Four ERC Starting Grants for IST Austria professors

Bernd Bickel, Jan Maas, Gaia Novarino, and Beatriz Vicoso receive prestigious grants | 27 ERC-funded projects at IST Austria

Four Assistants Professors at the Institute of Science and Technology Austria (IST Austria) are to receive Starting Grants from the European Research Council (ERC). Computer scientist Bernd Bickel, mathematician Jan Maas, neuroscientist Gaia Novarino and evolutionary biologist Beatriz Vicoso secured an award, each with a budget value of approximately EUR 1.5 million. IST Austria President Thomas Henzinger congratulates the awardees: "ERC Starting Grants recognize young talented scientists for their excellent research. With four more Starting Grants for IST Austria researchers, the total number of our ERC-funded projects has now risen to 27. This success strongly confirms our recruiting strategy." The ERC Starting Grants scheme targets promising scientists who have the proven potential of becoming independent research leaders in their respective fields.

In 2016, faculty members at IST Austria have secured seven ERC Grants so far. In addition to Bernd Bickel, Jan Maas, Gaia Novarino, and Beatriz Vicoso having been successful within the Starting Grant scheme, neuroscientists Peter Jonas and Ryuichi Shigemoto as well as physicist Robert Seiringer received ERC Advanced Grants this year.

Bernd Bickel researches computer graphics and digital fabrication

In his project, Bernd Bickel will delve into intelligent fabrication-oriented computational design and modeling. While access to 3D-printing technology becomes ubiquitous and provides revolutionary possibilities for fabricating complex, functional, multi-material objects with stunning properties, its potential impact is currently significantly limited due to the lack of efficient and intuitive methods for content creation. To address this challenge, he suggests a novel computational approach that facilitates intuitive design, accurate and fast simulation techniques, and a functional representation of 3D content. He proposes a multi-scale representation of functional goals and hybrid models that describes the physical behavior at a coarse scale and the relationship to the underlying material composition at the resolution of the 3D printer. His approach is to combine data-driven and physically-based modeling, providing both the required speed and accuracy through smart precomputations and tailored simulation techniques that operate on the data.

Bernd Bickel obtained his PhD at ETH Zurich. From 2010 to 2012 he was visiting professor at TU Berlin and then became a research scientist and research group leader at Disney Research Zurich. In 2015 he received the Microsoft Visual Computing Award and was appointed Assistant Professor at IST Austria.

Jan Maas examines optimal transport and stochastic dynamics

Many important properties of stochastic processes are deeply connected with the underlying geometric structure. The crucial quantity in many applications is a lower bound on the Ricci curvature. Since many important processes are defined in discrete, infinite-dimensional, or singular spaces, major research activity has been devoted to developing a theory of Ricci curvature beyond the classical Riemannian setting, which led to the powerful theories of Bakry-Émery and Lott-Sturm-Villani. Building on his recent work, Jan Maas will develop a comprehensive theory of curvature-dimension for discrete spaces based on geodesic convexity of entropy functionals along discrete optimal transport. He will analyze discrete stochastic dynamics using methods from optimal transport, focusing on non-reversible Markov processes and developing new methods for proving convergence of discrete stochastic dynamics. Performing a thorough investigation of noncommutative optimal transport, he aims for geometric and functional inequalities in quantum probability, and apply the results to the analysis of quantum Markov processes.

Jan Maas earned his PhD in mathematics from TU Delft and held postdoc positions at the University of Warwick, UK, and the University of Bonn, Germany. He has been Assistant Professor at IST Austria since 2014.

Gaia Novarino analyzes genetic and molecular basis of neurodevelopmental disorders

Autism Spectrum Disorders (ASD) are a group of neurological conditions characterized by stereotypical or repetitive behaviors as well as impairments in social interaction and communication skills, often of genetic basis. ASD have been classified as neurodevelopmental disorders, implying irreversible defects in the maturation of neural circuits. Mutations in the Branched Chain Ketoacid Dehydrogenase Kinase (BCKDK) gene lead to a potentially preventable and reversible form of ASD. The most direct consequence of BCKDK mutations is a hyper-metabolism of the branched chain amino acids (BCAAs), resulting in atypically low levels of serum and brain BCAAs. Gaia Novarino aims at elucidating the link between BCAAs, ASD, brain development and cognition, exploring the possibility of employing the BCAAs to reverse symptoms caused by mutations of ASD-genes, and at employing stem cell-derived human cerebral organoids to identify key molecular changes involved in the pathology of genetically distinct but functionally homogenous forms of ASD.

Gaia Novarino completed her PhD studies at the University "La Sapienza", Rome-Italy. Later she worked

as postdoc at Center for Molecular Neurobiology, Hamburg, Germany, and at University of California, San Diego, USA. She received the FENS Research Award 2016 and was appointed FENS-Kavli Scholar in 2016. She has been Assistant Professor at IST Austria since 2014.

Beatriz Vicoso studies sex-chromosome biology and evolution

Males and females display profound differences in phenotype, physiology and behavior. Sexually antagonistic conflict, resulting from traits and/or mutations that are beneficial to one sex but harmful to the other, can in theory lead to strong dimorphism. Quantifying it, however, has proved difficult, and only a few experimental studies have attempted to systematically identify genes under sexual conflict. Species groups with both sexual and asexual populations offer a promising approach to tackle this question. In her project Beatriz Vicoso will test the hypothesis that widespread sexual conflict maintains sex-biased gene expression, using the brine shrimp Artemia as a model. Specifically, she will compare gene expression levels of closely related Artemia sexual and asexual species, characterize the Z chromosome of the sexual and asexual species, and investigate the population genomics profile of genes under sexual conflict. Her analyses will provide a global overview of the prevalence of sexual antagonism, and of its influence on gene expression and genome evolution.

Beatriz Vicoso performed her PhD studies at the University of Edinburgh, UK. Between 2009 and 2014 she worked as a postdoc at the University of California Berkeley. She has been awarded a FWF Standalone grant and has been assistant professor at IST Austria since 2015.

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IST Austria
The Institute of Science and Technology (IST Austria) is a PhD granting research institution located in Klosterneuburg, 18 km from the center of Vienna, Austria. Inaugurated in 2009, the Institute is dedicated to basic research in the natural and mathematical sciences. IST Austria employs professors on a tenure-track system, postdoctoral fellows, and doctoral students at its international graduate school. While dedicated to the principle of curiosity-driven research, the Institute owns the rights to all scientific discoveries and is committed to promote their use. The first president of IST Austria is Thomas A. Henzinger, a leading computer scientist and former professor at the University of California, Berkeley, and the EPFL in Lausanne, Switzerland.
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