecular mechanisms underlying the genetic forms of seizure, autism syndromes, and intellectual disability may hold the key to developing therapeutic strategies for this group of conditions. The Novarino group studies the function of genes that cause epilepsy, intellectual disability, and autism at the system, cellular, and molecular levels. The goal is to better understand critical processes for brain development and provide a framework for the development of effective pharmacological therapies.

Current projects: Molecular mechanisms underlying autism spectrum disorders; Chromatin remodeling in intellectual disability; Studying convergences and divergences across genetically defined autism disorders; Metabolic pathways in neurodevelopmental disorders

Career: since 2024 Executive Vice President, ISTA ■ Since 2021 Vice President for Science Education, ISTA ■ Since 2019 Professor, ISTA ■ 2014-2019 Assistant Professor, ISTA ■ 2010-2013 Postdoc, UCSD, La Jolla, USA ■ 2006-2010 Postdoc, Center for Molecular Neurobiology, Hamburg, Germany and MDC/FMP, Berlin, Germany ■ 2006 PhD, University La Sapienza, Rome, Italy

Jérémie Palacci

Materiali Molli
[Physics]

Nature evolved to assemble complex architectures from simple building blocks consuming energy: bacteria form colonies, cells reshape, and muscles contract. The general physical principles that lead to those remarkable and robust phenomena remain, however, to be unveiled.

The Palacci group, aka Materiali Molli Lab, aims to unlock the organization mechanisms of such systems that consume energy. The group's research is experimental and curiosity-driven, primarily focused on systems at the colloidal scale—a microscopic scale just one-hundredth of the thickness of a human hair. The researchers investigate how to control materials by powering them from within and understand how to achieve order from noise. They are also exploring the design of modular microbots, carrying the physical and computational power to perform programmed dynamics without external control or feedback. Ultimately, the Materiali Molli Lab aims to emulate the fidelity and tunability of materials and organisms observed in nature using human-made or biomimetic materials.

Current projects: Emergent behavior in active matter; Materials powered from within; Smart materials; Metamachines, machines made of machines

Career: since 2023 Professor, ISTA ■ 2021-2023 Assistant Professor, ISTA ■ 2021-2023 Adjunct Professor, University of California, San Diego, USA ■ 2020-2021 Associate Professor (with tenure), University of California, San Diego, USA ■ 2015-2020 Assistant Professor, University of California, San Diego, USA ■ 2010-2015 Postdoc, Center for Soft Matter Research, NYU, New York City, USA ■ 2010 PhD, Université de Lyon, France

Francesca Pellicciotti

Cryosphere and Mountain Hydrosphere
[Data Science, Earth Science]

Models are a powerful tool to understand the relationships between Earth's climate and surface features. The Pellicciotti group models the interactions of the climate—especially a changing one—and glaciers, snow, and water resources.

The Pellicciotti group is currently investigating the only growing glaciers in the world, those in the Pamir and Karakoram mountains, west of the Himalayas, to understand the causes of this anomalous state. The group also looks at how glaciers provide vital water during megadroughts worldwide, and when their buffer role will reach a tipping point. The group's research bridges the scales from single glaciers to entire mountain regions—Pellicciotti's fieldwork has taken her from Nepal's Himalayas to Chile's Andes. The team combines data from field research and remote sensing with the application of numerical models and data science to understand the role of the mountain cryosphere in a changing world.

Current Projects: Modeling glacier-climate interactions; Glacier response to a changing climate, high elevation hydrological cycle, and water security; Green-blue water interactions in the mountains of the world; Debris-covered glaciers and their response to climate; Snow processes from catchments to global scale balance

Career: Since 2023 Professor, ISTA ■ 2018-2024 Group Leader, Swiss Federal Institute for Forest, Snow and Landscape Research, Switzerland ■ 2017-2022 Associate Professor, Northumbria University, UK ■ 2013-2018 Visiting Scientist, ICIMOD, Kathmandu, Nepal ■ 2007-2014 Senior Researcher, ETH Zurich, Switzerland ■ 2004-2007 Postdoctoral research associate, ETH Zurich, Switzerland ■ 2004 PhD, ETH Zurich, Switzerland

Bartholomäus Pieber

Catalysis and Synthetic Methodology
[Chemistry]

Nature uses light as a sustainable energy source to convert raw materials into complex molecules. From a synthetic chemist's perspective, light is an ideal reagent. Unlike conventional reagents, light is non-toxic, generates no waste, and can be obtained from renewable sources.

The Pieber group seeks to unravel the full potential of visible light for synthetic organic chemistry by developing new photocatalysts and methods. Their research is driven by curiosity and the understanding of reaction mechanisms and photophysical properties of photocatalysts. The Pieber group is particularly interested in photoactive ligands as well as metal complexes, heterogeneous photocatalysis using semiconductors, and the development of methods in which the wavelength serves as a parameter to control the outcome of reactions.

Current projects: Design of (photo) catalysts; Photoactive ligands; Light-mediated cross-couplings; Light-mediated bond cleavage; Heterogeneous photocatalysis; Chromoselective synthesis

Career: Since 2023 Assistant Professor, ISTA ■ 2020-2023 Lecturer (Dozent), University of Potsdam, Germany ■ 2018-2023 Group Leader at the Max Planck Institute of Colloids and Interfaces, Potsdam, Germany ■ 2022 Visiting Associate, California Institute of Technology, USA ■ 2016-2017 Postdoc, Max Planck Institute of Colloids and Interfaces, Germany ■ 2015 PhD, University of Graz, Austria

Krzysztof Pietrzak

Cryptography
[Computer Science]

The cryptography group works on problems in theoretical and applied cryptography, the science behind information security. Current projects include:

Sustainable Blockchains. The group invents and develops proof systems like proofs of space or verifiable delay functions, and uses them toward constructing new protocols like sustainable blockchains.

Group Messaging. Messaging applications like Signal or WhatsApp are hugely popular and provide surprisingly strong security guarantees. The team works on group messaging, which aims at developing messaging protocols that efficiently scale to large groups without giving up any of the strong security and privacy guarantees of existing solutions.

Leakage-resilient cryptography. The team constructs schemes that are provably secure against "side-channel attacks," where an attacker exploits information leaked during computation from a cryptographic device like a smart card.

Current projects: Sustainable blockchains; Leakage-, tamper-, and trojan-resilient cryptography; Group messaging; Adaptive security

Career: since 2016 Professor, ISTA ■ 2011-2016 Assistant Professor, ISTA ■ 2005-2011 Scientific Staff Member, Centrum Wiskunde & Informatica, Amsterdam, The Netherlands ■ 2006 Postdoc, École Normale Supérieure, Paris, France ■ 2005 PhD, ETH Zurich, Switzerland

Hryhoriy Polshyn

Emergent Electronic Phenomena in 2D Materials
[Physics]

Electrons confined to two dimensions can behave in unique and fascinating ways. For example, the quantum mechanical motion of electrons in certain 2D materials can acquire striking collective characters. These emergent strongly correlated electronic states manifest topological order, superconductivity, magnetism, and other electronic orders. The Polshyn group experimentally explores such novel electronic states and investigates their fundamental properties.

Graphene and other van der Waals (vdW) materials open exciting opportunities to create new strongly correlated 2D electronic systems in which both the strengths and character of the electronic interactions can be tuned. The Polshyn group employs advanced nanofabrication techniques, ultra-low-temperature electronic transport measurements, and scanning probe microscopy to uncover the physics of the correlated electrons harbored in vdW materials. The group's research aims to answer fundamental physics questions regarding exotic electronic states and establish the physics background for conceptually new electronic devices and qubits.

Current Projects: Chern insulators in graphene moiré systems; Probing the mechanisms of superconductivity in graphene heterostructures; Low-temperature scanning probe microscopy.

Career: since 2022 Assistant Professor, ISTA ■ 2017-2022 Postdoc, University of California, Santa Barbara, USA ■ 2017 PhD, University of Illinois Urbana-Champaign, USA

Florian Praetorius

Biomolecular Design
[Biochemistry, Cell Biology]

Individual proteins fold into specific shapes that determine their functions, and complex structures consisting of multiple proteins derive their function from their overall shape or how their parts are positioned. To create new shapes and structures with novel or optimized functions, the Praetorius group uses biomolecular design, which specializes in two types of building blocks: proteins and nucleic acids (DNA and RNA).

The group uses deep learning-based computational and conventional physics-based protein design tools to generate new proteins from scratch. They also harness DNA origami for crafting shapes and structures at the nanoscale level. They aim to create unique DNA-protein hybrid assemblies, which eventually will possess novel functions and properties beyond what each technique can achieve independently. This research promises to advance areas such as gene delivery, gene editing, or vaccine development.

Current projects: Biomolecular Design with proteins, DNA, or both

Career: since 2024 Assistant Professor, ISTA ■ 2018-2024 Postdoctoral researcher, University of Washington, USA ■ 2018 Postdoctoral researcher, Technical University Munich, Germany ■ 2018 PhD, Technical University Munich, Germany

Samara Ren

Geometric Computing and Digital Fabrication
[Computer Science, Data Science]

The Ren group focuses on research in geometry, simulation, and computational inverse design. Advancements in digital fabrication technology enable the creation of structures with intricate geometric details. By developing computational methods, the group can design shape-morphing structures that transfer the complexities of assembly, actuation, 3D shape approximation, and structural stability into the fabricated geometries.

The group works on developing efficient geometric representations to model physical systems, robust and accurate PDE solvers to simulate complex phenomena, and numerical optimization algorithms to navigate high-dimensional, highly non-convex energy landscapes. They draw both inspiration and validation from practical applications, aiming to develop techniques that address real-world challenges.

Current projects: Deployable structures; Soft robotics; Computational homogenization; Shape space analysis; Multistability

Career: since 2024 Assistant Professor, ISTA ■ 2024 PhD, EPFL, Lausanne, Switzerland

Matthew Robinson

Medical Genomics
[Data Science, Evolution & Ecology]

Common complex diseases such as type-2 diabetes, obesity, stroke, and cardiovascular disease are among the leading causes of mortality worldwide. Our limited understanding of how genetic variation and the environment affect health and disease makes it impossible to respond optimally, treat, and ultimately prevent symptoms.

The Robinson group develops statistical models and the computational tools required to implement these models for very large-scale human medical record data. The overall goal is to improve our understanding of how genetics and lifestyle shape our risk of disease. Why people develop first symptoms at different ages, or why the severity of symptoms varies, is not well understood. The Robinson group works to better characterize the underlying pathways and relationships among diseases. Their goal is to improve our ability to predict not only an individual's overall risk of disease but also when people are likely to become sick and how they might respond to different treatments.

Current projects: Statistical models for the genetic basis of common complex disease; Genetic basis of age of onset; Genetics of aging; Maternal health; Genomic prediction for personalized health

Career: since 2020 Assistant Professor, ISTA ■ 2017-2020 Assistant Professor, University of Lausanne, Switzerland ■ 2013-2017 Postdoc, University of Queensland, Brisbane, Australia ■ 2009-2013 NERC Junior Research Fellow, University of Sheffield, UK ■ 2008 PhD, University of Edinburgh, UK

Michael Sammler

Programming Languages and Verification
[Computer Science]

Modern computers depend on low-level systems software like operating systems or hypervisors. Such software often provides critical components that ensure the reliability and security of the overall system. However, this means that bugs and vulnerabilities in those systems can lead to failures and security problems. Thus, detecting and preventing such bugs is crucial to ensuring the reliability of modern computers.

Michael Sammler achieves this by using formal verification, which allows proving that a program behaves as described by a high-level mathematical specification. The Sammler group develops methodologies that can verify real-world code against realistic models of programming languages like C or assembly languages, while providing a high degree of automation and producing machine-checkable proofs in a proof assistant.

Current Projects: Combining automated and foundational verification for real-world programs; Reasoning about multi-language programs; Translation validation for real-world compilers

Career: since 2025 Assistant Professor, ISTA ■ 2024 Postdoctoral researcher, ETH Zurich, Switzerland ■ 2019-2023 PhD, Max Planck Institute for Software Systems, Germany

Anđela Šarić

Computational Soft and Living Matter
[Biochemistry, Cell Biology, Physics]

How do lifeless molecules create living organisms? How can such processes fail, resulting in diseases? At the intersection of soft matter physics, molecular cell biology, and physical chemistry, the Šarić group studies the physical mechanisms behind the non-equilibrium self-organization of biomolecules in healthy and diseased states.

Currently, the group is focused on investigating the physical principles of cellular reshaping and cell division across evolution, and on the formation of pathological protein aggregates in the context of neurodegenerative diseases. The Šarić group develops computational models rooted in soft matter and statistical physics that are powerful in traversing scales and investigating collective phenomena. The group closely collaborates with experimental colleagues on a range of systems, from synthetic setups to living cells.

Current Projects: Non-equilibrium protein assembly: from building blocks to biological machines; Evolution of trafficking: from archaea to eukaryotes; Collagen assembly: from molecules to fibrils; How do you build a wall? Mechanistic principles of bacterial division septum building; Cell division and repair by ESCRT-III filaments

Career: since 2023 Professor, ISTA ■ 2022-2023 Assistant Professor, ISTA ■ 2016-2022 Assistant Professor, then Associate Professor, University College London, UK ■ 2013-2016 HFSP Postdoctoral Fellow and Emmanuel College Junior Research Fellow, University of Cambridge, UK ■ 2013 PhD, Columbia University, New York City, USA

Leonid Sazanov

Structural Biology of Membrane Protein Complexes
[Biochemistry]

Membrane proteins are responsible for many fundamental cellular processes, including the transport of ions and metabolites and energy conversion, and are the target of about two-thirds of modern drugs. However, membrane proteins, especially large complexes, are challenging to study and are thus underrepresented in structural databases. The Sazanov group is interested in the structural biology of membrane proteins.

The research focus of the group has been on complex I of the respiratory chain, a huge (~1 MDa) enzyme central to cellular energy production. So far, they have determined the first atomic structures of complex I, from bacterial to the more elaborate mammalian version. The structures suggest a unique mechanism of proton translocation, which they study using cryo-electron microscopy and functional assays. The group also investigates other, related membrane protein complexes with the goal of explaining the molecular design of some of the most intricate biological machines.

Current projects: Mechanism of coupling between electron transfer and proton translocation in complex I; Structure and function of mitochondrial respiratory supercomplexes; Structure and function of other membrane protein complexes relevant to bioenergetics

Career: since 2015 Professor, ISTA ■ 2000-2015 Group and Program Leader, MRC Mitochondrial Biology Unit, Cambridge, UK ■ 1997-2000 Research Associate, MRC Laboratory of Molecular Biology, Cambridge, UK ■ 1994-1997 Research Fellow, Imperial College, London, UK ■ 1992-1994 Postdoc, University of Birmingham, UK ■ 1990-1992 Postdoc, Belozersky Institute of Physico-chemical Biology, Moscow State University, Russia ■ 1990 PhD, Moscow State University, Russia

Paul Schanda

Biomolecular Mechanisms From Integrated NMR Spectroscopy
[Biochemistry, Chemistry]

From the visible dance of living organisms to the invisible vibrations of atoms within molecules, movement is the essence of life. These microscopic interactions drive the processes that allow life to thrive.

The Schanda group focuses on unraveling how proteins—life's molecular machines—perform their intricate tasks. At the heart of their research lies a fundamental question: How do the structural dynamics of proteins govern their functions? The team explores puzzling phenomena, such as how proteins transport other proteins across cellular environments. By studying their structure, movement, and interactions, they decode how cells manage to shuttle large, aggregation-prone polypeptides and refold them into their native states. They also investigate the motions that underlie enzyme function and allosteric regulation, and address fundamental physicochemical questions related to protein dynamics, such as the impact of the environment on motions. To tackle these questions, the Schanda group harnesses the power of nuclear magnetic resonance (NMR) spectroscopy, pushing its boundaries and integrating it with biophysical, biochemical, *in silico,* and *in vivo* methods. Through this multidisciplinary approach, they aim to illuminate the dynamic foundations of life at the molecular level.

Current Projects: Mitochondrial import machinery; Chaperones; Dynamics of enzymes and allosteric regulation; New isotope-labeling and NMR methods to probe protein dynamics

Career: since 2021 Professor, ISTA ■ 2017-2020 Head of the NMR group, Institut de Biologie Structurale, Grenoble, France ■ 2011-2021 Research team leader, Institut de Biologie Structurale, Grenoble, France ■ 2008-2010 Postdoc, ETH Zurich, Switzerland ■ 2007 PhD, Université Joseph Fourier, Grenoble, France

Florian Schur

Virus, Cell, and Tissue Architecture
[Biochemistry, Cell Biology]

Numerous biological properties are governed by architectural and structural principles that depend on the higher-order, three-dimensional organization of biomolecules. How this organization is established, maintained, and dynamically adapted remains incompletely understood, largely due to the limited ability to study biomolecules within their native interaction networks at sufficient spatial resolution.

The Schur group develops such integrative approaches using cryo-electron microscopy (cryo-EM), cryo-electron tomography (cryo-ET), and advanced image processing to uncover how molecular assemblies shape the architecture of viruses, cells, and tissues.

Our research focuses on intra- and extracellular filamentous assemblies—including the actin cytoskeleton and the extracellular matrix—which are central to cell migration, tissue organization, and maintenance. We also investigate how protein–protein interactions define virus assembly and infection pathways, which are often governed by distinctive geometrical and structural principles.

More recently, we have begun to explore the evolutionary emergence of genome architecture.

Current projects: ActinID – a molecular atlas of the actin cytoskeleton; A structural atlas of the extracellular matrix; Viral architectures in retroviruses and poxviruses; EvoChromo – The rise of genome architecture; Cryo-electron tomography and image processing method development

Career: since 2024 Professor, ISTA ■ 2017-2024 Assistant Professor, ISTA ■ 2016-2017 Postdoc, European Molecular Biology Laboratory, Heidelberg, Germany ■ 2016 PhD, European Molecular Biology Laboratory, Heidelberg & University of Heidelberg, Germany

Robert Seiringer

Mathematical Physics
[Mathematics, Physics]

The Seiringer group develops mathematical tools for the rigorous analysis of many-particle systems in quantum mechanics, with a special focus on exotic phenomena in quantum gases, like Bose-Einstein condensation and superfluidity.

A basic problem in statistical mechanics is to understand how the same equations on a microscopic level lead to a variety of very different manifestations on a macroscopic level. Due to the intrinsic mathematical complexity of this problem, one typically resorts to perturbation theory or other uncontrolled approximations, whose justification remains open. The challenge is thus to derive non-perturbative results and obtain the precise conditions under which various approximations can or cannot be justified. For this, new mathematical techniques and methods are needed; these increase our understanding of physical systems. Concrete problems under investigation include the spin-wave approximation in magnetism, the validity of the Bogoliubov approximation in the description of dilute Bose gases, and the study of polaron models at strong coupling.

Current projects: Stability of many-body systems with point interactions; The Heisenberg ferromagnet at low temperature and the spin-wave approximation; Excitation spectrum and superfluidity for weakly interacting Bose gases; Strongly coupling limit of polaron models; Mathematical foundations of Density Functional Theory

Career: since 2013 Professor, ISTA ■ 2010-2013 Associate Professor, McGill University, Montreal, Canada ■ 2005 Habilitation, University of Vienna, Austria ■ 2003-2010 Assistant Professor, Princeton University, USA ■ 2001-2003 Postdoc, Princeton University, USA ■ 2000-2001 Assistant, University of Vienna, Austria ■ 2000 PhD, University of Vienna, Austria

Maksym Serbyn

Quantum Dynamics and Condensed Matter Theory
[Physics]

How do isolated quantum systems behave when prepared in a highly non-equilibrium state? How can such quantum systems avoid ubiquitous relaxation to a thermal equilibrium? How can we gain novel insights into the properties of quantum matter using modern non-equilibrium probes? These and other open questions in the field of quantum non-equilibrium matter are the focus of the Serbyn group.

The majority of isolated quantum systems thermalize, that is, reach thermal equilibrium when starting from non-equilibrium states. One research focus of the Serbyn group is to understand the mechanisms of thermalization breakdown. Many-body localized systems present one generic example of thermalization breakdown due to the presence of strong disorder. The Serbyn group is studying the properties of many-body localized phase and phase transition into the thermalizing phase. In addition, systems with quantum many-body scars avoid thermal equilibrium, however, only when prepared in specific initial conditions. The Serbyn group is actively studying the properties of quantum many-body scars and their potential applications.

Current projects: Many-body localization; Quantum ergodicity breaking; Non-equilibrium probes of solids; Superconductivity

Career: since 2022 Professor, ISTA ■ 2017-2022 Assistant Professor, ISTA ■ 2014-2017 Gordon and Betty Moore Postdoctoral Fellow, University of California, Berkeley, USA ■ 2014 PhD, Massachusetts Institute of Technology, Cambridge, USA

Ryuichi Shigemoto

Molecular Neuroscience
[Neuroscience]

Information transmission, the formation of memory, and plasticity are all controlled by various molecules at work in the brain. Focusing on the localization and distribution of molecules in brain cells, the Shigemoto group investigates their functional roles in higher brain functions.

The release of neurotransmitters from a nerve cell into the synapse, where they act on receptors of the connecting nerve cell, is the primary process of information transmission and computation in the brain. The Shigemoto group studies the localization of single neurotransmitter receptors, ion channels, and other functional molecules to understand the molecular basis of neuronal information processing. The group has pioneered several methods for studying the localization of functional molecules at unprecedented sensitivity, detecting and visualizing even single membrane proteins in nerve cells using SDS-digested freeze-fracture replica labeling. This method was recently combined with "Flash & Freeze" to visualize millisecond dynamics of presynaptic molecules relative to vesicle fusion events in the active zone. The group is also developing new chemical labeling methods for higher detection sensitivity, higher labeling resolution, and applicability to any membrane proteins of interest.

Current projects: New chemical labeling methods for high-resolution EM visualization of single molecules; Ultrastructural localization and function of receptors and ion channels in the brain; Flash & Freeze-fracture; Mechanisms of long-term memory formation; Left-right asymmetry of neuronal circuitry

Career: since 2013 Professor, ISTA ■ 1998-2014 Professor, National Institute for Physiological Sciences, Okazaki, Japan ■ 1990-1998 Assistant Professor, Kyoto University Faculty of Medicine, Japan ■ 1994 PhD, Kyoto University, Japan ■ 1985 MD, Kyoto University Faculty of Medicine, Japan

Sandra Siegert

Microglia-Neuron Interaction
[Cell Biology, Neuroscience]

Research on brain function has traditionally focused on how environmental signals are encoded within complex neuronal networks, while the contribution of the immune system—particularly microglia—was largely overlooked. The Siegert group investigates how neurons and microglia communicate and how dysfunctions in this interaction affect neuronal circuit formation and function in health and disease.

Microglia are the CNS-resident macrophages that continuously monitor and respond to their neuronal environment, not only during pathogenic challenges but also under physiological conditions. Recent studies, including our own, demonstrate that microglia adapt to defined environmental cues and can profoundly influence established circuit elements, such as synapses and the extracellular matrix.

However, the specific cues that drive these microglial responses, the underlying molecular mechanisms, and the resulting consequences for neuronal function in the adult brain remain poorly understood. The goal of the Siegert group is to discover how environmental factors shape microglial signaling and how these responses influence neuronal circuit function and behavior.

Current projects: Disentangle the morph-functional relationship of microglia; How to alter microglia function and pinpoint the consequences on the neuronal network; Microglia-neuron interaction in the human context

Career: since 2023 Professor, ISTA ■ 2015-2023 Assistant Professor, ISTA ■ 2011-2015 Postdoctoral Associate, MIT, Cambridge/MA, USA ■ 2010 PhD, FMI, Basel, Switzerland

Michael Sixt

Cellular Morphodynamics
[Cell Biology]

Immune cells zip through our bodies at high speeds to fight off infections and diseases. The Sixt group works at the interface of cell biology and immunology to investigate how cells migrate and communicate in tissues.

Most cells in our bodies are stationary, forming solid tissues and encapsulated organs. One exception is leukocytes, the cells mediating innate and adaptive immune responses to infections. Leukocytes migrate with extraordinary speed and are the Sixt group's favorite model system. The group seeks to identify basic mechanistic principles of how cells change shape, move the cell body, and interact with other cells to coordinate their behavior. Principles, which are also important for processes such as embryonic development, regeneration, and cancer cell dissemination. The group also investigates how cells navigate along guidance cues, specifically how they orient their polarity axis in response to chemotactic gradients. In their work, they combine genetics, biochemistry, pharmacology, micro-engineering, surface chemistry, advanced imaging, and *in vivo* imaging techniques.

Current projects: Environmental control of leukocyte migration; Cellular force generation and transduction; Interpretation of chemo-attractive gradients

Career: since 2013 Professor, ISTA ■ 2014-2024 Executive Vice President, ISTA ■ 2010-2013 Assistant Professor, ISTA ■ 2008-2010 Endowed Professor, Peter Hans Hofschneider Foundation for Experimental Biomedicine ■ 2005-2010 Group Leader, Max Planck Institute of Biochemistry, Martinsried, Germany ■ 2003-2005 Postdoc, Institute for Experimental Pathology, Lund, Sweden ■ 2003 MD, University of Erlangen, Germany ■ 2002 Approbation in Human Medicine

Veronika Sunko

Symmetry Probes of Quantum Matter
[Physics]

The Sunko group is dedicated to understanding quantum materials, where countless interacting electrons give rise to emergent states that are greater than the sum of their parts. Their goal is to uncover the fundamental principles driving these phenomena, one material at a time.

Symmetry serves as a powerful organizing principle, shaping theoretical descriptions of materials, constraining their possible behaviors, and predicting functional properties. The group develops experimental methodologies that are highly sensitive to broken symmetries, using these techniques to discover, characterize, and manipulate novel quantum phenomena.

Recognizing that the manifestations of broken symmetry are material-specific, the group employs a diverse set of experimental tools attuned to various energy scales. By integrating theoretical modeling with complementary experimental probes, they construct a comprehensive understanding of each material's unique properties.

Current Projects: Optical detection of unconventional magnetism, with a focus on non-relativistic spin-splitting in magnets; Strain-tuning electronic structure in unconventional magnetism; Transport signatures of symmetry-breaking; Magnetism in 2D: flakes, surfaces, and interfaces

Career: since 2025 Assistant Professor, ISTA ■ 2021-2024 Miller Fellow, University of California, Berkeley, USA ■ 2020-2024 Minerva Fast Track Fellow, Max Planck Institute for Chemical Physics of Solids, Germany ■ 2015-2019 PhD, University of St Andrews, UK & Max Planck Institute for Chemical Physics of Solids, Germany

Lora Sweeney

Evolution, Development, and Function of Motor Circuits
[Cell Biology, Evolution & Ecology, Neuroscience]

Movement is fundamental to nearly every animal behavior: to escape predators, to eat and breathe, animals must move. The Sweeney group aims to define the molecular, cellular, and neural circuit components that underlie differences in motor behavior, and to explore how such differences arise during an organism's development.

The group uses a wide range of vertebrates, including the *Xenopus* frog, to address these fundamental questions. The frog undergoes metamorphosis, transitioning from a swimming tadpole to a walking frog during its development. The Sweeney group explores this transition and categorizes, compares, and manipulates frog neurons at each stage. This allows the scientists to map variations in cellular properties and neural circuit structure onto differences in motor behavior. Such knowledge of cell-circuit-behavior relationships in the frog provides a basis for broader comparisons of motor circuits across vertebrates, for understanding how motor circuits evolved from swimming to walking, and for pinpointing how motor circuits break down in movement disorders.

Current projects: Single-cell sequencing of tadpole, frog, fish, and reptile neurons; Viral tracing and genetic manipulation of neural circuits for swimming and walking; Multiphoton imaging of calcium dynamics over metamorphosis; Machine-learning based kinematic analysis of motor behavior across species

Career: since 2020, Assistant Professor, ISTA ■ 2011-2020 Postdoc, Salk Institute for Biological Studies, San Diego, USA ■ 2011 PhD, Stanford University, Palo Alto, USA

Gašper Tkačik

Information Processing in Biological Systems
[Cell Biology, Data Science, Evolution & Ecology, Neuroscience, Physics]

How do networks built out of biological components—neurons, signaling molecules, genes, or even cooperating organisms—process information? In contrast to engineered systems, biological networks operate under strong constraints due to noise, limited energy, or specificity, yet still perform their functions reliably. The Tkačik group uses biophysics and information theory to understand the principles and mechanisms behind this remarkable phenomenon.

How can cells in a multicellular organism reproducibly decide what tissue they become? How do neurons in the brain cooperate to best encode visual information as neural spikes? How does the physics at the microscopic scale, which dictates how individual regulatory molecules interact with each other, constrain the kinds of regulatory networks observed in real organisms today, and how can such networks evolve? With the goal of developing theoretical ideas about biological network function and connecting these to high-precision data, the Tkačik group seeks to answer these and other questions through data-driven and theoretical projects.

Current projects: Visual encoding in the brain; Genetic regulation during early embryogenesis; Collective dynamics; Evolution of gene regulation

Career: since 2025 Deputy Dean of the Graduate School, ISTA ■ Since 2017 Professor, ISTA ■ 2011-2016 Assistant Professor, ISTA ■ 2008-2010 Postdoc, University of Pennsylvania, Philadelphia, USA ■ 2007 Postdoc, Princeton University, USA ■ 2007 PhD, Princeton University, USA

Latha Venkataraman

Single-Molecule Physics and Chemistry
[Chemistry, Physics]

Our research program aims to understand matter at the nanoscale through an interdisciplinary approach that combines physics, chemistry, and engineering. Our lab is a leader in probing, manipulating, and controlling single molecules as active elements of circuits, understanding the electronic, mechanical, optical, and thermoelectric properties of devices that achieve the smallest possible (i.e., atomic) dimensions.

By collaborating with synthetic chemists and theoretical solid-state physicists, we relate our experimental findings to fundamental chemical structures and theoretical models. Besides advancing the field known broadly as molecular electronics, our interdisciplinary work has also broadened our understanding of charge transfer at metal/organic interfaces. This has an impact on the fields of organic electronics, photovoltaics, catalysis, and charge transfer processes in biological systems.

Current Projects: Electronic transport in single-molecule devices; Electroluminescence in single-molecule devices; Temperature dependent conductance and mechanical properties of single-molecule devices

Career: since 2025 Professor, ISTA ■ Since 2019 Lawrence Gussman Professor of Applied Physics, Columbia University, USA ■ Since 2016 Professor of Chemistry, Columbia University, USA ■ 2019-2022 Vice Provost for Faculty Affairs, Columbia University, USA ■ 2012-2019 Associate Professor (with tenure), then Professor of Applied Physics, Columbia University, USA ■ 2003-2012 Research Scientist, Assistant Professor, then Associate Professor (Applied Physics), Columbia University, USA ■ 1999-2003 Research Scientist, Vytran Corporation, USA ■ 1999 PhD, Harvard University, USA

Beatriz Vicoso

Sex-Chromosome Biology and Evolution
[Data Science, Evolution & Ecology]

Sex chromosomes, such as the X and Y of mammals, are involved in sex determination in many animal and plant species. Their sex-specificity leads them to evolve differently from other chromosomes and acquire distinctive biological properties. The Vicoso group investigates how sex chromosomes evolve over time and what biological forces are driving their patterns of differentiation.

The Vicoso group is interested in understanding several aspects of the biology of sex chromosomes, and the evolutionary processes that shape their peculiar features. By combining the use of next-generation sequencing technologies with studies in several model and non-model organisms, the researchers can address a variety of standing questions, such as: Why do some Y chromosomes degenerate while others remain homomorphic, and how does this relate to the extent of sexual dimorphism of the species? What forces drive some species to acquire global dosage compensation of the X, while others only compensate specific genes? What are the frequency and molecular dynamics of sex chromosome turnover?

Current projects: Sex chromosome turnover and conservation; Dosage compensation in female-heterogametic species; Gene expression evolution in sexual and asexual species

Career: since 2020 Professor, ISTA ■ 2015-2020 Assistant Professor, ISTA ■ 2009-2014 Postdoc, University of California, Berkeley, USA ■ 2010 PhD, University of Edinburgh, Scotland, UK

Tim Vogels

Computational Neuroscience and Neurotheory
[Data Science, Neuroscience]

The Vogels group seeks to build models of neurons and neuronal networks that distill and re-articulate the current knowledge of how nervous systems compute at a mechanistic level. In particular, they are interested in the neuronal interplay of excitatory and inhibitory activity in the cortex and how these dynamics can form reliable sensory perceptions, stable memories, and motor outputs.

The group has three main areas of interest. (1) Plasticity: they use mechanistic models of synaptic plasticity to understand how the brain updates its synaptic connections to learn and adapt to a changing world. (2) Network dynamics and computation: they seek to understand how neuronal networks process and transform sensory inputs, store and manipulate memories, and send motor outputs. (3) Ion channels and single-neuron biophysics: they build detailed biophysical models of single neurons to understand the complex input-output relationships in single neurons and their dendritic branches.

Current projects: Machine learning-guided searches for synaptic plasticity in cortical neuron models; Spontaneous activity as a homeostatic controller of neuronal metabolism; Interdependent synaptic plasticity between excitatory and inhibitory neurons; Context-dependent memory switching

Career: since 2020 Professor, ISTA ■ 2014-2020 Hayward Junior Research Fellow, Sir Henry Dale Wellcome Trust & Royal Society Research Fellow, Fellow of St. Peter's College, and Associate Professor, University of Oxford, UK ■ 2010-2013 Marie Curie Postdoctoral Fellow, EPFL, Lausanne, Switzerland ■ 2007-2010 Patterson Trust Postdoctoral Fellow, Columbia University, New York City, USA ■ 2007 PhD, Brandeis University, Waltham, USA

Uli Wagner

Discrete and Computational Geometry and Topology
[Computer Science, Mathematics]

How and when can a geometric shape be embedded in n-dimensional space without self-intersections? The Wagner group's research focuses on combinatorial and computational geometry and topology.

A simplicial complex is a description of how to represent a geometric shape by joining points, edges, triangles, and their n-dimensional counterparts in a 'nice' way. Simplicial complexes are a natural way to represent shapes for computation and algorithm design, and the Wagner group explores both their topological properties as well as what can be proved about their combinatorics—e.g., bounds on the number of simplices—given particular constraints. They take classical topological questions and consider them from a combinatorial point of view. Conversely, they use techniques and ideas from topology to approach questions in combinatorics. They are moreover interested in the computational aspects of these problems, such as questions of decidability and complexity like: Does an algorithm exist? And if so, what are the costs in terms of time or space?

Current projects: Embeddings of simplicial complexes; Topological Tverberg-type problems and multiple self-intersections of maps; Discrete isoperimetric inequalities and higher-dimensional expanders

Career: since 2018 Professor, ISTA ■ 2013-2018 Assistant Professor, ISTA ■ 2012-2013 SNSF Research Assistant Professor, EPFL, Lausanne, Switzerland ■ 2006-2012 Postdoc and Senior Research Associate, ETH Zurich, Switzerland ■ 2004-2006 Postdoc, Einstein Institute of Mathematics, The Hebrew University of Jerusalem, Israel ■ 2004 Postdoc, Univerzita Karlova, Prague, Czech Republic ■ 2003 Fellow, Mathematical Sciences Research Institute, Berkeley, USA ■ 2004 PhD, ETH Zurich, Switzerland

Scott Waitukaitis

Soft Electrified Materials
[Physics]

Scott Waitukaitis leads an experimental soft matter physics lab. The group focuses on complex phenomena that emerge when everyday materials interact with electric fields.

One major focus is contact electrification of insulators, i.e., the exchange of electrical charge between materials when they touch. Although known to occur even in ancient Greece, the underlying mechanism remains poorly understood. In our lab, we have found that contact electrification seems to have different causes depending on the type of material used. For soft organic materials such as plastics, our work points to irreversible nanoscale mechanical deformations as a key ingredient, potentially through the release of charge through mechanochemical and flexoelectric effects. For oxide insulators, i.e., hard inorganic materials like glass or ceramic, we find that surface adsorbates (e.g., nanoscopic layers of water and other molecules) play a critical role.

Other interests of the group include creating emergent activity with electrical energy injection (e.g., Quincke rollers or charged matter in acoustic levitation), the physics of lightning, the development of charge-measurement techniques, and the Leidenfrost effect.

Current projects: Triboelectric series of identical insulators; Contact electrification of oxides; The elastic Leidenfrost effect; Anisotropic active matter; Measuring charge of aerosols; KPFM of insulator surfaces; Ionomer-induced charge exchange; Emergent activity of acoustically levitated charged matter

Career: since 2019 Assistant Professor, ISTA ■ 2016-2018 NWO Veni Fellow and Postdoc, AMOLF, Amsterdam, The Netherlands ■ 2013-2016 Postdoc, Leiden University, The Netherlands ■ 2007-2013 PhD, University of Chicago, USA

Chris Wojtan

Computer Graphics and Physics Simulation
[Computer Science, Data Science]

Computer simulations of natural phenomena are indispensable for modern scientific discoveries, modern engineering, and the digital arts. The Wojtan group uses techniques from physics, geometry, and computer science to create efficient simulations and detailed computer animations.

Natural phenomena like flowing fluids and shattering solids are both beautifully chaotic and overwhelmingly complex. This complexity makes them extremely difficult to compute without the aid of a supercomputer. The Wojtan group overcomes this complexity by combining laws of motion from physics, geometric theories from mathematics, and algorithmic optimizations from computer science to efficiently compute highly complicated natural phenomena on consumer-grade computing hardware. Their research achieves some of the world's fastest and most detailed simulations through a deeper understanding of the underlying mathematical models and inventing novel computational techniques.

Current projects: Efficient simulation of fluid and solid dynamics; Numerical and geometric algorithms for solving partial differential equations; Algorithms for re-using simulation data; Computational physics applied to motion pictures, video games, and virtual reality

Career: since 2015 Professor, ISTA ■ 2011-2014 Assistant Professor, ISTA ■ 2010 PhD, Georgia Institute of Technology, Atlanta, USA

Daniel Zilberman

Epigenetics and Chromatin
[Cell Biology, Evolution & Ecology]

Most information that passes across generations is encoded in the DNA sequence. However, there is increasing appreciation that cells and organisms also inherit information through other mediums, known collectively as epigenetics. The Zilberman group studies cytosine DNA methylation—a key epigenetic mechanism in plant and animal cells.

Cytosine methylation can carry epigenetic information because it is precisely copied when the DNA is replicated. Methylation regulates gene expression, and accurate reproduction of DNA methylation patterns during cell division is therefore essential for plant and animal development, efficient agriculture, and human health. The enzymes that maintain DNA methylation must work within chromatin, particularly to contend with nucleosomes—tight complexes of DNA and histone proteins. The Zilberman group combines genetic, genomic, biochemical, and evolutionary approaches to understand the maintenance and function of DNA methylation within chromatin using *Arabidopsis thaliana* as the primary model.

Current projects: Regulation of DNA methylation patterns by chromatin remodelers and linker histones; Influence of DNA methylation on nucleosome properties; Mathematical modeling of DNA methylation inheritance; Evolution of eukaryotic DNA methylation pathways; Epigenetic inheritance as a mechanism of phenotypic diversification in natural populations

Career: since 2021 Professor, ISTA ■ 2017-2021 Group Leader, John Innes Centre, Norwich, UK ■ 2007-2017 Assistant Professor then Associate Professor, University of California, Berkeley, USA ■ 2004-2007 Postdoc, Fred Hutchinson Cancer Research Center, Seattle, USA ■ 2004 PhD, University of California, Los Angeles, USA

Satish Arcot Jayaram
Preclinical Facility

Arcot Jayaram provides comprehensive support to research groups on genome engineering technology to generate transgenic animals. He collaborates with research groups by providing tools for gene functional analysis.

The lack of genome-modifying toolkits greatly hindered the research community for a long time. This changed with the identification of zinc finger nucleases, TALENs, as well as CRISPR and its associated protein Cas9, making precise genome modification possible. On the other hand, animal research vastly facilitates our understanding of mammalian gene function and its associated biological processes.

Representing the transgenic unit of the Preclinical Facility, Arcot Jayaram offers advice to researchers and carries out the entire process of genome engineering in rodents. The unit aims to keep up with the latest DNA modification techniques to aid ISTA researchers with the best transgenic models for their research.

Additional interests include simplifying the inducible Cre system, vaccine efficacy, and dissecting the functions of conserved genes across evolution.

Current projects: Mosaic analysis with double markers in rats (Hippenmeyer group); Knock-in mice with epitope tags for *in vivo*-labeling experiments (Shigemoto group); Humanized mouse models (Novarino group); Knock-in mouse lines to study receptor protein dynamics (Sixt group); Generation of floxed alleles for comparative genomics (de Bono group)

Career: Since 2020 Staff Scientist, ISTA ■ 2019–2020 Senior Scientific Officer, CRUK-MI, University of Manchester, UK ■ 2015–2019 Postdoc, University of Oxford, UK ■ 2010–2014 Postdoc, MRC Laboratory of Molecular Biology, Cambridge, UK ■ 2010 PhD, Stockholm University, Sweden

Dániel Balázs
Lab Support Facility

The properties of materials are encoded in their structures, with the relevant length scales ranging from sub-nanometers to centimeters. Each length scale, each material system, and each studied detail requires a different investigative approach. When faced with such challenges, ISTA researchers can consult Daniel Balázs, who helps them find the way to determine the desired information.

Balázs helps design experiments using the two X-ray characterization instruments on Campus and analyzes complex datasets on a broad range of materials, mostly inorganic. His expertise in characterizing disorder in otherwise ordered systems, both qualitatively and quantitatively, is applied to thermoelectric materials by the Ibáñez group and to battery research by the Freunberger group. His personal research interest is self-assembly in the gray area between molecular and bulk systems, such as the interactions of organic-inorganic clusters consisting of hundreds to thousands of atoms.

Current projects: Structural evolution and phase diagram of lithium polysulfides for next-generation batteries (Freunberger group); In operando tracking the degradation of transition metal oxide cathodes (Freunberger group); Phase diagram, processing-related structural changes, and structure-property relationships in a broad range of thermoelectric ceramics (Ibáñez group); Formation of 3D superlattices from nanostructured colloid building blocks (Ibáñez group)

Career: Since 2022 Staff Scientist, ISTA ■ 2020–2022 Postdoc, ISTA ■ 2018–2020 Postdoc, Cornell University, New York, USA ■ 2018 PhD, University of Groningen, The Netherlands

Robert Hauschild
Imaging and Optics Facility

Robert Hauschild brings his expertise in imaging, optical engineering, automation, and image analysis to ISTA. Working with the Imaging and Optics Facility, he collaborates with scientists from various disciplines to develop innovative solutions for imaging challenges. This includes designing and constructing new equipment and software.

Microscopy at the cutting edge involves more than the physics of imaging; it depends on coordinated control of hardware, automation, and image processing. Identifying the most suitable methods for specific projects can be a complex task. Hauschild provides extensive support in areas such as evaluating commercial microscopy equipment and implementing custom modifications in both hardware and software. His assistance ensures that scientists have access to the optimal tools and knowledge necessary for conducting their research effectively.

Current projects: Hardware for sample manipulation, and automation software (CZI); Accessories and protocols to evaluate and maintain microscope performance (CZI); Image analysis and quantification of a wide range of systems: Morphodynamics of immune cells (Sixt group); Bacteria in mother machines (Guet group); Antibiotic interactions (Guet group); Actin & collagen structure (Schur group); NIR spectroscopy (Freunberger group); Mesoscopic imaging systems (Sweeney group, Cremer group, Novarino group, de Bono group)

Career: Since 2021 Senior Staff Scientist, ISTA ■ 2010–2021 Staff Scientist, ISTA ■ 2007–2010 Engineer for laser scanning, light sheet, and two-photon microscopes, Zeiss MicroImaging, Jena, Germany ■ 2006–2007 Postdoc, Karlsruhe Institute of Technology, Germany ■ 2006 PhD, Karlsruhe Institute of Technology, Germany

Walter Kaufmann
Electron Microscopy Facility

Walter Kaufmann helps ISTA scientists apply advanced electron microscopy to their research in the life sciences.

Kaufmann focuses on the ultrastructural analysis of biological tissues and cells and the high-resolution localization of signaling proteins. He investigates their cell-type-specific expression, subcellular localization, and association with specific micro- and nano-domains. He applies state-of-the-art electron microscopy techniques and develops new sample preparation and analysis procedures. Key methodologies performed are pre- and post-embedding immunogold EM, serial section volume TEM, 3D electron tomography, high-pressure freezing freeze-substitution plus resin embedding (HPF-FS), platinum-replica EM, and freeze-fracture replica labeling. Currently, his main collaborations are in neuroscience, developmental biology, and plant cell biology.

Current projects: Ultrastructural localization of calcium source and sensors at the chemical synapse in the brain (Jonas group, Shigemoto group, Siegert group); Solute carrier detection in extracellular vesicles (Novarino group); Adhesion independent topography sensing of cells, and their high-resolution characterization migrating under confinement (Sixt group); Immunolabeling of growth hormones and subcellular trafficking proteins in the higher plant cell (Friml group)

Career: Since 2022 Senior Staff Scientist, ISTA ■ 2013–2022 Staff Scientist, ISTA ■ 2013 Habilitation in Neurosciences, Innsbruck Medical University, Austria ■ 2004–2013 Research Scientist, Innsbruck Medical University, Austria ■ 2002–2004 Postdoc, Centre for Molecular Biology and Neuroscience, Oslo, Norway ■ 1997–2002 Postdoc, Innsbruck Medical University, Austria ■ 1997 PhD, Leopold Franzens University Innsbruck, Austria

Peter Koppensteiner
Preclinical Facility

Peter Koppensteiner offers experimental and theoretical expertise on a wide range of physiology-related questions.

Koppensteiner's methodological repertoire comprises functional and structural techniques in acute brain and organoid slice preparations, such as patch clamp recordings (often combined with opto- and chemogenetics) and "Flash and Freeze" electron microscopy. He supports the development of cutting-edge physiology techniques at ISTA. In particular, he developed a new method to study the structural and molecular dynamics of neuronal connections, called "Flash and Freeze-fracture" (Shigemoto group). Furthermore, he supported the development of an acute slice single-cell RNA patch sequencing technique to study brain development, called "MADM-Cloneseq" (Hippenmeyer group). Importantly, Koppensteiner teaches neurophysiology and acute slice EM methods in theory and practice to ISTA students.

Current projects: Acute slice physiology of human brain organoids (Novarino group); Cortical physiology of autism model mice (Novarino group); Structural and molecular dynamics of neurotransmitter release using Flash and Freeze-fracture (Shigemoto group); Hemispheric asymmetry of hippocampal and habenula synapses (Shigemoto group); GABAergic transmission in the retina (Jösch group); Monoaminergic neuromodulation of periaqueductal gray and superior colliculus neurons (Jösch group); Cortical neurodevelopment using MADM-Cloneseq (Hippenmeyer group); Spinal cord physiology across development in frogs (Sweeney group); Sex-dependent microglial modulation of cortical neurotransmission after ketamine anesthesia (Siegert group)

Career: Since 2023 Staff Scientist, ISTA ■ 2017-2023 Postdoc, Shigemoto group, ISTA ■ 2015-2017 Postdoc, New York University, USA ■ 2015 PhD, Medical University of Vienna

Jack Merrin
Nanofabrication Facility

Microfluidics involves the experimental manipulation of fluids and objects, such as live cells, at small-length scales. Jack Merrin develops novel systems to study diverse biophysical phenomena in collaboration with various groups at ISTA.

Transparent microfluidic devices are ideal for analyzing single cells, as well as for cell culture and microenvironmental control, all of which can be performed during microscopy. With the Kicheva group, we study stem cell patterning using through-hole stencils. With the Friml group, we have studied the rapid temporal response of roots to auxin hormone within microchips, which are important for studying gravitropism. With the Sixt group, we found that dendritic cells move through obstacles along the path of least resistance to protect the nucleus and can also move by pushing off wavy walls in the absence of surface adhesion.

Other current projects: Spatiotemporal control of chemotactic gradients for immune cells, cancer cell migration in post arrays, and cell migration through obstacles and mazes (Sixt group); Single-cell mutation studies inside droplets and cell lineage analysis in microdevices (Guet group, Hof group); Organization of particles in microfluidic devices (Palacci group)

Career: Since 2024 Senior Staff Scientist, ISTA ■ 2013-2024 Staff Scientist, ISTA ■ 2012 Postdoc, Memorial Sloan Kettering Cancer Center, New York, USA ■ 2009-2011 Postdoc, The Rockefeller University, New York, USA

Mary Muhia
Preclinical Facility

Mary Muhia collaborates with various groups at ISTA to offer expertise in designing and implementing behavioral studies in animal models. She develops and establishes rodent paradigms at the Preclinical Facility to evaluate behavioral functions, including emotionality, social behavior, and different forms of cognition.

Research in behavioral neuroscience has improved our understanding of human conditions and led to the availability of tools necessary to understand the neurobiological basis of behavior. Muhia collaborates with groups that employ rat and mouse models to understand behavioral changes in various human neurodevelopmental and mental disorders. She also supports researchers interested in combining behavioral paradigms with *in vivo* imaging or optical techniques to understand neuronal ensembles that underlie cognitive functions.

Current Projects: Investigating the efficacy of 60-Hz light entrainment in modifying fear memories (Siegert group); Examining the role of calcium sensors in distinct hippocampus-dependent memory processes (Jonas group); Characterizing the role of Paired immunoglobulin-like receptor B (PirB) in hippocampal input-side–dependent asymmetry (Shigemoto group); Investigating how brain organoid integration into neural circuitry influences behavioral functions (Novarino group); Investigating hippocampal place cell activity during navigation using optogenetic stimulation and *in vivo* calcium imaging (Jonas group).

Career: Since 2021 Staff Scientist, ISTA ■ 2011-2020 Postdoc, Center for Molecular Neurobiology, Hamburg, Germany ■ 2010-2011 Postdoc, ETH Zurich, Switzerland ■ 2010 PhD, ETH Zurich, Switzerland

Christoph Sommer
Imaging and Optics Facility

Christoph Sommer specializes in image analysis, data science, and software development, particularly at the intersection of computer science and biology.

Sommer's collaborative efforts span various interdisciplinary projects, including multi-animal behavioral analysis with the Cremer and Novarino groups, and super-resolution imaging of expanded brain and plant tissue with the Danzl group. He has also developed a novel method for quantifying cytoskeletal proteins together with the Loose group. Currently, he is working with the Sweeney group to apply deep learning-based body part detection and tracking to study neural locomotor networks in *Xenopus* frogs. In collaboration with the Danzl group, he has established 3D spatial transcriptomics analysis. Additionally, through his work with the Imaging and Optics Facility (IOF), he introduces advanced bioimage analysis methods to a diverse user community.

Current projects: Expansion microscopy in plants and brain tissue (Friml group, Danzl group); Localization microscopy (Hetzer group); Mouse and ant behavioral analysis (Novarino group, Cremer group); Image enhancement (Danzl group, Heisenberg group); Treadmilling filaments and FRAP analysis (Loose group); Tadpole locomotion analysis (Sweeney group); Elastic stitching of cryo-electron tomographs (Schur group)

Career: Since 2017 Staff Scientist, ISTA ■ 2013-2017 Staff Scientist, Institute of Molecular Biotechnology (IMBA), Vienna, Austria ■ 2011-2013 Postdoc, ETH Zurich, Switzerland ■ 2010-2011 Postdoc, Heidelberg Collaboratory for Image Processing (HCI), Germany ■ 2010 PhD, University of Heidelberg, Germany

Facts & Figures

As an institution situated near Vienna, ISTA brings together people from different backgrounds, cultures, and mindsets. It fosters respectful and constructive dialogue and recognizes every individual's inherent worth and dignity, regardless of race, ethnicity, religion, sexual orientation, or any other characteristic.

77 Citizenships

Europe

Austria
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Czech Republic
Denmark
Estonia
Finland
France
Greece
Hungary
Germany
Ireland
Italy
Kosovo
Latvia
Luxembourg
Malta
North Macedonia
Poland
Portugal
Romania
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
The Netherlands
Türkiye
United Kingdom
Ukraine

North- and Central America

Canada
Cuba
El Salvador
Mexico
USA

South America

Argentina
Brazil
Chile
Colombia
Ecuador
Peru

Africa

Egypt
Kenya
Nigeria
Ghana
Sudan

Asia

Afghanistan
Azerbaijan
China
Cyprus
Hong Kong
India
Indonesia
Iran
Israel
Japan
Kazakhstan
Lebanon
Mongolia
Nepal
Pakistan
Philippines
Russia
Singapore
South Korea
Sri Lanka
Syria
Taiwan
Thailand
Turkmenistan
Vietnam

Oceania

Australia
New Zealand

■ Home countries of ISTA employees
■ No employees yet—looking forward to your application

34.9 Average Employee Age

Citizenships

As of December 31, 2025

■ Less than five people

	All Employees (excluding staff scientists due to data protection)	PhD Students	Postdoctoral Researchers	Professors	Scientific Interns	Scientific Support	Administrative Staff (including Construction & Maintenance)
Austria	341	49	13	14	6	95	164
Germany	93	26	20	14	■	15	15
India	84	33	33	■	5	11	■
Italy	79	19	28	6	■	23	■
China	67	26	32	■	■	5	■
Russia	59	39	8		■	7	■
USA	39	11	9	11	■	5	■
France	38	12	18	■		■	
Hungary	32	■	■	■		17	8
Slovakia	30	12	■	■		7	6
Spain	29	8	12	■		5	■
Czech Republic	28	13	5	■		7	■
United Kingdom	26	■	8	■	■	7	■
Iran	25	21			■	■	■
Ukraine	22	9	■	■	■	■	■
Poland	17	■	■	■	■	5	5
Other Coutries	279	95	66	20	9	52	37
Total	1,288	379	263	86	37	269	254

Campus Community

As of December 31, 2025; percentages are rounded

Professors: 86
Female: 24 (28%)
Male: 62 (72%)
(without visiting professors and faculty joining in 2026)

Dan Alistarh
Deep Algorithms and Systems (DASLab)

Zhanybek Alpichshev
Condensed Matter and Ultrafast Optics

Nick Barton
Evolutionary Genetics

Denitsa Baykusheva
Ultrafast Quantum Spectroscopy

Eva Benková
Plant Developmental Biology

Carrie Bernecky
RNA-based Gene Regulation

Jack Bravo
Bacterial Immune Systems

Alexander Bronstein
Bronstein Group

Tim Browning
Analytic Number Theory and Its Interfaces

Lisa Bugnet
Asterics – Asteroseismology and Stellar Dynamics

Ilaria Caiazzo
Stars and Compact Objects

Krishnendu Chatterjee
Computer-aided Verification, Game Theory

Bingqing Cheng*
Computational Materials Science

Xujia Chen**
Geometric Topology of Manifolds

Sylvia Cremer
Social Immunity

Jozsef Csicsvari
Systems Neuroscience

Johann Danzl
High-Resolution Optical Imaging for Biology

Mario de Bono
Genes, Circuits, and Behavior

Amelia Douglass
The Neurobiology of Homeostasis

Herbert Edelsbrunner
Discrete and Computational Geometry, Topological Data Analysis

László Erdős
Mathematics of Disordered Quantum Systems and Matrices

Simone Fatichi**
Environmental Biophysics and Ecohydrology

Xiaoqi Feng
Reproductive Genetics and Epigenetics

Carla Fernández-Rico**
Soft and Biofabricated Materials

Johannes Fink
Quantum Integrated Devices

Julian Fischer
Theory of Partial Differential Equations, Applied and Numerical Analysis

Stefan Freunberger
Materials Electrochemistry

Jiří Friml
Developmental and Cell Biology of Plants

Carl Goodrich
Theoretical and Computational Soft Matter

Ylva Götberg
Massive Binary Stars

Călin Guet
Systems and Synthetic Biology of Genetic Networks

Zoltán Haiman
Black Hole Astrophysics and Cosmology

Edouard Hannezo
Physical Principles in Biological Systems

Tamás Hausel
Geometry and Its Interfaces

Carl-Philipp Heisenberg
Morphogenesis in Development

Monika Henzinger
Algorithms

Thomas A. Henzinger
Design and Verification of Concurrent and Embedded Systems

Martin Hetzer
Protein Homeostasis and Aging

Simon Hippenmeyer
Genetic Dissection of Cerebral Cortex Development

Björn Hof
Nonlinear Dynamics and Turbulence

Onur Hosten
Quantum Sensing with Atoms and Light

Maria Ibáñez
Inorganic Materials from Nano to Macro Scales

Peter Jonas
Cellular Neuroscience

Maximilian Jösch
Neuroethology

Vadim Kaloshin
Dynamical Systems, Celestial Mechanics, and Spectral Rigidity

Georgios Katsaros
Nanoelectronics

Anna Kicheva
Tissue Growth and Developmental Pattern Formation

Rafal Klajn
Colloidal and Supramolecular Chemistry

Vladimir Kolmogorov
Discrete Optimization

Vivian Kuperberg**
Primes, Polynomials, and Patterns

Matthew Kwan
Combinatorics and Probability

Christoph Lampert
Machine Learning and Computer Vision

Mikhail Lemeshko
Theoretical Atomic, Molecular, and Optical Physics

Julian Léonard
Quantum Optics

Francesco Locatello
Causal Learning and Artificial Intelligence

Martin Loose
Self-Organization of Protein Systems

Jan Maas
Stochastic Analysis

Jorryt Matthee
Astrophysics of Galaxies

Alicia Michael
Genome Regulation and Biological Timekeeping

Kimberly Modic
Thermodynamics of Quantum Materials at the Microscale

Marco Mondelli
Data Science, Machine Learning, and Information Theory

Caroline Muller
Atmosphere and Ocean Dynamics

Gaia Novarino
Genetic and Molecular Basis of Neurodevelopmental Disorders

Jérémie Palacci
Materiali Molli

Francesca Pellicciotti
Cryosphere and Mountain Hydrosphere

Bartholomäus Pieber
Catalysis and Synthetic Methodology

Krzysztof Pietrzak
Cryptography

Hryhoriy Polshyn
Emergent Electronic Phenomena in 2D Materials

Florian Praetorius
Biomolecular Design

Julia Reisenbauer**
Biocatalysis and Protein Engineering

Samara Ren
Geometric Computing and Digital Fabrication

Matthew Robinson
Medical Genomics

Charles Roques-Carmes**
Nanophotonics and Light-Matter Interaction

Michael Sammler
Programming Languages and Verification

Andela Šarić
Computational Soft and Living Matter

Leonid Sazanov
Structural Biology of Membrane Protein Complexes

Paul Schanda
Biomolecular Mechanisms from Integrated NMR Spectroscopy

Florian Schur
Virus, Cell, and Tissue Architecture

Robert Seiringer
Mathematical Physics

Maksym Serbyn
Quantum Dynamics and Condensed Matter Theory

Ryuichi Shigemoto
Molecular Neuroscience

Sandra Siegert
Microglia-Neuron Interaction

Michael Sixt
Cellular Morphodynamics

Friedrich Stricker**
Photoresponsive Adaptive Molecules & Materials

Veronika Sunko
Symmetry Probes of Quantum Matter

Lora Sweeney
Evolution, Development, and Function of Motor Circuits

Gašper Tkačik
Information Processing in Biological Systems

Latha Venkataraman
Single-Molecule Physics and Chemistry

Beatriz Vicoso
Sex-Chromosome Biology and Evolution

Monica Visan**
Partial Differential Equations

Tim Vogels
Computational Neuroscience and Neurotheory

Uli Wagner
Discrete and Computational Geometry and Topology

Scott Waitukaitis
Soft Electrified Materials

Yuval Wigderson**
Extremal Combinatorics and Ramsey Theory

Chris Wojtan
Computer Graphics and Physics Simulation

Daniel Zilberman
Epigenetics and Chromatin

Staff Scientists: 8
(no gender data due to data protection)

Satish Arcot Jayaram
Preclinical Facility

Dániel Balázs
Lab Support Facility

Robert Hauschild
Imaging & Optics Facility

Walter Kaufmann
Electron Microscopy Facility

Peter Koppensteiner
Preclinical Facility

Jack Merrin
Nanofabrication Facility

Mary Muhia
Preclinical Facility

Christoph Sommer
Imaging & Optics Facility

One of the aims of this section is to report on gender identity. Due to the lack of available data, this current report can only contain data on the biological sex of an individual as recorded in a government-issued identity document. In this annual report, only people with either the male or female sex are included due to a lack of recordings of other sexes, and/or in order to keep anonymity.

*Visiting Professor
**joining ISTA in 2026 (pp. 66–69)

Campus Community

As of December 31, 2025; except Summer Interns and Scientific Interns; percentages are rounded

42 **ISTerns**
(summer interns)
♀ 23 (55 %) • ♂ 19 (45%)

146 **Scientific Interns**
(throughout the year)
♀ 68 (47%) • ♂ 78 (53%)

379 **PhD Students**
♀ 146 (39%) • ♂ 233 (61%)

263 **Postdoctoral Researchers**
♀ 89 (34%) • ♂ 174 (66%)

269 **Scientific Support**
(Lab Technicians, SSUs, and Academic Support)
♀ 166 (62%) • ♂ 103 (38%)

254 **Administrative Staff**
(including Construction & Maintenance)
♀ 127 (50%) • ♂ 127 (50%)

841 **Alumni**
(295 Graduates)
(546 Postdocs)
♀ 275 (33%) • ♂ 566 (67%)

Theses in 2025

PhD Theses

In 2025, 60 students completed their PhD, and one student completed their master's degree.

Julia Datler
Elucidating the structural determinants of the poxvirus core using multi-modal cryo-EM; Schur group

Georg Michael Arnold
Microwave-optic interconnects for superconducting circuits; Fink group

Ondřej Draganov
Structures and Computations in Topological Data Analysis; Edelsbrunner group

Mikhail Maslov
Emergent physics of rotating quantum impurities in many-body environments; Lemeshko group

Hüseyin Cihan Önal
Asymmetrical modulation of fear expression via GABAB receptors in the mouse medial habenula; Shigemoto group

Volker Karle
Non-equilibrium topological phases with periodically driven molecules and quantum rotors; Lemeshko group

Aline Monzer
Cell-Surface Auxin Signaling: Linking molecular pathways to plant development; Friml group

Linda Sartoris
The effect of circadian rhythm on organisational immunity of ant colonies; Cremer group

Marwan Elkrewi
Evolution of sex chromosomes, sex determination, and asexuality in *Artemia* brine shrimp; Vicoso group

Annamária Hlavatá
Regulation of Cytoplasmic RNA Polymerase II; Bernecky group

Andrea Cumpelik
The role of prefrontal spatial coding in supporting a contextual association task; Csicsvari group

Huihuang Chen
The cAMP second messenger in auxin signalling; Friml group

Riya Sett
Quantum Remote Sensing and Non-Equilibrium Phase Transitions in the Microwave Regime; Fink group

Sven Joscha Henheik
Modeling complex quantum systems – Random matrices, BCS theory, and quantum lattice systems; Erdős group

Lena Anna Maria Schwarz
Mapping developmental dynamics of autism spectrum disorder mouse models at single-cell resolution; Novarino group

Peter Heiss Synak
Methods for Fluid Simulation, Surface Tracking, and Statistics of Non-Manifold Structures; Wojtan group

Gökhan Yalnız
Transition to turbulence: Data-, solution-, and pattern-driven approaches; Hof group

Nikola Čanigová
Adaptive strategies of dendritic cell migration in response to environmental cues; Sixt group

Syamala Inumella
Molecular Mechanisms of Microtubule Reorganization in Elongating Root Epidermal Cells; Benková group

Bernd Prach
Robust Image Classification with 1-Lipschitz Networks; Lampert group

Stefanie Lehr
Dynamics of morphogen signalling and cell fate decisions in the dorsal neural tube; Kicheva group

Jakob Glas
Counting rational points over function fields; Browning group

Sarath Sankar Suresh
Turbulence in polymeric flows, A characterisation of Elasto-inertial turbulence and the Maximum drag reduction asymptote; Hof group

Jaime Sáez Mollejo
Singlet-Triplet Qubits in Planar Germanium; Katsaros group

Valentin Hübner
Reciprocity and inequality in social dilemmas; Chatterjee group

Florian Strahodinsky
Social immunity in a tri-partite host-pathogen relationship; Cremer group

Verena Schmied
Human microglia impact neuronal development in retinal organoid; Siegert group

Jakub Svoboda
Structural Properties of Games on Graphs; Chatterjee group

N. Ege Saraç
A Monitoring-Oriented Theory and Classification of Quantitative Specifications; Henzinger group

Hanna Schön
The ER complex SUTU-7/MACO-1 regulates the fate of mRNAs encoding GPCRs; de Bono group

Osvaldo Antonio Miranda Romero
Unraveling the Role of Pten in Cortical Stem Cell Lineage Progression using MADM; Hippenmeyer group

Jakob Vorlaufer
Construction of a cryo-super-resolution microscope to guide *in situ* structure analysis; Danzl group

Juan Carlos Antonio Sobarzo Ponce
Tribocharging of identical insulators: triboelectric series, triboelectric cycles and surface charges; Waitukaitis group

Patricia Reis-Rodrigues
Coordination of protrusive forces in immune cell migration; Sixt group

Raimundo Julián Saona Urmeneta
Robustness of Solutions in Game Theory; Chatterjee group

Yiqun Wang
The role of dynamin related protein 2A in cytokinin regulated plant growth and development; Benková group

Manas Bhargava
Design and Control of Deformable Structures: From PCB Lighting Displays to Elastomer Robots; Bickel group

Gianluca Tasinato
Topological Methods in Discrete Geometry and Theoretical Computer Science; Wagner group

Natália Ružičková
Effect propagation in biological networks; Tkačik group

David Babić
Mechanisms of auxin-mediated early embryogenesis in *Arabidopsis thaliana*; Friml & Benková groups

Andrea Trioni
High-Impedance Quantum Circuits for Mesoscopic Physics. Geometric Superinductors and Insulating Josephson Chains; Fink group

Caterina Giannini
Auxin signalling in *Arabidopsis thaliana* development; Friml & Loose groups

Kasumi Kishi
Regulation of notochord and floor plate size during mouse development; Kicheva & Hannezo groups

Seungho Lee
Nanoparticle-Based Precursors toward Advanced Crystalline Inorganic Solids; Ibáñez group

Florianne Evelien Miteva
The role of cyclooxygenase 1 on microglial response to inflammatory stressors; Siegert group

Michaela Mišová
Dissecting gap junction biology using the *C. elegans* nervous system; de Bono group

Suyash Naik
Keratins act as global coordinators of tissue spreading through mechanosensitive feedback; Heisenberg & Hannezo groups

Volodymyr Riabov
Universality in Random Matrices with Spatial Structure; Erdős group

Bryan Wu
An Examination on Phages as a Naturally Composable System; Guet group

Vincent Kiplangat Bett
Evolution and regulation of the Z chromosome; Vicoso group

Sadashige Ishida
Symplectic-prequantum structures and dynamics on the codimension-2 shape space; Wojtan group

Soumyadip Mondal
Oxygen and Sulfur Redox: Conversion Kinetics and Phase Equilibria; Freunberger group

Charlotte Hoffmann
Theory and Applications of Verifiable Delay Functions; Pietrzak group

Filippo Quattrocchi
Optimal Transport Methods for Kinetic Equations, Boundary Value Problems, and Discretization of Measures; Maas group

Arka Pal
Using genealogies to study the genomic basis of species divergence; Barton group

Marko Kojić
Towards understanding the assembly mechanisms of the Z-ring in Archaea and Bacteria; Loose group

Raquel Casado Polanco
Role of NOTCH Signaling in Radial Glial Progenitor Lineage Progression; Hippenmeyer group

Predrag Živadinović
Scale-free activity as a basis for spatial learning and memory in the brain; Csicsvari group

Sebastian Wald
Atoms in a Propagating-Wave Cavity for Squeezed Mach-Zehnder Atom Interferometry; Hosten group

Simon Rella
Adaptive Processes in Biology and Culture: Models of Evolving Vaccine Resistance and the Record Statistics of Innovation; Tkačik & Kondrashov groups

Master Theses

Arian Etemadihaghighi
Filling the Holes of Non-Manifold Self-Intersecting Meshes for Implicit Topology Changes in Surface Tracking; Wojtan group

Fields of Research

As of December 31, 2025; except Scientific Interns and Summer Interns

	Professors	Postdoctoral Researchers	PhD Students	Scientific Interns (throughout the year)	Summer Interns
Astronomy	4	8	7	5	4
Biology	21	85	64	31	7
Chemistry	6	20	21	10	4
Computer Science	13	24	48	34	10
Earth Sciences	2	11	5	2	
Mathematics	9	20	21	3	4
Neuroscience	11	31	45	22	4
Physics	20	64	72	37	9
SSU				2	
Unaffiliated			96		
Total	86	263	379	146	42

Grants 2025

Active and awarded third-party funding in 2025

Newly Awarded Research Grant Funding in 2025
Rounded, pooled amounts per funding body.

Funder	Total Funding (Contract)
NOMIS	€20,000,000
ERC	€18,640,000
FWF	€7,105,000
CZI	€1,317,000
ÖAW	€1,260,000
WWTF	€763,000
Other EU	€719,000
Google Research	€544,000
FFG	€335,000
NOEF	€197,000
HFSP	€194,000
EMBO	€163,000
GFF	€148,000
BMBWF	€120,000
OeAD EACEA	€26,000
BMWFW	€15,000
Others	€3,361,000
Total newly awarded funding	**€54,906,000***

* Individual amounts are rounded; total reflects the actual sum

List of abbreviations

BIF
Boehringer Ingelheim Fonds
BMBWF
Bundesministerium für Bildung, Wissenschaft und Forschung
CZI
Chan Zuckerberg Initiative
DFG
Deutsche Forschungsgemeinschaft
EMBO
European Molecular Biology Organization
– **PF** Postdoctoral Fellowship
EIC
European Innovation Council
ESA
European Space Agency
ERA
European Research Area
ERC
European Research Council
– **AdG** Advanced Grant
– **CoG** Consolidator Grant
– **PoC** Proof of Concept Grant
– **StG** Starting Grant
– **SyG** Synergy Grant
FEBS
Federation of European Biochemical Societies
FFG
Forschungsförderungs-gesellschaft
FWF
Fonds zur Förderung der wissenschaftlichen Forschung
– **COE** Cluster of Excellence
– **EF** Emerging Fields
– **FG** Forschungsgruppen
– **IP** International Program
– **PIP** Principal Investigator Project
– **SFB** Spezialforschungs-bereich
– **StA** Stand-Alone
GFF
Gesellschaft für Forschungsförderung Niederösterreich (prev. NFB)
– **FTI** Forschungs-, Technologie-, und Innovationsstrategie
HE
Horizon Europe
– **RIA** Research and Innovation Action
HFSP
Human Frontier Science Program
– **LTF** Long-term Postdoctoral Fellowship
H2020
Horizon 2020
JSPS
Japan Society for the Promotion of Science
MSCA
Marie Skłodowska-Curie Actions
– **DN** Doctoral Network
– **PF** Postdoctoral Fellowship
NFB
Niederösterreich Forschung und Bildung
NIH
National Institutes of Health
NÖF
Land Niederösterreich – Funds
OeAD
Österreichischer Austauschdienst
– **WTZ** Wissenschaftlich-Technische Zusammenarbeit
ÖAW
Österreichische Akademie der Wissenschaften
– **DOC** Doctoral Fellowship Program
ScS
Schmidt Sciences
SNF
Schweizer Nationalfonds
– **PDM** Postdoc.Mobility Fellowship
TSF
Takenaka Scholarship Foundation
WSS
Werner Siemens Stiftung
WWTF
Wiener Wissenschafts-, Forschungs-, und Technologiefonds

Alistarh Group
– Vienna Graduate School on Computational Optimization, FWF DK, €152,000; 3/20-8/25
– FastML: Efficient and Cost-Effective Distributed Machine Learning, HE ERC PoC, €150,000; 5/24-10/25
– Next-Generation Compression for Massive Models, Google Internal, €28,000; 1/25-12/26
– Alistarh-Hoefler Research Cooperation Agreement, SPCL COOP, €50,000; 11/25-10/26

Alpichshev Group
– Center for Correlated Quantum Materials and Solid State Quantum Systems: Nonlinear THz spectroscopy of quantum critical materials, FWF SFB, €251,000; 1/23-12/26

Barton Group
– Dynamics of Wolbachia Spread in Rhagoletis cerasi, FWF StA (National Research Partner), €84,000; 6/22-5/26
– Understanding the evolution of continuous genomes, HE ERC AdG, €2,500,000; 9/22-8/27
– Understanding Polygenic Adaptation, FWF SFB, €370,000; 1/24-12/27
– The Population Genetics of Heterogeneity in Space and Time, ÖAW DOC, €102,000; 9/25-8/27
– On the Predictability of Hybrid Fitness, FWF ESPRIT, €371,000; 3/26-2/29

Baykusheva Group
– Towards quantum sensing at ultrafast speeds, FWF 1000 Ideas, €183,000; 8/25-1/27

Benková Group
– Post-translational Control of CRFs in Plant N Signalling, FWF ESPRIT, €288,000; 2/22-1/25
– Breeding for coffee and cocoa root resilience in low input farming systems based on improved rootstocks, HE RIA Cluster Biodiversity, €375,000; 10/22-9/26
– Adenylate and Guanylate Cyclase Functionalities of Arabidopsis Histidine Kinase Receptors, OeAW DOC, €99,000; 9/24-8/26
– Phytohormonal cell cycle control in the plant root meristem, FWF IP, €466,000; 6/25-5/29

Bernecky Group
– RNAdeco: decorating RNA for a purpose/ P03- Roles of A-to-I editing in dsRNA recognition, FWF SFB, €373,000; 3/24-2/28
– Structure and function of the NCoR complex and SETD5, FWF PIP, €480,000; 9/24-8/27
– Hacking the ribosome to map virus-host associations, HE EIC Pathfinder Open, €375,000; 2/25-1/29

Bravo Group
– Understanding the molecular mechanisms of an Hsp90 repurposed for anti-phage defense, EMBO PF, €37,000; 1/25-6/25
– Unfolding the mechanisms of Tiamat, a unique prokaryotic defense system, HFSP LTF, €194,000; 7/25-6/28
– Molecular Mechanisms of Specific Plasmid Targeting, FEBS Excellence Award, €100,000; 1/26-12/28
– Search & Destroy: Mechanisms of anti-plasmid immunity, FWF PIP, €449,000; 12/25-11/29

Bronstein Group
– Acoustics-based drone navigation and interaction, H2020 ERC CoG, €375,000; 10/24-6/26
– Sounds of Silence: Codons and Chaperones in the Protein Folding Concert, WWTF LS24, €180,000; 7/25-6/29

Browning Group
– Rational curves via function field analytic number theory, FWF StA, €361,000; 12/22-11/25

Bugnet Group
– Unveiling the mysteries of stellar dynamics: a pioneering journey in magnetoasteroseismology, HE ERC StG, €1,499,000; 10/24-9/29
– Unveiling the structure and dynamics of the deep convective core – radiative zone boundary throughout stellar evolution, ÖAW DOC, €102,000; 9/25-8/27

Chatterjee Group
– Microsoft Research Faculty Fellowship, €143,000; 4/11-12/26
– Formal Methods for Stochastic Models: Algorithms and Applications, H2020 ERC CoG, €1,998,000; 1/21-12/25
– Probably the best moment to terminate, WWTF ICT25, €293,000; 1/26-12/29

Cheng Group
– Development of a protective inorganic interface for using metallic Mg anodes in next-generation Mg-ion batteries, FFG Energieforschung, €213,000; 1/23-12/25

Cremer Group
– Ant Hygiene Behavior, FFG Praktikum, €1,200; 6/25-6/25
– Antiviral ART in Ants, FWF PIP, €458,000; 7/25-6/28

Danzl Group
– CryoMinflux-guided in-situ molecular census and structure determination, CZI Visual Proteomics, €415,000; 8/21-12/25
– Multi-modal mapping of neural circuits, CZI, €1,317,000; 6/25-5/27
– Multimodal Characterization of Human Brain Tissue, Google Internal, €450,000; 6/25-5/29
– Molecularly informed dense connectomic mapping of mammalian brain tissue, HE ERC AdG, €2,844,000; 1/26-12/30

de Bono Group
– Roles of MALT-1 and NFKI-1/IKBzeta in IL-17 neuromodulation, FWF Lise Meitner, €178,000; 2/22-1/25
– Regulation of mRNA expression at the ER, FWF ESPRIT, €294,000; 8/22-7/25
– Molecular Dynamic of Neurons during C. elegans Lifespan, HE MSCA DN, €270,000; 9/23-8/27
– What Modulates the Modulator? Discovering Genes that Regulate Neuronal Calmodulin Activity, BIF PhD Fellowship, €59,000; 5/24-4/26
– Die Modellierung der Neurodegeneration mit Eisenspeicherung im Gehirn (NBIA) durch C. elegans, GFF FTI Dissertationen, €76,000; 9/24-8/27
– C. Elegans genetics, FFG Praktikum, €1,200; 7/25-7/25

Douglass Group
– The hypothalamic control of behavioral and physiological adaptations to stress, HE ERC StG, €1,498,000; 4/26-3/31

Edelsbrunner Group
– Quantitative Unbiased Shape Analysis with Geometry & Topology, FWF ESPRIT, €341,000; 3/25-2/28

Erdős Group
– Random matrices beyond Wigner-Dyson-Mehta, H2020 ERC AdG, €1,912,000; 10/21-9/26
– Random matrix and finite free probabilistic limits of differential, FWF ESPRIT, €347,000; 5/25-4/28

Feng Group
– EMBO Young Investigator Program – Xiao Feng, €10,000; 5/23-12/27
– JSPS Research Fellowship for Young Scientists, €44,000; 9/23-3/25
– The moleculaR mEchAnismS Of dNa methylatIon reprogrammiNg in Arabidopsis sexual lineaGe, HE MSCA PF, €199,000; 4/24-3/26
– Mechanisms and biological functions of H3K27me3 reprogramming in plant microspores, HE ERC CoG, €2,000,000; 6/24-5/29
– Promoter-proximal Pol II pausing as a novel mechanism of gene regulation in plant pollen, ÖAW APART MINT, €94,000; 8/24-7/25
– Epigenetic regulation of nurse cells underlying reproductive thermotolerance, Japanese Biochemical Society Osamu Hayaishi Memorial Scholarship for Study Abroad, €44,000; 4/26-3/27

Fink Group
– Protected states of quantum matter, NOMIS Research Project, €550,000; 2/22-10/26
– Cavity Quantum Electro Optics: Microwave photonics with nonclassical states, HE ERC CoG, €1,999,000; 9/23-8/28
– Open Superconducting Quantum Computers (OpenSuperQPlus), HE Cluster Digital, Industry, and Space, €531,000; 3/23-8/26
– Quantum Information Systems Beyond Classical Capabilities, FWF SFB, €498,000; 3/23-2/27
– Cavity-Integrated Electro-Optics: Measuring, Converting and Manipulating Microwaves with Light, HE EIC Pathfinder Open, €766,000; 2/25-1/28
– Integrated optical coupling for low loss electro-optic interconnects, HE ERC PoC, €150,000; 8/25-1/27

Fischer Group
– Bridging Scales in Random Materials, H2020 ERC StG, €1,143,000; 3/21-2/26
– Taming Complexity in Partial Differential Systems, FWF SFB, €203,000; 3/21-2/26
– Analytic derivation of effective models in physics of matter, FWF ESPRIT, €347,000; 7/26-6/29

Freunberger Group
– Electrode development for novel all-organic redox flow batteries, GFF FTI Grundlagenforschung, €131,000; 9/23-8/26
– Reactive oxygen species at TM oxide intercalation materials, Alistore PhD Fellowship, €120,000; 12/23-11/26
– Singlet oxygen in non-aqueous oxygen redox chemistry, FWF StA, €399,000; 4/24-3/27
– Ligating Quinoidal Compounds for Battery Electrodes, FWF ESPRIT, €375,000; 5/25-4/28
– Electro-fermentation as advanced tool for targeted bioproduction of green fuels and chemicals, FFG COMET, €322,000; 4/26-3/30

Friml Group
– A Case Study of plant adaptation to effects of water scarcity: Mechanism of MIZI-mediated hydrotropism, ÖAW DOC, €99,000; 9/24-8/26
– AFB1-generated cGMP targets CNGC14 to trigger rapid auxin responses in plants, HE MSCA PF, €230,000; 1/26-12/27
– Cyclic nucleotides as second messengers in plants, HE ERC AdG, €2,500,000; 6/24-5/29
– Developmental and Cell Biology of Plants, FWF Wittgenstein, €1,700,000; 7/25-6/30
– Guanylate cyclase activity of TIR1/AFBs auxin receptors, FWF StA, €422,000; 8/23-7/27
– Identification of a novel regulator in auxin canalization, FWF ESPRIT, €294,000; 12/22-11/25
– Light signalling via cAMP/ cGMP second messengers in plants, FWF IP, €454,000; 11/25-10/29
– Molecular mechanism underlying auxin regulation of autophagy in plants, EMBO PF, €144,000; 9/23-8/25
– Peptide receptors for auxin canalization in Arabidopsis, FWF IP, €407,000; 9/22-8/26
– Tailored molecular adaptation to drought: A soybean case study, NFB FTI, €13,000; 6/22-6/25
– TIR1-generated cAMP as second messenger in transcriptional auxin signaling, EMBO PF, €144,000; 1/24-12/25
– Körber Prize, €41,000; 4/15-12/26

Goodrich Group
– Dynamically reconfigurable self-assembly with triangular DNA-origami bricks, GFF FTI Grundlagenforschung, €270,000; 3/24-2/27
– Functional bio-inspired nanomachines from sticky colloids, FWF PIP, €472,000; 9/24-8/27

Götberg Group
– The Role of Binary-Stripped Stars: from Atomic Scales to Cosmic Dawn, HE ERC StG, €1,500,000; 9/26-8/31

Guet Group
– Non-canonical antibiotic interactions, FWF ESPRIT, €324,000; 3/23-7/26
– Evolutionary analysis of gene regulation, FWF IP, €395,000; 7/22-2/26
– The Effect of Persistent Non-Steady States in Gene Regulation via Stable DNA Loops, ÖAW DOC, €99,000; 9/24-8/26
– FFG Praktikum – Guet Group, €1,200; 8/25-8/25
– Decoding phage-bacteria interaction: the role of physiology in temperate phage decision making, GFF FTI Dissertationen, €74,000; 9/25-8/28

Haiman Group
– Enabling multi-messenger science with black hole binaries, HE ERC AdG, €2,650,000; 9/26-8/31

Hannezo Group
– Design Principles of Branching Morphogenesis, H2020 ERC StG, €1,453,000; 7/20-6/26
– Motile active matter models of migrating cells and chiral filaments, OeAW DOC, €77,000; 7/22-7/25
– Multiscale Dynamics of Mammary Gland Remodeling, FWF IP, €399,000; 2/23-1/27
– Information flow in embryonic self-organization, OeAW APART MINT, €92,000; 8/24-3/25
– Decoding and engineering multiscale mechano-responses in synthetic and biological tissues, WWTF LS24, €262,000; 7/25-6/29
– Robustness of morphogenesis via noise and mechano-chemical feedbacks, HE ERC CoG, €1,999,000; 1/27-12/31

Hausel Group
– Geometry of the tip of the global nilpotent cone, FWF StA, €378,000; 10/22-9/25
– Arithmetic, geometry, topology and representation theory arising from the affine Grassmannian, ÖAW DOC, €99,000; 9/24-8/26
– Representation theory, equivariant topology and Langlands duality via fixed point schemes, HE ERC AdG, €2,500,000; 3/26-2/31
– Big algebras in classical types, ÖAW DOC, €102,000; 10/25-9/27
– Enumerative Geometry of Character Varieties, FWF ESPRIT, €347,000; 10/25-9/28

Heisenberg Group
– Bridging biophysics and evolution: impact of intermediate filament evolution on tissue mechanics, HFSP Research Grant, €306,000; 9/22-8/25
– Cytoplasmic reorganization in zebrafish oocytes, FWF StA, €366,000; 11/22-10/25
– Mechanosensitive signaling activation in the crosstalk between mechanical force and tissue fluidity, EMBO PF, €139,000; 2/23-1/25
– Metabolic regulation of cell cleavages in early embryogenesis, HE MSCA PF, €199,000; 3/24-2/26
– Keratins in epithelial tissue spreading, FWF PIP, €454,000; 7/24-6/27
– Conserved and divergent mechanisms underlying cytokinesis in early vertebrate and invertebrate embryogenesis, HE MSCA PF, €199,000; 5/24-4/26
– Cytoplasmic self-organization into cell-like compartments as a common guiding principle in early animal development, NOMIS Research Project, €960,000; 10/24-9/29
– Dissecting the establishment of early embryonic geometries, FWF ESPRIT, €341,000; 12/24-11/27

Henzinger Monika Group
– Efficient algorithms, FWF Wittgenstein, €1,500,000; 3/23-2/28
– The design and evaluation of modern fully dynamic data structures, H2020 ERC AdG, €2,192,000; 3/23-12/26
– Fast Algorithms for a Reactive Network Layer, FWF StA, €173,000; 3/23-3/25
– Static and Dynamic Hierarchical Graph Decompositions, FWF IP, €145,000; 3/23-2/27

Henzinger Thomas Group
– Vigilant Algorithmic Monitoring of Software, H2020 ERC AdG, €2,451,000; 1/22-12/26
– Interface Theory for Security and Privacy, FWF SFB, €284,000; 1/23-12/26

Higginbotham Group
– Protected states of quantum matter, NOMIS Research Grants, €550,000; 2/22-10/26

Hippenmeyer Group
– Role of cell lineage in generating cell-type diversity in developing neocortex, EMBO PF, €144,000; 1/24-12/25
– Stem Cell Modulation in Neural Development and Regeneration, FWF SFB, €413,000; 3/24-2/28

Hof Group
– Hydrodynamic stability of pulsatile flow of complex fluids, FWF IP JP DFG, €319,000; 1/24-12/26
– Pattern Formation Mechanisms in Planar Shear Flows, FWF ESPRIT, €341,000; 9/24-12/25

Hosten Group
– A quantum hybrid of atoms and milligram-scale pendulums: towards gravitational quantum mechanics, HE ERC CoG, €2,000,000; 6/23-5/28

Ibañez Group
– HighTE: The Werner Siemens Laboratory for the High Throughput Discovery of Semiconductors for Waste Heat Recovery, €8,000,000; 9/20-8/28
– Mediated Biphasic Battery, HE EIC Pathfinder Open, €380,000; 5/22-10/25

Jonas Group
– Mechanisms of GABA release in hippocampal circuits, FWF StA, €596,000; 2/23-1/27
– Synaptic networks of human brain, FWF PIP, €400,000; 6/24-5/28
– Synaptic mechanisms of engram storage and retrieval in CA3 hippocampal microcircuits, HE ERC AdG, €2,500,000; 12/25-11/30

Jösch Group
– Action Selection in the Midbrain: Neuromodulation of Visuomotor Senses, HE ERC CoG, €1,998,000; 10/23-9/28
– Evolution of Sensorimotor Transformation Across Diptera, DFG Priority Program, €381,000; 3/24-2/27
– Defining the behavioural repertoire instructed by the fly's "cockpit", ÖAW DOC, €102,000; 9/25-8/27

Kaloshin Group
– Spectral rigidity and integrability for billiards and geodesic flows, H2020 ERC AdG, €1,821,000; 3/21-2/26

Katsaros Group
– Protected states of quantum matter, NOMIS Research Project, €550,000; 2/22-10/26
– Center for Correlated Quantum Materials and Solid State Quantum Systems: Conventional and unconventional topological superconductors, FWF SFB, €507,000; 1/23-12/26
– Integrated Germanium Quantum Technology, HE Cluster Digital, Industry, and Space, €260,000; 7/22-12/25
– Merging spin and superconducting qubits in planar Ge, FWF StA, €399,000; 1/23-12/26
– Quantum bits with Kitaev Transmons, HE EIC Pathfinder Challenges, €697,000; 10/23-9/27
– Realization and Manipulation of a Planar hybrid superconducting Andreev spin qubit in Germanium, HE MSCA PF, €184,000; 3/25-2/27
– Transversal and longitudinal coupling of hope spins in planar Germanium, FWF PIP, €486,000; 8/24-7/28
– Superconducting spin qubits in planar Ge, FWF PIP, €454,000; 9/25-8/29

Kicheva Group
– The role of mechanosensitive feedback on the regulation of tissue growth in the developing neural tube, EMBO PF, €139,000; 2/23-2/25
– Mechanisms of tissue size regulation in spinal cord development, HE ERC CoG, €1,993,000; 12/22-11/27
– Stem Cell Modulation in Neural Development and Regeneration/ P02-Morphogen control of growth and pattern in the spinal cord, FWF SFB, €414,000; 3/24-2/28

Klajn Group
– Adaptive and self-regulating non-equilibrium systems by integrating molecular photoswitches with pH-feedback mechanisms, Minerva Stiftung ARCHES Award, €45,000; 8/23-6/25
– Photoresponsive inverse micelles, FWF ESPRIT, €341,000; 9/24-8/27

Kolmogorov Group
– Vienna Graduate School on Computational Optimization, FWF DK, €152,000; 3/20-8/25

Kwan Group
– Randomness and structure in combinatorics, HE ERC StG, €1,344,000; 5/23-4/28
– Thresholds in Semi-Random Embeddings and Graph Embeddings, FWF ESPRIT, €341,000; 5/24-2/25
– Combinatorial Optimisation Problems on Sparse Random Graphs, FWF ESPRIT, €341,000; 7/24-6/27

Lemeshko Group
– Non-Equilibrium Field Theory of Molecular Rotations, HE MSCA PF, €199,000; 2/23-1/25
– Coherent Optical Metrology Beyond Electric-Dipole-Allowed Transitions, FWF SFB, €713,000; 3/24-2/28
– Polarons in Lead Halide Perovskites, ÖAW APART MINT, €96,000; 8/24-7/25

Léonard Group
– Fermionic Fractional Quantum Hall Systems under the Microscope, HE MSCA PF, €214,000; 4/25-3/27
– Optical Tweezers, FFG Praktikum Student:innen, €8,000; 8/25-2/26
– Non-abelian anyons in programmable lattices, HE ERC StG, €1,000,000; 9/25-7/29
– Quantum optimization with an atom-light simulator, FWF START, €190,000; 9/25-10/27
– Neutral-atom quantum systems with high connectivity, FWF SFB, €525,000; 3/26-2/30

Locatello Group
– Causal Lifting: Eliciting causal knowledge from statistical models, Google Research Scholar Program, €56,000; 5/24-4/26
– Epistemology for the AI age at the example of virtual cells, CZI AI Residency Program, €992,000; 10/24-9/26
– Building Energy Systems on causal reasoning, FFG Technologien und Innovationen für die klimaneutrale Stadt, €148,000; 4/25-3/27
– FFG Praktikum – Locatello Group, €1,200; 7/25-7/25
– Representation learning for uncovering causality in science, Google PhD Fellowship, €51,000; 10/25-9/26
– Water from the mountains: global re-analysis and future tipping points (ISTA Collaborators: Pellicciotti and Fatichi Groups), ScS VIEW; 3/26-2/31

Loose Group
– A synthetic and structural biology approach to study regulatory networks of Rab GTPases, HE ERC CoG, €1,929,000; 1/23-12/27
– Deciphering lipid-transport mechanism at inter-organelle membrane contact sites during autophagosome biogenesis, EMBO PF, €144,000; 4/24-4/26
– Mechanisms and evolution of FtsZ regulation, FWF PIP, €450,000; 2/26-1/29
– SynCellEU programme for recruiting next generation European leaders in Synthetic Cell research, HE MSCA Cofund, TBD; TBD

Maas Group
– Taming Complexity in Partial Differential Systems: Structure preserving variational discretization via optimal transport, FWF SFB, €531,000; 3/17-2/26

Matthee Group
– Young galaxies as tracers and agents of cosmic reionization, HE ERC StG, €1,498,000; 9/23-8/28
– Witnessing galaxies' birth with JWST spectroscopy, MERAC Prize, €100,000; 9/23-11/25
– Dark UNiverse Exploration, FWF SFB, €381,000; 7/26-6/29

Michael Group
– Circadian structural transitions of chromatin, HE ERC StG, €1,625,000; 1/25-12/29

Modic Group
– A new probe of multipole physics in Pr-based compounds, FWF ESPRIT, €301,000; 5/22-8/25
– Center for Correlated Quantum Materials and Solid State Quantum Systems: Scale invariance in entangled quantum spin systems, FWF SFB, €277,000; 1/23-12/26
– Gaining leverage with spin liquids and superconductors, HE ERC StG, €2,325,000; 5/23-4/28
– Probing quantum spin liquid states and scale-invariance in α-RuCl3 and beyond: high magnetic field studies of Kitaev materials, GFF FTI Dissertationen, €76,000; 9/24-8/27
– Tuning Symmetry and Electronic Order in Kagome Metals via Strain and Dimensional Control, São Paulo Research Foundation Research Internship Abroad Fellowship, €50,000; 12/25-11/26
– Unraveling the mysteries of 1T-TaS2, FWF StA, €423,000; 4/22-3/26

Mondelli Group
– Prix Lopez-Loretta 2019 – Marco Mondelli, €1,000,000; 10/20-9/25
– Inference in High Dimensions: Light-speed Algorithms and Information Limits, HE ERC StG, €1,662,000; 10/24-9/29
– Trustworthy Deep Learning Theory: Private Over-Parameterized Models and Robust LLMs, Google PhD Fellowship, €54,000; 10/24-9/26

Muller Group
– organization of CLoUdS, and implications of Tropical cyclones and for the Energetics of the tropics, in current and waRming climate, H2020 ERC StG, €719,000; 9/21-5/25

Novarino Group
– Multi-level analysis of negative valence in ASD models, FWF FG, €616,000; 4/22-9/26
– Reducing the impact of major environmental challenges on mental health, HE Cluster Health, €430,000; 6/22-5/27
– Toward an understanding of the brain interstitial system and the extracellular proteome in health and autism spectrum disorders, HE ERC CoG, €1,998,000; 12/22-11/27
– Stem Cell Modulation in Neural Development and Regeneration/ P07-Neural stem cells in autism and epilepsy, FWF SFB, €408,000; 3/24-2/28
– Enhancing brain resilience to prevent neurodevelopmental disorders, FWF EF, €1,170,000; 10/24-9/29
– Tailored Approaches targeting Pathophysiology in GRIN-related neurodevelopmental disorders, FWF IP ERA, €439,000; 5/25-5/28
– Deciphering the contribution of common non-coding genetic variation to Autism Spectrum Disorders, CaixaRes Health, €150,000; 1/26-12/28
– Biological Drivers of Sex Differences in Brain Development, Engelhorn Foundation Postdoctoral Fellowship, €187,000; 1/26-12/27

Palacci Group
– Emergent Phenomena in Collection of Autonomous Spinning Microgears Guided by Light, Army Research Office Basic Research Award, €264,000; 11/22-11/25
– Emergent Behavior in Spinning Active Matter, FWF StA, €400,000; 2/22-1/26
– VULCAN: matter, powered from within, HE ERC CoG, €1,965,000; 9/23-8/28

Pellicciotti Group
– ExPloring the eco-hydrological Impacts of a changing Cryosphere in the Peruvian Andes, HE MSCA PF, €184,000; 1/24-12/25
– Evaluation glacier mass balance by modeling topographic features on debris-covered glaciers, TSF Scholarship for Studying Abroad, €103,000; 7/23-7/28
– Resolving the thickness of debris on Earth's glaciers and its rate of change, SNF Project Funding II, €686,000; 7/23-2/26
– Glacier retreat and their impact on mountain ecosystems and agriculture in Peru, SNF SPIRIT, €289,000; 5/23-1/26
– Megadroughts in the Water towers of Europe – from process understanding to strategies for, FWF IP ERA, €397,000; 4/24-3/27
– Inverting Mountain Meteorology From Cryospheric Remote Sensing And Ecohydrological Modelling, ESA MOST D6, €55,000; 7/25-12/27
– INferring Glacier mEteorology through phySical modeling and remoTe sensing, HE MSCA PF, €214,000; 6/25-5/27
– From ice to microorganisms and humans: Toward an interdisciplinary understanding of climate change impacts on the Third Pole, SPI FI, €105,000; 3/24-2/26
– Water from the mountains: global re-analysis and future tipping points (ISTA Collaborators: Pellicciotti and Fatichi Groups), ScS VIEW; 3/26-2/31

Pieber Group
– Photoactive ligands for transformative nickel catalysis, FWF PIP, €481,000; 5/24-4/28
– Iron catalyzed carbon–carbon cross-couplings triggered by visible-light, American Chemical Society Ignition Grant, €40,000; 10/24-3/25
– 2024 Preis der Dr. Otto-Röhm-Gedächtnisstiftung für Hochschullehrer- Nachwuchs in der deutschsprachigen Chemie, €2,000; 1/25-12/26

Pietrzak Group
– Security and Privacy by Design for Complex Systems, FWF SFB, €284,000; 1/23-12/26
– ProvACAna: Provable Algebraic CryptAnalysis, FWF ESPRIT, €347,000; 3/26-2/29
– Foundations and Applications of Resource-Restricted Cryptography, WWTF ICT25, €290,000; 20/26-9/30
– SCALE2: SeCure, privAte, and interoperabLe layEr 2, WWTF ICT22, €237,000; 6/23-12/25

Polshyn Group
– Orbital Chern Insulators in van der Waals Moiré systems, HE ERC StG, €1,832,000; 7/24-6/29

Praetorius Group
– Design of Nucleic Acid-Templated Ordered Protein Assemblies, HE ERC StG, €1,500,000; 3/24-2/29
– De novo design of an enzyme regulated allosterically by RNA, SNF PDM, €118,000; 8/24-9/26

Šarić Group
– Non-Equilibrium Protein Assembly: from Building Blocks to Biological Machines, H2020 ERC StG, €1,055,000; 1/22-9/25
– EMBO Young Investigator Program – Anđela Šarić, €15,000; 1/22-12/26
– Modelling cell division and repair by ESCRT-III filaments, Vallee Foundation Vallee Scholar Award, €335,000; 9/22-8/26
– How do you build a wall? Mechanistic principles of bacterial division septum building, Wellcome Trust Discovery Award, €944,000; 1/24-1/32
– Condensates at Membrane Scaffolds – Integrated Systems as Synthetic Cell Compartments, HE MSCA DN, €270,000; 11/24-10/28
– Chemically active membranes in evolution of cell shape, Allen Foundation Distinguished Investigator Awards, €459,000; 12/24-11/27
– Studying the machinery driving bacterial cell division, GFF FTI Dissertationen, €74,000; 9/25-8/28
– ÖAW APART-USA Nomination – Yongick Cho, €375,000; 11/25-10/29
– SynCellEU programme for recruiting next generation European leaders in Synthetic Cell research, HE MSCA Cofund, TBD; TBD

Sazanov Group
– Structure and mechanism of respiratory chain molecular machines, H2020 ERC AdG, €1,781,000; 9/21-8/26
– Mitochondrial Complex I as a Target for Neuroprotection in AD, NIH R01, €293,000; 9/22-8/25
– Capturing the respiratory chain in action with time-resolved cryo-EM, EMBO PF, €148,000; 2/26-1/28

Schanda Group
– AlloSpace. The emergence and mechanisms of allostery, FWF IP JP ANR, €303,000; 2/22-5/26
– Exploring protein dynamics by solid-state MAS NMR through specific labeling approaches, ÖAW DOC, €117,000; 9/23-2/26
– High sensitivity room temperature NMR detection for biological samples, FFG EUROS 3, €216,000; 3/25-2/27
– Protein import mechanisms at the mitochondrial entry gate, FWF PIP, €450,000; 1/26-12/28
– Structure and mechanism of the mitochondrial MEM insertase, FWF IP, €372,000; 5/23-4/26

Schur Group
– CryoMinflux-guided in-situ molecular census and structure determination, CZI Visual Proteomics, €407,000; 8/21-12/25
– Integrated visual proteomics of reciprocal cell-extracellular matrix interactions, FEBS Excellence Award, €100,000; 3/22-2/25
– EMBO Young Investigator Program – Florian Schur, €15,000; 1/22-12/25
– A molecular atlas of Actin filament IDentities in the cell motility machinery, HE ERC StG, €1,500,000; 4/23-3/28
– In Situ Actin Structures via Hybrid Cryo-electron Microscopy, FWF ESPRIT, €316,000; 7/23-8/25
– Unveiling the structural architecture of skin layers through cryo-electron microscopy, HE MSCA PF, €199,000; 9/24-4/25
– Crucial steps in evolution: The rise of genome architecture and function, FWF EF, €1,303,000; 9/24-8/29

Seiringer Group
– Mathematical Challenges in BCS Theory of Superconductivity, FWF DFG SFB, €172,000; 3/23-2/27

Serbyn Group
– Non-Ergodic Quantum Matter: Universality, Dynamics and Control, H2020 ERC StG, €1,498,000; 2/20-1/25
– Center for Correlated Quantum Materials and Solid State Quantum Systems: Probing topology in circuits and quantum materials, FWF SFB, €363,000; 1/23-12/26
– Many-Body Localization and Thermalization in Two-Dimensional Systems, Google Internal, €43,000; 9/25-9/27
– Nonequilibrium Quantum Matter beyond Unitary Dynamics, HE ERC CoG, €2,000,000; 1/27-12/31

Shigemoto Group
– LGI1 antibody-induced pathophysiology in synapses, FWF IP, €285,000; 7/23-6/26
– New regime of presynaptic release regulation, FWF PIP, €445,000; 1/25-12/26
– Novel model systems for studying the role of calcium channel subunits in brain disorders, NFB Life Science, €82,000; 1/21-9/25
– Structural & functional basis of presynaptic plasticity, FWF IP JP ANR, €396,000; 1/23-6/26

Siegert Group
– Dissecting the morpho-functional relationship of microglia, FWF StA, €424,000; 9/23-8/26
– 60-Hz light entrainment to unlock mental health conditions, HE ERC PoC, €150,000; 3/24-8/25
– Segmentation of High-dimensional data using AI for Precise Evaluation, EIT Health Deep Tech Venture Builder Programme, €60,000; 1/25-7/25

Sixt Group
– Bioelectric patrolling: the role of the local membrane potential in immune cell migration, HFSP LTF, €211,000; 7/21-9/25
– ImMuNet: Decoding the Immunological Microtubule Network, SNF Sinergia, €483,000; 10/23-9/27
– Pushing from within: Control of cell shape, integrity and motility by cytoskeletal pushing forces, HE ERC SyG, €2,516,000; 5/23-4/29
– Systematic interrogation of transmembrane protein trafficking routes in amoeboid cell migration, SNF PDM, €110,000; 8/24-7/26
– The role of polysialic acid in T cell immunity, FWF DFG Research Group, €324,000; 4/23-3/26

Sweeney Group
– Development and Evolution of Tetrapod Motor Circuits, HE ERC StG, €1,500,000; 9/22-8/27
– Development of Viral Vectors for Amphibian Gene Delivery and Manipulation, NSF EDGE, €190,000; 2/22-8/25
– Development of V1 interneuron diversity during swim-to-walk transition of Xenopus metamorphosis, GFF FTI Dissertationen, €64,000; 7/22-6/25
– Stem Cell Modulation in Neural Development and Regeneration, FWF SFB, €413,000; 3/24-2/28
– A Tale of Two Circuits: Rostrocaudal spinal cord patterning during the swim-to-limb transition of Xenopus metamorphosis, ÖAW DOC, €99,000; 9/24-8/26
– Evolution and diversification of spinal neuron lineages, BIF PhD Fellowship, €59,000; 8/24-7/26
– Novel suppressors of neurodegeneration in sod-1 G85R models, ALS Association Postdoc Fellowship, €38,000; 5/25-10/25
– EMBO Young Investigator Program – Lora Sweeney, €15,000; 1/26-12/26

Tkačik Group
– Collective behaviour of cells in pancreatic Islets of Langerhans, ÖAW DOC, €95,000; 10/23-9/25
– Transcription in 4D: the dynamic interplay between chromatin architecture and gene expression in developing pseudo-embryos, HE ERC SyG, €2,123,000; 5/24-4/30
– Understanding pancreas biology with AI/ML, WWTF LS23, €386,000; 5/24-4/28
– ÖAW APART-USA Nomination – Elia Mascolo, €375,000; 11/25-10/29
– Deciphering the Cellular Code for Developmental Time, FWF IP, €228,000; 5/26-4/29

Venkataraman Group
- Exploring Charge Transport in Single Molecule Junctions under Quantum Light-Matter Strong Coupling, OeAD WTZ India, €15,000; 7/25-6/27

Vicoso Group
- Mechanisms and Evolution of Reproductive Plasticity, FWF ESPRIT, €288,000; 2/22-4/26
- The hijacking of meiosis for asexual reproduction, FWF SFB, €385,000; 3/22-2/26
- The hijacking of meiosis for asexual reproduction in Artemia brine shrimp (extension), FWF SFB, €497,000; 3/26-2/30
- Sex chromosomes in evolution and development, FWF PIP, €479,000; 9/24-8/28
- Does genetic drift set a limit on the adaptive evolution of sex-biased expression?, FWF ESPRIT, €341,000; 10/24-9/27

Vogels Group
- Learning the shape of synaptic plasticity rules for neuronal architectures and function through machine learning, H2020 ERC CoG, €1,769,000; 8/20-5/25
- What's in a memory? Spatiotemporal dynamics in strongly coupled recurrent neuronal networks., Wellcome Trust Senior Research Fellowship, €1,161,000; 8/20-1/26
- Uncovering computational principles underlying the distributed organization of memory, ÖAW APART MINT, €101,000; 5/26-4/27

Waitukaitis Group
- Tribocharge: a multi-scale approach to an enduring problem in physics, H2020 ERC StG, €1,494,000; 1/21-12/25
- Advanced Leidenfrost Effect, HE MSCA DN, €270,000; 3/25-2/29
- Loading the DICE: Dynamics of Ion Contact Electrification, FWF ESPRIT, €347,000; 3/26-2/29

Wojtan Group
- Computational Discovery of Numerical Algorithms for Animation and Simulation of Natural Phenomena, HE ERC CoG, €1,937,000; 6/22-5/27

FWF "Clusters of Excellence" Program
- Materials for Energy Conversion and Storage (ISTA Groups: Freunberger, Venkataraman), FWF COE, €1,682,000; 10/23-9/28
- Quantum Science Austria (ISTA Groups: Fink, Hosten, Katsaros, Léonard, Serbyn), FWF COE, €2,310,000; 10/23-9/28
- Microbiomes Drive Planetary Health (ISTA Groups: Sazanov), FWF COE, €338,000; 10/23-9/28
- Bilateral Artificial Intelligence (ISTA Groups: Alistarh, Chatterjee, Lampert, Locatello, Mondelli), FWF COE, €3,543,000; 10/24-9/29
- Neuronal Circuits in Health and Disease (ISTA Groups: Csicsvari, Danzl, de Bono, Hippenmeyer, Jonas, Jösch, Novarino, Shigemoto, Sweeney, Tkačik, Vogels), FWF COE, €6,653,000; 12/24-11/29

Admin & SSUs

Imaging & Optics Facility
- Tools for automation and feedback microscopy, CZI Imaging Scientist, €947,000; 12/20-12/25

ISTA HR
- Diversitätsmanagement-Preis Diversitas 2024, BMWFW, €25,000; 2/25-11/26

ISTA Postdoctoral Fellowships
- IST-BRIDGE: International postdoctoral training program, H2020 MSCA COFUND, €4,598,000; 11/21-10/26
- NOMIS Fellowship Program at ISTA Austria, €1,800,000; 2/20-3/27
- NOMIS-ISTA Fellowship Program, €2,032,000; 10/24-12/30

ISTA Scientific Activities
- Erasmus+ staff mobility GA8, €13,000; 6/23-7/25
- Erasmus+ staff mobility GA9, €13,000; 6/24-7/26
- Erasmus+ staff mobility GA10, €26,000; 6/25-7/27

Library
- FWF Open Access Block Grant, €134,000; 1/24-12/26

VISTA (Science Education)
- Frag die Science Oma! – Generationenübergreifendes Forschen & Entdecken, Lea, €100,000; 4/24-12/25
- Vifzack-Academy – Wissenschaft erleben am Institute of Science and Technology Austria, BMBWF, €365,000; 1/25-12/26
- Young Talents Club, BMBWF, €94,000; 1/25-12/26
- Science Academy, NOEF, €130,000; 01/24-07/25
- Science Academy Erweiterung, NOEF, €56,000; 01/24-07/25
- Bringing Cutting-Edge Biology into the Classroom, OeAD ERASMUS+; TBD
- Workshop Neurowissenschaften im Rahmen des Forschungsfestes NÖ, NOEF Workshops, €470; 10/26
- NeuroScience Academy am Institute of Science and Technology Austria, NOEF Science Academy, €130,000; 1/26-6/27
- Science Academy Erweiterung (2. Lehrgangsgruppe), NOEF Science Academy, €55,000; 1/26-6/27
- VISTA Science Experiences – Wissenschaft erleben am Institute of Science and Technology Austria (ISTA), OeAD Kinderuni, €70,000; 1/25-12/25
- Sommercampus, OeAD SCC, €50,000; 1/25-11/25
- Angebot Science Classes SoSe2025, NOEF ScClass, €3,000; 3/25-5/25
- Science Afternoons SS25, NOEF ScAfter, €5,700; 2/25-6/25

Publications 2025

A full list of the 2025 publications can be found in the Annual Report 2025 online version, which can be accessed by scanning the QR code.

Awards 2025

Scientific Awards and Distinctions 2025
(selection)

American Mathematical Society, Leroy P. Steele Prize for Seminal Contribution to Research:
László Erdős

American Physical Society, Early Career Award for Soft Matter Research:
Scott Waitukaitis

EMBO membership:
Edouard Hannezo,
Gaia Novarino

EMBO Young Investigator:
Lora Sweeney

ERC Advanced Grant:
Johann Danzl,
Zoltan Haiman,
Tamás Hausel,
Peter Jonas

ERC Consolidator Grants:
Edouard Hannezo,
Maksym Serbyn

ERC Proof of Concept Grant:
Johannes Fink

ERC Starting Grant:
Amelia Douglass,
Ylva Götberg

Dr. Otto Röhm Memorial Foundation Award:
Bartholomäus Pieber

Science Prize of Lower Austria:
Sandra Siegert

ISTA Internal Awards 2025

Alumni Award:
Matyáš Fendrych, former postdoc Friml group

ISTA Sustainability Award:
Natália Ružičková &
Valentin Leitner

Outstanding Administrative Support:
May Chan, Eszter Nucz,
Niall O'Brien, Birgit
Oosthuizen-Noczil,
Susana Moreno-Flores

Outstanding Scientific Support:
Victor-Valentin Hodirnau,
Petra Rovó, Fangfang Sun,
Margarita Valhondo-Falcón,
Simon Weißmann

Outstanding PhD Thesis:
Georg Arnold, Fink group
Huihuang Chen, Friml group
Elias Frantar, Alistarh group
Joscha Henheik, Erdős group
Volker Karle, Lemeshko group

Golden Chalk Award for Inspiring Lecturers:
Johann Danzl,
Chaitanya Chintaluri

Golden Sponge Award for Dedicated Teaching Assistant:
Gianluca Tasinato

Events 2025

Scientific Conferences, Workshops, and Symposia
(selection)

February 25–26
SFB BeyondC Winter Workshop
The workshop gathered members of the BeyondC research programme to exchange recent results and discuss current directions in quantum information science.

March 21
ATgliaNet Symposium 2025
A platform for leading glial labs to share recent advancements and ideas, opportunities to discuss collaborations, and offer students the possibility to get insights into the open questions within the community.

March 26–28
Charged Matter Conference
Conference to bring together widely divergent disciplines where electric charge and charged interactions play a vital role.

May 7–9
XSHOOTU Workshop
The XShootU project aimed to obtain optical spectra for all massive star targets observed in the ultraviolet spectral range through the ULLYSES program, thus reaching firmer constraints on massive stellar properties.

July 7–11
TASC9/KASC16 workshop
The conference focused on advancing asteroseismology by sharing methods and results from TESS and Kepler data, with the aim of improving how stellar oscillations are used to probe stellar structure, evolution, and exoplanet host stars within the Kepler Asteroseismic Science Consortium community.

August 27–29
CECAM Flagship workshop: Entropy of Soft Matter Systems
The workshop brought together theorists, computational scientists, and experimentalists to identify key challenges, encourage dialogue between theory and experiment, and foster collaborations that advance the field.

September 8–10
ANA Meeting
The conference brought together neuroscientists for talks, workshops, and networking on the latest advances in brain research.

September 17–19
Photoexciting Molecules
The event was focused on advancing research in photochemistry, especially molecular photoswitches and photochemical synthesis.

November 11–12
cryoEM symposium
A two-day scientific meeting on cryo-electron microscopy and cryo-electron tomography in structural biology.

November 18
Young Scientist Symposium 2025
Organized by ISTA's PhD students and postdocs, the symposium is dedicated to in-depth explorations of emerging technologies across neuroscience, oncology, bio-engineering, complex systems, climate science, ecophysiology, and photonics.

December 12
Wienerwald Astronomy Symposium
A meeting that brought together astronomers to share and discuss current research across all areas of astronomy, from stars and galaxies to (exo)planets, black holes and cosmic instrumentation.

Outreach and Science Education Events
(selection)

February 11
Women in Science
ISTA's women professors share their perspectives and experiences on what it takes to be a (women) leader in STEM in 2025.

March – July
Ask the Science Granny
In 2025, eight employed Science Grandmas have enthusiastically led around 70 research workshops in Horten, inspiring over 600 children with experiments.

April – June
Artist in Residency
Two outstanding artists—Fiona Connor and Sara Ghalandari—served as Artists-in-Residence at ISTA, collaborating with researchers and developing new work that culminated in pieces presented during the opening of the VISTA Science Experience Center.

May 14
Science Journalism around the Globe during Times of Disruption
A panel discussion with ISTA journalists in residence about the challenges they face within their respective national (media) landscape—and how they navigate them.

June 15
Open Campus
ISTA opens its doors to visitors on the annual Open Campus Day—a big science party for the whole family.

June 30 – July 4
Neuroscience Academy
Students aged 14–16 gain insights into cutting-edge research and have the chance to connect with neuroscientists at ISTA.

July 21 – August 8
Sommercampus
Children step into the role of researchers, carry out exciting experiments, and get to experience life at a research campus.

August 17–22
Vifzack Academy
An intensive research week designed for young talents from all of Austria, in which they engage in experiments, discover current research, and encounter scientists at ISTA.

September
Young Talents Club
With the Young Talents Club, we invite science-enthusiastic students from the Vifzack Academy to continue exploring and experimenting; the program launched in September with online sessions and Campus excursions.

October 3–5
VISTA Opening Festival
The VISTA Opening Festival welcomed around 3,600 visitors over three days, featuring the opening of the Science in the Making exhibition, inspiring talks, special guided tours with scientists and artists, and live concerts.

November 25
Virtual Student Open Day
The Virtual Open Day is a great opportunity to explore our programs and Campus virtually, wherever you are.

December 17–18
VISTA Christmas Science Show
A holiday-themed science show with spectacular experiments streamed into classrooms and homes all over the country.

Public Lectures

February 16
Richard Cockett
ISTA Science & Society Lecture
Vienna's Lab of Thoughts: How the City of Ideas Shaped the World

October 21
Lisa Kaltenegger (Cornell University)
ÖAW-ISTA Lecture
Searching for Other Earths

December 10
Cynthia Dwork (Harvard University)
ISTA Lecture
Differential Privacy: Public Methods for Private Data

Institute Colloquia

January 13
Alicia Michael and Alex Bronstein (ISTA)
Inaugural Lecture
Alicia Michael: Orchestrating Gene Expression: How Proteins Decode DNA
Alex Bronstein: From RealSense to Real Science – A journey of a Curious Character

February 3
Karolin Luger (University of Colorado Boulder)
The Rapidly Expanding Histone Universe

February 10
Simona Bordoni (University of Trento)
The Influence of Moisture on Seasonally Varying Circulations in Planetary Atmospheres

February 17
Irene Tracey (Oxford University)
Understanding Human Pain and Altered States of Conscious Awareness Through Advanced Neuroimaging

February 24
Samara Ren and Michael Sammler (ISTA)
Inaugural Lecture
Samara Ren: Computational Inverse Design of Shape-Morphing Structures
Michael Sammler: Automated and Foundational Verification of Low-Level Programs

March 5
Helmut Pottmann (TU Wien)
Mathematics Colloquium
Isotropic Geometry: New Results with Applications in Geometric Computing

March 10
Eva Kanso (University of Southern California)
Self-Organization in Massive Fish Schools

March 17
Teri W. Odom (Northwestern University)
Nanoscale Optics in Flatland

March 24
Andrea Pauli (IMP)
Fundamental Principles during the Egg-to-Embryo Transition

March 31
Michael Sixt & Thomas Henzinger (ISTA)
SeniorISTA Talk
Michael Sixt: How Cells Perceive Their Environment
Thomas Henzinger: Certificates in AI: Learn but Verify

April 2
Rachel Greenfeld (Northwestern University)
Mathematics Colloquium
Integer Distance Sets

April 7
Yuliy Baryshnikov (University of Illinois Urbana-Champaign)
Hyperbolic Geometry of Google Maps

April 14
Detlef Lohse (University of Twente)
Melting & Tipping: From the Lab to the Ocean

April 28
Renana Gershoni-Poranne (Technion-Israel Institute of Technology)
Mission ImPASSible: Decoding Polycyclic Aromatic Systems with Deep Learning

May 5
Julian Léonard & Latha Venkataraman (ISTA)
Inaugural Lecture
Julian Léonard: Assembling quantum systems atom by atom
Latha Venkataraman: Physics and Chemistry of Single-Molecule Devices

May 7
Angkana Rüland (University of Bonn)
Mathematics Colloquium
Nonlocality and Anisotropy in Inverse Problems

May 12
Matthew Kwan (ISTA)
Tenure Talk
Two Stories About Randomness

May 19
Daniel Bonn (University of Amsterdam)
Drunk T. Tubifex Worms: How are Active Polymers Different from Real Polymers?

May 21
George Ellis (University of Cape Town)
On the Nature of Causation in Cosmology: The Basis for Our Existence.

June 2
Jeremy Baumberg (University of Cambridge)
Confining Light to the Sub-Atomic Scale: Watching Atoms, Electrochemistry, Catalysis, and Sensing

September 22
Ian Henderson (University of Cambridge)
Cycles of Centromere Evolution in Eukaryotes

September 29
Alexander Kuhn (University of Bordeaux)
Electrochemically Induced Asymmetry: From Molecules and Materials to Motion and Back

October 1
Doron Puder (Tel Aviv University)
Mathematics Colloquium
Invariant of Words from Random Matrices

October 6
Thierry Emonet (Yale University, New Haven, CT | Quantitative Biology Institute)
Non-Genetic Adaptation by Collective Migration

October 13
Katie Breivik (Carnegie Mellon University)
Binary Evolution: A Decades-Old Problem with a Data-Motivated Solution

October 20
Shengduo Xu (ISTA)
3D Printed Thermoelectrics: From Bricks to Bridges

October 27
Kresten Lindorff-Larsen (University of Copenhagen)
Prediction and Design of Intrinsically Disordered Proteins and Condensates

November 3
Claudia Köhler (Max Planck Institute of Molecular Plant Physiology)
Mobile Small RNAs Controlling Plant Reproduction

November 5
Kurt Johansson (KTH Royal Institute of Technology, Stockholm)
Mathematics Colloquium
Planar Coulomb gases on Curves and Domains

November 17
Gašper Tkačik & Björn Hof (ISTA)
SeniorISTA
Rocket Science, the Wrong Control Parameter, and One of the Martians & Life, Information, and Everything

November 24
Seigo Tarucha (RIKEN Center for Emergent Matter Science & RIKEN Center for Quantum Computing)
Challenges in Semiconductor Quantum Computing

December 1
Chiara Mingarelli (Yale University)
Targeted Searches for Supermassive Black Hole Binaries

December 3
Noga Alon (Princeton University and Tel Aviv University)
Mathematics Colloquium
Vantage Points and Sign Patterns

December 15
Christa Schleper (University of Vienna)
Meet your Prokaryotic Ancestor: On the Role of Asgard Archaea in the Evolution of Eukaryotes

Technology Transfer Talks

February 20
Thomas Monz (Founder and CEO of AQT)
The Uncertain Journey of a Quantum Tech Startup
XISTA talk

May 8
Gregory Vladimer
XISTA talk

October 8
Raj Lehal
Journey from Cell to Cellestia
XISTA talk

October 9
bigX 25
Innovation Ecosystems

November 20
Anna Orlova, (Co-Founder and CEO of RIANA Therapeutics)
XISTA talk

Boards & Donors

Board of Trustees

The Board of Trustees oversees the development of the Institute, while acting as its highest authority and ensuring that the Institute adheres to its founding principles and vision. It provides guidance to the management and—among other tasks—is responsible for approving the statutes of the organization and its strategic direction; the budget and annual financial statements; the appointment of the President, the Scientific Board, and the Managing Director, and the procedures for academic appointments and the promotion of scientists.

The Board of Trustees consists of 17 members. Ten of them are internationally well-known scientists, four are appointed by the Federal Government, and three are appointed by the Government of Lower Austria.

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Executive Comittee

The Executive Committee is a subcommittee of the Board of Trustees and has the following rights and duties, among others:
– Act on behalf of the Board of Trustees in all matters between the meetings of the Board of Trustees.
– Hold preliminary discussions on matters to be brought for approval to the Board of Trustees, e.g., the annual budget.

The Executive Committee consists of seven members:

Chair:
Iain Mattaj

Vice Chair:
Reinhard Jahn

Elisabeth Engelbrechtsmüller-Strauß
Alexander Hartig
Andrew Murray (starting January 1, 2026)
Patricia Neumann
Heike Riel

Scientific Board

The Scientific Board prepares recommendations on scientific direction. It provides guidance to ensure a high degree of scientific productivity, and among other duties, it organizes internal evaluations of the various research fields. The Scientific Board consists of researchers who are internationally recognized at the highest level and an additional (non-voting) member with outstanding management experience. The members are appointed by the Board of Trustees for a term of 6 years.

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Peter Fratzl
Director, Max Planck Institute of Colloids and Interfaces, Potsdam, Germany

Vice-Chair:
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Research Director, CEREMADE (Mathematics), CNRS and Université Paris-Dauphine, France (until December 31, 2025)

Kathryn Hess Bellwald
Professor, Laboratory for Topology and Neuroscience, EPFL, Switzerland (starting January 1, 2026)

Conny Aerts
Professor, Institute of Astronomy, KU Leuven, Belgium

Peer Bork (†)
Director, EMBL Heidelberg (until January 2026)

Markus Buehler
Professor, Massachusetts Institute of Technology, USA (starting January 1, 2026)

Catherine Dulac
Professor, Harvard University, USA (starting January 1, 2026)

Dame Alison Etheridge
Professor, University of Oxford, Magdalen College, Mathematical Institute, UK (starting January 1, 2026)

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Professor, Stratingh Institute for Chemistry, University of Groningen, Netherlands

Véronique Garcon
CNRS Emeritus Senior Scientist, Institut de Physique du Globe de Paris, France

Tony F. Heinz
Professor of Applied Physics and of Photon Science, Stanford University, USA

Hannah Monyer
Professor, Department of Clinical Neurobiology, University of Heidelberg, Germany

Andrew Murray
Professor, Department of Molecular and Cell Biology, Harvard University, Cambridge, USA (until December 31, 2025)

Bradley Nelson
Professor, Institute of Robotics and Intelligent Systems, ETH Zurich, Switzerland (until December 31, 2025)

Helen Saibil
Professor, Institute of Structural and Molecular Biology, Birkbeck College, London, UK

Joachim Spatz
Director, Max Planck Institute for Medical Research, Germany (starting January 1, 2026)

Max Welling
Professor, University of Amsterdam, Netherlands

Non-voting Member:

Wolfgang Ruttenstorfer
Chair of the ISTA Foundation Board and former CEO of OeMV

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Dean of the Graduate School

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Area Chair Life Sciences

Mikhail Lemeshko
Area Chair Mathematical and Physical Sciences

Christopher Wojtan
Area Chair Information and System Sciences

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CAMPUS MAP

A Home for Science

Just a short bus ride from Vienna, the Klosterneuburg campus blends peaceful nature with the vibrant energy of scientific activity across its buildings.

Buildings:
01 Central Building
02 Raiffeisen Lecture Hall
03 voestalpine Building
04 Bertalanffy Foundation Building
05 Preclinical Facility
06 Lab Building East
07 Administrative Building
08 VISTA Science Experience Center
09 Michael Gröller Bridge
11 Facility Management
12 Heating Plant
13 Miba Machine Shop / Central Storage Deliveries
16 Power Control
21 Lab & Office Building West
22 Cafeteria
23 Sunstone Building
24 Moonstone Building
25 Lab 7
26 Lab 8
27 Lab 9

C01 Container Facility
30 Kindergarten
31-45 Apartments
60 Utility Building
61 Sports Facility
X1 XISTA Science Park
X2 XISTA Science Park Extension

Existing Buildings
Under construction
Masterplan 2036 (construction not yet started)

Institute of
Science and
Technology
Austria