



# NEWSLETTER

1st edition | April 2012

## FOREWORD



# Welcome!

I would like to welcome you to this first edition of the quarterly newsletter of IST Austria.

As the Institute continues to grow – one new professor has already arrived in 2012 – we would like to keep everyone interested in IST Austria up-to-date on what's happening at the Institute.

This newsletter will be published every three months. It will bring you news about the research conducted at the Institute, honors and grants awarded to IST Austria scientists, campus developments and upcoming events for which you might wish to join us, as well as other items of news concerning the Institute.

I hope you will enjoy reading this first newsletter and will continue to follow the developments at IST Austria as its presence is growing on the national and international scientific landscapes.

Thomas A. Henzinger | President

## NEWS

### Future of IST Austria secured

**Long-term development of IST Austria until 2026 ensured**

As announced on February 22, an agreement was reached on the future financing of IST Austria for the 10-year period 2017-2026. The Federal Republic of Austria will invest up to € 990 Mio. Euro between 2017 and 2026; in addition, the Province of Lower Austria will provide € 368 Mio. Euro for infrastructure, construction, and maintenance on the IST campus.

A third of the promised funds are conditioned on the performance of the Institute, including the acquisition of third-party funds such as grants and private donations, as well as research achievements. With the government's

pledge, IST Austria is not given a blank check – it will receive the amount held out in prospect only if it performs well. The promised financing will allow IST Austria to continue attracting world-class scientists and to grow into a successful, internationally visible research institute of 90-100 professors, embedded in the wider community of Austrian science.



## EVENTS

### Basic Research, Economic Value & Entrepreneurship

**Science Industry Talk in Honor of Veit Sorger**

Together with the Federation of Austrian Industries, IST Austria initiated the series **"Science-Industry Talk"**. The event enables the exchange of opinions and facts between science and business.

The Science-Industry Talk 2012 taking place on June 5 is dedicated to the topic of „Basic Research, Economic Value and Entrepreneurship – Best Practices of International Spin-off and Technology-Parks". A lively and growing entrepreneurship and high-tech scene is important for the long-term economic strength of a region and country. One important principle of IST Austria is to exploit the results of basic research via licensing or spin-offs. But what does it take to start a successful technology- and spin-off-park close to a first-

class basic research institute? What are the international role models and best practices? A high-level international panel featuring Tillman Gerngross, Barbara Mayer, David Mirelman and Gerald Murrer will discuss these questions and try to provide answers.



Participants of the 2010 SIT

The event at the Raiffeisen Lecture Hall on the IST campus starts on June 5 at 5.00pm. A free shuttle bus is provided, and more information can be found at [www.ist.ac.at](http://www.ist.ac.at).

## UPCOMING EVENTS

### May 7 | Young Scientist Symposium

A one-day symposium on “**Human Evolution**”, organized entirely by the students and postdocs of IST Austria. General talks on topics in human evolution are followed by a panel discussion on the future of human evolution. For further information see [www.ist.ac.at/young-scientist-symposium-2012](http://www.ist.ac.at/young-scientist-symposium-2012).

### June 3 | IST Open Campus (12.00-6.00pm)

This is the biggest event at IST Austria, and once again everyone interested in IST Austria and its research is invited to join in this celebration. More information on [www.facebook.com/ISTpublic](http://www.facebook.com/ISTpublic).

### June 5 | Science Industry Talk (5.00 pm)

The Science Industry Talk aims to foster interactions between the basic research community and the business world. The topic of this year's discussion are successful spin-offs and technology parks connected to research institutes.

**June 28 | IST Lecture (5.00 pm)**  
**Physicist Stefan Hell** will present his work on a novel strategy for visualizing living cells at the nanometer level.

**With the exception of the YSS, all events are open to the public and free of charge.**

## SCIENCE AT IST AUSTRIA

### Neuroscience Peter Jonas

The human brain is comprised of approx. 10 billion neurons with an array of different functions. Communication between neurons occurs at synapses, at which signals are transmitted from the axon of one neuron to the dendrite of another neuron. Signals impinging on neurons are integrated and lead to an appropriate output, such as the transmission of the signal to another neuron. CA3 pyramidal neurons in the hippocampus are critical for the processing of spatial information and memory formation. The complex information processing by the CA3 dendrites is currently not well understood, for there is a need to first characterize the properties of CA3 dendrites.

In their Nature Neuroscience Publication from March 4, the Jonas group presents the first analysis of dendritic function of CA3 pyramidal neurons by subcellular patch-clamp recording, giving insights in how these dendrites provide computational power in the hippocampus. Using the subcellular patch-clamp technique, the researchers were able to measure voltage changes in different areas of the cell simultaneously at microsecond resolution. This analysis showed that



CA3 dendrites have two domains with differing properties. The proximal domain, closest to the neuron's cell body, displays prominent backpropagation, in which voltage changes in the axon propagate back into the dendrite. In the distal domain, further away from the cell body, spikes in voltage, so-called dendritic spikes, are initiated at a low threshold. This work gives insight in the computational repertoire of CA3 pyramidal neurons, which differ from that of other neuron types in the hippocampus. While the dendritic spikes in the distal dendrite domain may enhance the computational power of CA3 neurons, the backpropagation of action potentials in the proximal domain could provide precise feedback signals to synaptic partners, which are suited to the induction of plasticity, a foundation of memory formation.

Kim S, Guzman SJ, Hu H, Jonas P  
Active dendrites support initiation of dendritic spikes in hippocampal CA3 pyramidal neurons. *Nature Neuroscience*, 2012, 15, 600-606.

## NEW PROFESSORS | Three new Professors join IST Austria

### DARIA SIEKHAUS



is an American cell biologist investigating the principles of cell migration. Siekhaus earned her PhD at Stanford University in 1998. She then worked as postdoc in the group of David Drubin at the University of California in Berkeley. Since 2003, Siekhaus has worked as a research scientist in Ruth Lehmann's group at the Skirball Institute, NYU Medical Center. Her research focuses on hemocyte migration and barrier penetration in *Drosophila*. Daria Siekhaus joined IST Austria as Assistant Professor in January 2012.

### SIMON HIPPENMEYER



is a Swiss neurobiologist. He received his PhD in 2004 after working in the group of Sylvia Arber at the Friedrich Miescher Institute in Basel. Hippenmeyer moved to Stanford University in 2006, as postdoc and research associate in the group of Liqun Luo. Hippenmeyer analyses the development of the mouse cortex at break-through resolution, to dissect the mechanisms responsible for neuronal circuit assembly in the brain. Simon Hippenmeyer will join IST Austria as Assistant Professor in July 2012.

### RYUICHI SHIGEMOTO



is a Japanese neurobiologist. He received his PhD from the University of Kyoto in 1994. Shigemoto was appointed Assistant Professor at the Kyoto University Faculty of Medicine in 1989. Since 1998, he has been a Professor at NIPS in Okazaki. Shigemoto is interested in the subcellular localization of neurotransmitter receptors and voltage gated channels, as well as in the mechanisms of long-term memory stabilization. He has received an ISI Citation Laureate Award in 2000. Ryuichi Shigemoto will join IST Austria as Professor in 2013.

## HONORS AND AWARDS

**CARL-PHILIPP HEISENBERG**



Carl-Philipp Heisenberg has been awarded an FWF-DFG grant together with Stephan Grill (Max Planck Institute of Molecular Cell Biology and Genetics), and Guillaume Salbreux (Max Planck Institute for the Physics of Complex Systems). The grant is awarded jointly by the Austrian Science Fund (FWF) and the German Research Foundation (DFG) for their project on "Control of Epithelial Cell Layer Spreading in Zebrafish".

**TOBIAS BOLLENBACH**



Tobias Bollenbach and Harald Janovjak have been awarded Marie Curie Career Integration Grants. Devised by the European Commission, the Marie Curie Career Integration Grant scheme is part of the Seventh Framework Programme (FP7) and helps experienced researchers from any country in the world to start scientific work in a European research institution.

**HARALD JANOVJAK**



Harald Janovjak and Gašper Tkačik have been awarded grants from the Human Frontier Science Program (HFSP) in the 2012 award round. HFSP is a funding program for frontier research in the life sciences, placing an emphasis on cutting-edge projects pursued by internationally collaborating, interdisciplinary teams.

**GAŠPER TKAČIK**



## COLLOQUIUM SPEAKERS | JANUARY – APRIL

Edo Kussell, New York University | Richard Benton, University of Lausanne | Jacobus J. Boomsma, University of Copenhagen | Valentina Emiliani, Université de Paris Descartes | Andrew Read, Pennsylvania State University | Thomas Lecuit, IBDML - Developmental Biology Institute of Marseille – Luminy | Thomas J. Silhavy, Department of Molecular Biology, Princeton University | Nikos K. Logothetis, Physiology of Cognitive Processes Department, Max Planck Institute for Biological Cybernetics | Laurence Hurst, University of Bath | Maria Leptin, European Molecular Biology Organization

## SELECTED RECENT PUBLICATIONS

**A survey of stochastic omega-regular games** | Chatterjee, K & Henzinger, T A, 2012 | *Journal of Computer and System Sciences* 78, 394-413

**Evolutionary dynamics of biological auctions** | Chatterjee, K, Reiter, J G & Nowak, M A, 2012 | *Theoretical Population Biology* 81, 69-80

**Cell adhesion in embryo morphogenesis** | Barone, V & Heisenberg, C, 2012 | *Current Opinion in Cell Biology* 24, 148-153

**Spurred by Resistance: Mechanosensation in Collective Migration** | Behrndt, M & Heisenberg, C, 2012 | *Developmental Cell* 22, 3-4

**Dual Complexes of Cubical Subdivisions of  $R^n$**  | Edelsbrunner, H & Kerber, M, 2012 | *Discrete and Computational Geometry* 47, 393-414

**Active dendrites support efficient initiation of dendritic spikes in hippocampal CA3 pyramidal neurons** | Kim, S, Guzman, S, Hu, H & Jonas, P, 2012 | *Nature Neuroscience* 15, 600-606

**Nanodomain coupling between  $Ca^{2+}$  channels and sensors of exocytosis at fast mammalian synapses** | Eggermann, E, Bucurenciu, I, Goswami, S & Jonas, P, 2012 | *Nature Reviews Neuroscience* 13, 7-21

**Social Transfer of Pathogenic Fungus Promotes Active Immunisation in Ant Colonies** | Konrad, M, Vyleta, M L, Theis, F J, Stock, M, Tragust, S, Klatt, M, Drescher, V, Marr, C, Ugelvig, LV & Cremer, S, 2012 | *PLoS Biology* 10, e1001300

**Remaining genetic diversity in Brazilian Merganser *Mergus octosetaceus*** | Vilaça, S T, Redondo, R A F, Lins, L V & Santos, F R, 2012 | *Conservation Genetics* 13, 293-298

**Real-time detection of colored objects in multiple camera streams with off-the-shelf hardware components** | Lampert, C H & Peters, J, 2012 | *Journal of Real-Time Image Processing* 7, 31-41

**The complexity of conservative valued CSPs** | Kolmogorov, V & Živný, S, 2012 | In: *SODA: Symposium on Discrete Algorithms* SIAM, 750-759

**Message Authentication, Revisited** | Dodis, Y, Kiltz, E, Pietrzak, K & Wichs, D, 2012 | *Eurocrypt* 355-374

**Ideal abstractions for well structured transition systems** | Zufferey, D, Wies, T & Henzinger, T A, 2012 | In: *LNCs 7148 VMCAI: Verification, Model Checking, and Abstract Interpretation* Springer, 445-460

**A full list of publications from IST Austria can be found at [publist.ist.ac.at](http://publist.ist.ac.at)**