

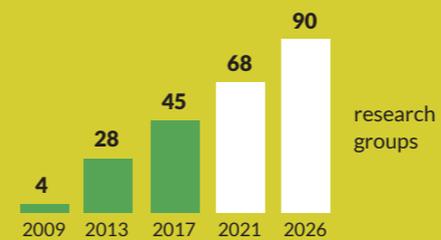


# PHD. I | S | T. AUSTRIA

**I | S | T** AUSTRIA

The PhD Experience

# THE IST AUSTRIA CONCEPT



1 graduate school with  
6 scientific tracks  
of study

IST Austria is located just  
outside of Vienna



**Scientific excellence in basic research** All scientists at IST Austria are recruited based on their research success and promise. The 53 professors at the Institute were selected from over 11,000 applicants.

**State-of-the-art facilities** From bioimaging and electron microscopy to nanofabrication and high performance computing: centralized scientific services support cutting-edge research.

**International character and diversity** Scientists and staff come from over 70 nations. The working language of the Institute is English.

**Career development and mentoring** Graduate training and career development programs prepare scientists for their next steps—in academia, industry, and beyond.



Assistant Professor Martin Loose joined the IST Austria faculty from Harvard Medical School and received an ERC Grant in 2015. Currently, he works with students to understand self-organization of the cell.

# SIX RESEARCH CLUSTERS

## BIOLOGY BIOLOGY.IST.AC.AT

As the largest track in the PhD program, the Biology track encompasses a wide variety of research areas. Clusters within the track include cell and developmental biology, evolutionary biology, plant sciences, systems biology, and structural and molecular biology. Students benefit from a vibrant research community with collaborations across sub-fields such as neuroscience, physics, as well as data science and scientific computing.

## NEUROSCIENCE NEUROSCIENCE.IST.AC.AT

Understanding the function of the brain is one of the major challenges in modern life sciences. The Neuroscience track covers multiple approaches, from structural, molecular, cellular, and systems level of analysis, to computational neuroscience and the study of neurodevelopmental disorders. Neuroscientists at IST Austria aim to examine brain function at multiple levels in both health and disease, as well as develop advanced techniques and optical tools for addressing these research questions.

## MATHEMATICS MATHEMATICS.IST.AC.AT

Mathematics at IST Austria is an open, curious community, active in research that is inspired by both purely mathematical concepts and applications in physics, computer science, and other fields. The groups on campus have strengths in a variety of areas, and work closely with each other and with groups in other areas, such as computer science and biology. Students in the Mathematics track have opportunities to conduct research in discrete and computational topology and geometry, mathematical physics, stochastic analysis, partial differential equations, algebraic geometry, and representation theory, among other topics.

## COMPUTER SCIENCE CS.IST.AC.AT

The Computer Science track encompasses a wide variety of research topics, based on a solid foundation of mathematical rigor and a focus on developing new algorithms and formalisms. Research topics include distributed and embedded systems analysis, formal methods, machine learning and computer vision, discrete optimization, cryptography, computer graphics, computational fabrication as well as computational geometry and topology.

## DATA SCIENCE & SCIENTIFIC COMPUTING DSSC.IST.AC.AT

Data Science & Scientific Computing is the most interdisciplinary track. Typically, faculty in this track work on a diverse set of problems, ranging from mathematical models of evolution, bioinformatics, systems biology and theoretical biophysics, to machine learning, optimization, computational fabrication and physics simulation.

## PHYSICS PHYSICS.IST.AC.AT

The Physics track is comprised of both theoretical and experimental approaches. On the theory side, research areas include atomic, molecular, and optical physics, theoretical condensed matter physics and quantum dynamics, mathematical physics, and biophysics. Experimental research is carried out in the areas of fluid dynamics and turbulence, nanoelectronics, quantum integrated devices, and nanoscale photonics for biology.

# ONE INTERDISCIPLINARY GRADUATE SCHOOL

IST Austria is pioneering a new form of doctoral education. Our single interdisciplinary PhD program enables students and faculty to freely collaborate across research groups and disciplines. This gives rise to new ideas and research approaches.

### Rotations in three different groups

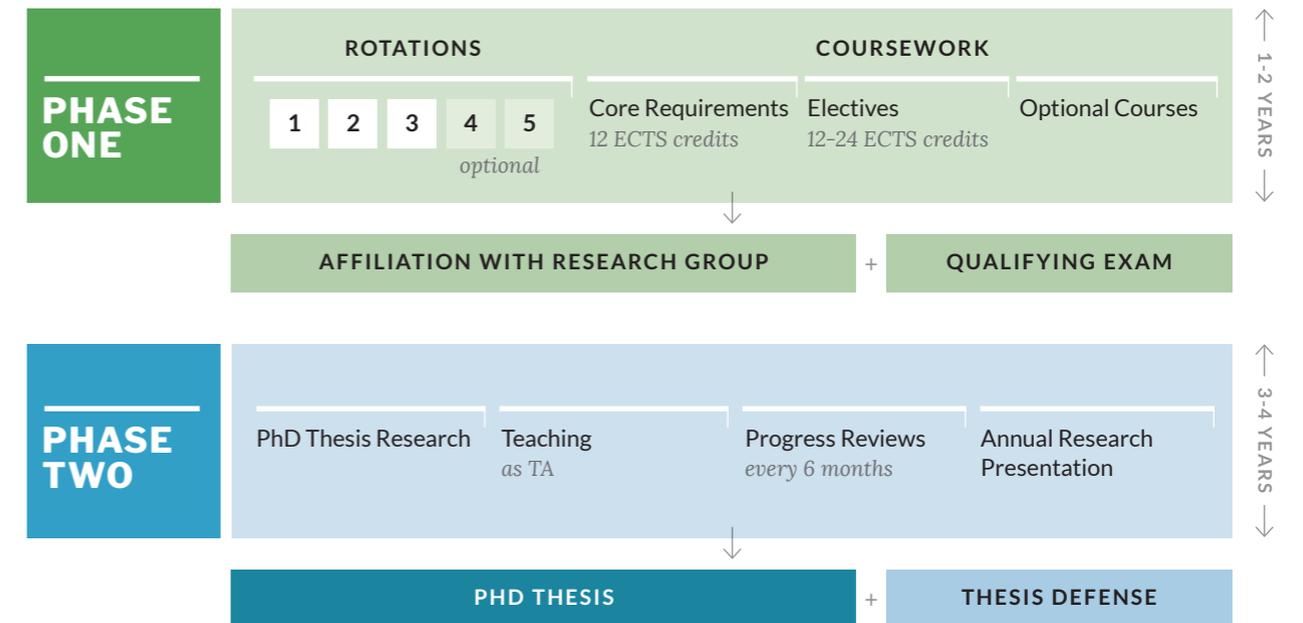
Every incoming PhD student performs three approximately two-month rotations in different research groups. This guarantees a good fit between students and supervisors and exposes students to new areas and methodologies.

### Unique blend of breadth and depth

A combination of interdisciplinary core courses and advanced electives gives students the chance to interact with scientists across disciplines as well as pursue their chosen topic in greater depth.

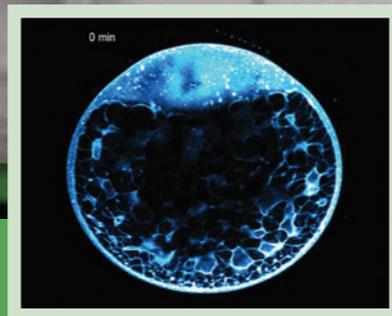
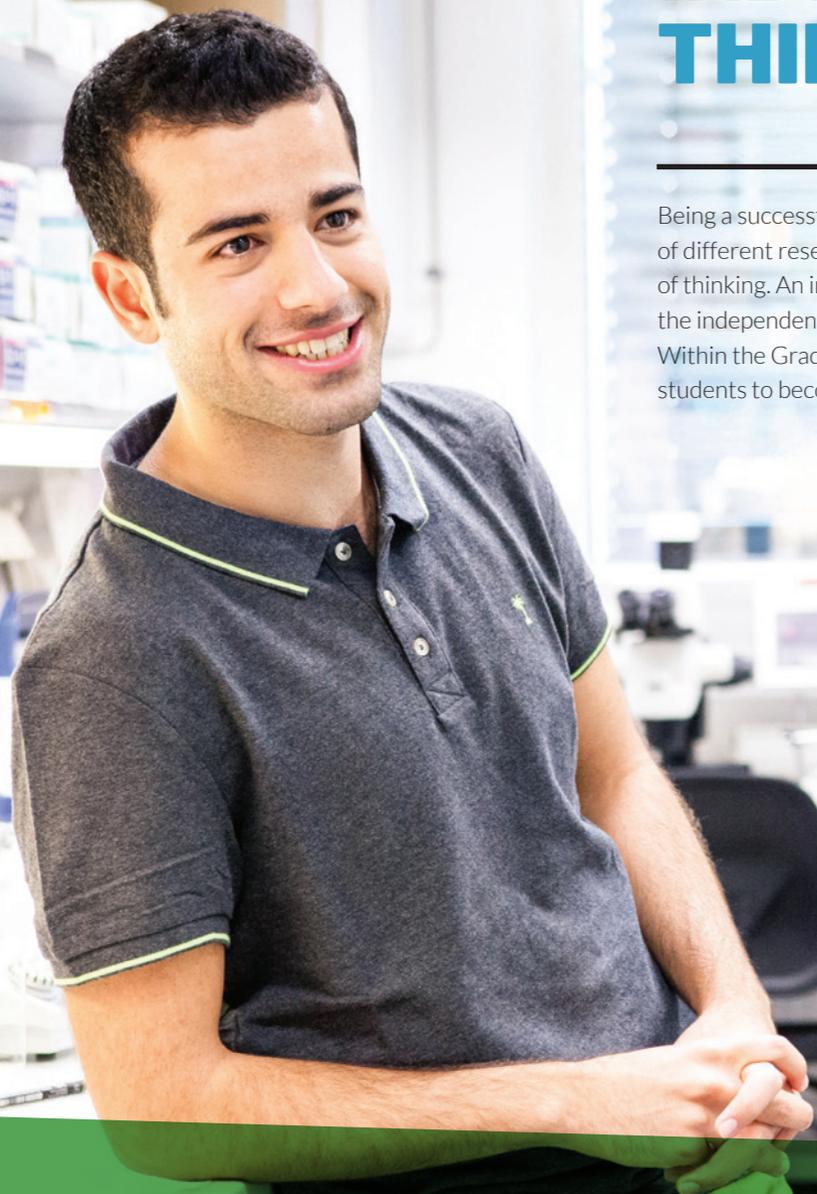
### Pushing the frontiers of knowledge

The most innovative research tends to arise at the interfaces of disciplines. In the Graduate School, students play a central role in bringing together different approaches to shape the future of science.



# CULTIVATING INDEPENDENT THINKERS

Being a successful scientist today requires an appreciation of different research cultures, methodologies, and ways of thinking. An initial period of exploration gives students the independence to design their own research trajectories. Within the Graduate School, our key mission is to support students to become independent thinkers in their own right.



## SHAYAN SHAMI POUR

Shayan came to IST Austria with a background in physics. In his first year, he did rotations in computer graphics (Wojtan group), physics (Hof group), and biology (Heisenberg group), before choosing a PhD project that combines his interests in physics and biology. He is now investigating biophysical factors of morphogenesis in zebrafish embryonic development in the Heisenberg group.

A zebrafish egg just after fertilization – black structures are yolk and light colors indicate cytoplasm. The Heisenberg group studies their mixing and un-mixing behavior in the course of development.



Sandhill cranes engaged in a mating dance. Gemma is studying how sexual selection shapes evolution.

Photo: Manith Kainickara/Creative Commons.

## GEMMA PUIXEU SALA

Gemma came to IST Austria as an ISTern to work in the Siekhaus lab on fly genetics. During her first year in the PhD program, she made use of rotations (in the Barton, Heisenberg, and Vicoso groups) and coursework in data science and scientific computing to expand her programming and data analysis skills. She is currently working in evolutionary biology, and plans to apply her newly developed skills to a project on sexual selection involving theory and data analysis.



“The time, space and academic support I was given during my first year of graduate school allowed me to explore other fields and acquire new skills which ultimately gave shape and content to my PhD project.”

## ZUZKA MASÁROVÁ

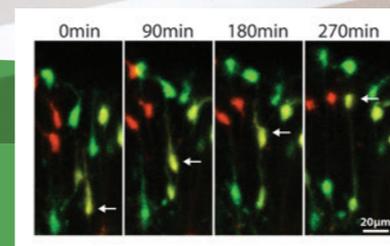
Zuzka obtained her bachelor's degree in education with mathematics and her master's degrees in cryptography and pure mathematics before she came to IST Austria. In addition to her interests in cryptography and game theory, which she explored during two rotations in the Chatterjee and Pietrzak groups, she has also pursued her passion for education. Over the summers, Zuzka has taught mathematics in Ghana, Ethiopia, and Kenya, combining her interest in teaching with her enthusiasm for mathematics. Her PhD research is jointly supervised by Herbert Edelsbrunner and Uli Wagner, both at IST Austria, and Anna Lubiw of the University of Waterloo.

Zuzka is working in computational geometry on the triangulations of point sets and polygons.



## DIVERSE INDIVIDUAL TRAJECTORIES

What is special about the IST Austria PhD curriculum is its flexibility—students come in with different goals and are able to shape their own educational and research trajectories. Some students come to IST Austria looking to explore, others have a clear idea of where they want to go. Our program accommodates both.



In his first-year rotation, Andi helped develop a time-lapse imaging technique to visualize cortical projection neuron migration.

## ANDI HARLEY HANSEN

Originally from Denmark, Andi studied in Vienna for his bachelor's and master's degrees. During his first year rotations at IST Austria, he worked on the effects of synthetic ligands on synthetic receptors in bacterial cells (Janovjak group), performed literature searches to help develop a lab protocol for calcium imaging for stem cell-derived neurons and brain organoids (Novarino group), and established 4D live imaging of embryonic brain slices (Hippenmeyer group). His rotation experience helped confirm Andi's original goal to study neuroscience. Currently, Andi is working on molecular mechanisms of radial neuronal migration for his PhD research in the Hippenmeyer group.

The quality of an educational institution can be measured by the success of its alumni.

-THOMAS A. HENZINGER / PRESIDENT OF IST AUSTRIA



Anastasia Pentina (left) graduated from the IST Austria PhD program in 2017. For her PhD research, she worked in the Lampert group on the theoretical foundations of multi-task and lifelong learning. She is now a postdoctoral data scientist at the Swiss Data Science Centre, a joint venture between EPFL and ETH Zurich.

## SUPPORTING CAREERS

We support PhD students in preparing for their next career steps, whether in academia or industry, or something else entirely. This starts on day one of the PhD program, and continues beyond the day they graduate.



### Close mentoring from faculty

Research groups are kept small to ensure direct contact with faculty. Specially appointed mentors, track representatives, the PhD program chair, and the Dean offer guidance in addition to the students' direct supervisors.

### A lifelong network of peers

Students entering the PhD program in the same cohort might come with a diverse range of backgrounds and interests but take the same core courses, share common offices, help each other with coursework and form a coherent class. Experience shows that this not only triggers ideas that may lead to joint interdisciplinary projects between different research groups, but also helps build a support network of peers which can last a lifetime.

### Teaching and presentation skills

The ability to explain complex concepts to a scientific audience is honed through teaching. Being able to give clear and effective presentations is useful beyond a career in academia. All PhD students gain teaching experience

by acting as course assistants, as well as by helping professors to develop and improve courses.

### Career development

With regular career talks, skills training sessions, as well as visits from industry leaders, our career development program helps scientists prepare for a career in academia, industry, and other sectors.

### Global career network

After graduation, students are invited to join our rapidly growing global network of alumni. With alumni distributed all over the world, membership in the IST Austria alumni network opens doors and offers new opportunities.

### "Stay in touch" initiative

Once an IST-member, always an IST-member. Through the "Stay in touch" initiative, you can foster and strengthen connections with other alumni through reunions, industry and innovation initiatives, and regular events. For more information, visit [alumni.ist.ac.at](http://alumni.ist.ac.at).



## VIBRANT CAMPUS LIFE

The location of IST Austria combines the best of both worlds—a spacious green campus in the Vienna woods while just bordering the city of Vienna. The campus also offers numerous amenities, housing, and has a lively community.

### Active campus community

Having a shared campus means scientists and staff not only interact during work time, there are plenty of activities outside of work which take place on and off campus. These are some of the clubs and activities taking place regularly:

- card/board games
- choir
- climbing
- cycling
- dancing
- fitness
- German and English lessons
- running
- soccer
- table tennis
- table soccer
- photography
- tennis
- yoga

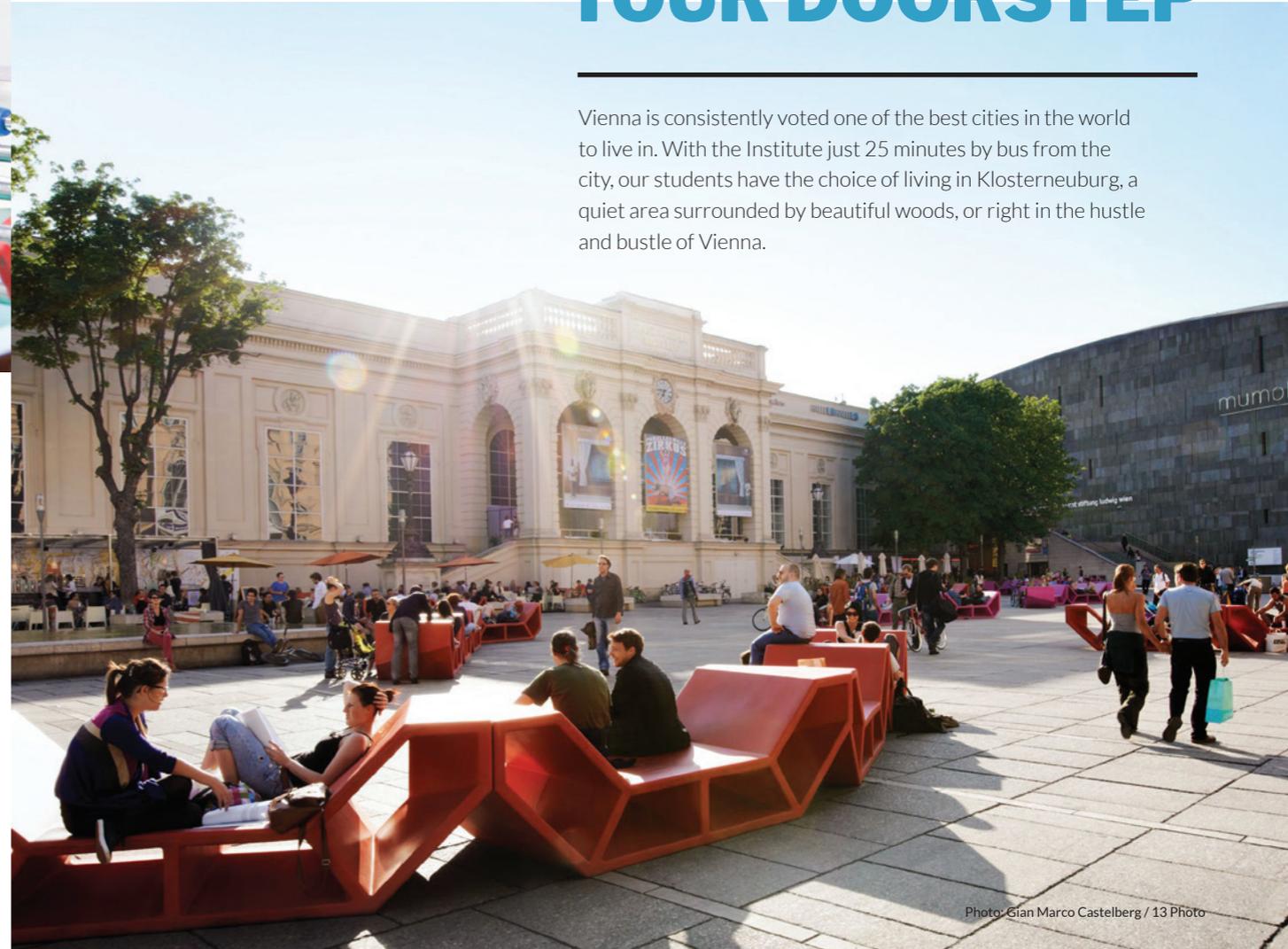
### Institute-wide events

Frequent interactions between scientists across research groups and disciplines are encouraged through the following institute-wide events and seminars:

- *Institute Colloquium*: renowned scientists from across the world are invited to give a general lecture accessible to a broader scientific audience.
- *Think & Drink*: a general talk series on Fridays during the academic year encourages discussion of scientific ideas across research groups. Students, postdocs, and faculty members give accessible talks about their research, followed by drinks in the campus pub.
- *Institute-wide social events*: the Institute Retreat, Summer BBQ, and Winter Bash are some of the events where all scientists and staff are invited for fun social interactions.
- *Young Scientist Symposium*: a yearly symposium organized by PhD students and postdocs.
- *Annual research presentations*: in Phase II, students are required to give an annual presentation on their thesis research in a wider forum at least once per year.
- *Cross-group seminars*: frequent seminars bring together different research groups.

## VIENNA AT YOUR DOORSTEP

Vienna is consistently voted one of the best cities in the world to live in. With the Institute just 25 minutes by bus from the city, our students have the choice of living in Klosterneuburg, a quiet area surrounded by beautiful woods, or right in the hustle and bustle of Vienna.



# HOW TO APPLY

## Who are we looking for?

We are looking for highly motivated, exceptional students who are passionate about scientific research and have a drive to succeed. Students with a degree in biology, mathematics, computer science, physics or related interdisciplinary areas are invited to apply.

## What can I study?

Students can advance their studies in 6 scientific tracks:

**Biology**

**Computer Science**

**Data Science & Scientific Computing**

**Mathematics**

**Neuroscience**

**Physics**

## Can I apply with a bachelor's degree?

Absolutely. We encourage students with a bachelor's degree to apply. All applicants must hold a bachelor's or master's degree (or equivalent), or anticipate the completion of the degree, before September in the same year that they start their PhD.

## Funding

We offer competitive salaries and financial support for attending scientific conferences and workshops.

## We also offer

- an interdisciplinary graduate school
- state-of-the-art facilities
- English-speaking environment
- international and diverse community
- vibrant campus life
- housing options on campus

## Application requirements

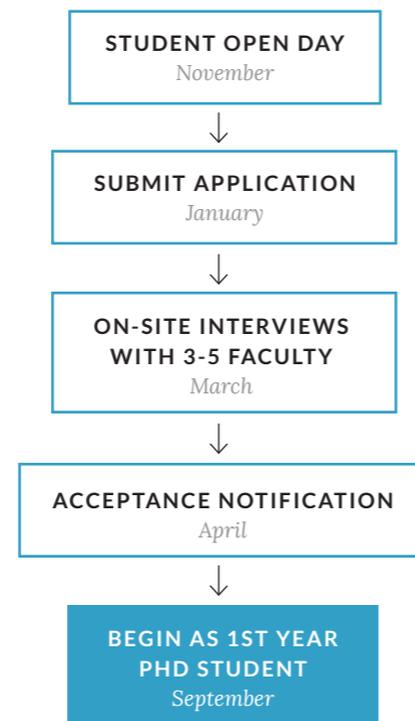
To complete your application, you will need the following:

- your resume/CV
- statement of purpose
- three academic references
- transcripts and certificates

All applications should be submitted using our online application form.

## Timeline

The deadline for PhD applications is in January for a start in September of the same year. For details on exact dates, please consult [phd.ist.ac.at](http://phd.ist.ac.at).



The best way to know if IST Austria is the right place for you is to visit the campus, meet our students and faculty, and see innovation in action.

STUDENT OPEN DAY:

**NOVEMBER**

APPLICATIONS DUE:

**JANUARY**

Visit [phd.ist.ac.at](http://phd.ist.ac.at) for exact dates.

In the Katsaros group, students study spin qubits in Ge-based systems, as well as self-assembled- and lithographically-defined quantum dots. Visit us at the Student Open Day to find out more about our research groups.



**BIOLOGY**  
**COMPUTER  
SCIENCE**  
**DATA SCIENCE  
& SCIENTIFIC  
COMPUTING**  
**MATHEMATICS**  
**NEUROSCIENCE**  
**PHYSICS**

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