



# NEWSLETTER

2nd edition | August 2012

## FOREWORD



**We have reached the middle of summer, but it's a busy time at IST Austria.**

The 15a agreement between the Republic of Austria and the province of Lower Austria concerning the continued financing of IST Austria until 2026 passed the Austrian parliament in its last session before summer on July 5, and the state parliament of Lower Austria on July 6. With this financing, and the long-term perspective now available, it will be possible for IST Austria to grow to a size of about 90 to 100 research groups by 2026 and venture into new research fields.

Two professors have been recruited to IST Austria in the past months. Eva Benková and Jiří Friml will widen the scope of biological research at IST Austria to include plant biology. They will join the Institute at the end of the year, once the second laboratory building is open.

We hope you'll enjoy reading about what's new at IST Austria, its scientists and their research.

Thomas A. Henzinger | President  
Gerald Muraier | Managing Director

## AWARDS

### Tom Henzinger Wittgenstein Laureate 2012

#### Most important Austrian Science Prize for IST Austria President

Tom Henzinger is one of two Wittgenstein Award Laureates of 2012. He received this award with Niyazi Serdar Sariçiftçi at the Johannes Kepler University Linz, as was announced by Federal Minister for Science and Research, Karlheinz Töchterle, and Christoph Kratky, President of the FWF, on June 12.

Wittgenstein Laureates are chosen by an international jury on the basis of appraisals. The award serves to support scientists working in Austria, who have accomplished outstanding scientific achievements and are of high standing in the international scientific community of their discipline. The Wittgenstein Award is not bound to a research proposal and, through its high degree of freedom and flexibility, supports the

pursuit of "blue sky"-projects, scientific research expanding the horizon of our current knowledge.



Apart from his activities as IST Austria President, the acclaimed computer scientist leads a research group of currently five Postdocs and two PhD students. Of particular scientific interest to Henzinger are mathematical models for the improvement of software quality, developing new theories, algorithms and tools for error detection in computer programs.

## NEW PROFESSORS

### EVA BENKOVÁ



is a plant cell biologist focusing on plant hormone research. Benková earned her PhD in Biophysics at the Institute of Biophysics of the Academy of Science of the Czech Republic in 1998. She then worked at the Max-Planck Institute for Plant Breeding in Cologne and at the Centre for Plant Molecular Biology in Tübingen. Since 2007, Benková holds a group leader position at the Flanders Institute for Biotechnology (VIB) in Gent, Belgium. In 2007, Benková was awarded an ERC Starting Grant.

### JIŘÍ FRIML



is a plant developmental biologist, studying signal integration. He obtained one PhD from the University of Cologne and a second one from Masaryk University in Brno. Having worked at the universities of Tübingen and Göttingen, Friml, in 2007, joined the Flanders Institute for Biotechnology (VIB) as full professor. In 2011, he received an ERC Starting Grant. Friml was awarded the Körber European Science Award in 2010, elected EMBO member in 2010 and AAAS fellow in 2011, and received the EMBO Gold Medal 2012.

## HONORS

### Herbert Edelsbrunner has been elected Member of the Austrian Academy of Sciences

(Österreichische Akademie der Wissenschaften, ÖAW).

At the annual election meeting on May 7, when the ÖAW accepted 38 scientists from Austria and abroad, IST Austria Professor Herbert Edelsbrunner was appointed Corresponding Member of the mathematical-scientific class in Austria. The decree was bestowed upon him at the festive meeting on May 9 with Federal President Heinz Fischer and Federal Minister Karlheinz Töchterle attending.

## NEWS

Our first PhD students have graduated! The **first graduation ceremony** at IST Austria took place on June 4. **Jean-Léon Maître**, who performed his doctoral studies in the group of Carl-Philipp Heisenberg, was presented with his diploma by Haim Harari, chair of the Executive Committee of IST Austria and former president of the Weizmann Institute of Science, Herbert Edelsbrunner, Head of the IST Austria PhD Program, and Tom Henzinger.

## SCIENCE AT IST AUSTRIA

### Evolutionary Biology Sylvia Cremer

Sylvia Cremer and her group focus on the evolutionary and behavioral biology of ants. In two recent publications, the group describes behavioral dynamics of ants in different situations: when fighting infections and during male rivalry.

When facing disease, ants co-operate to protect the colony. Healthy ants remove fungal pathogens from an exposed ant's body, increasing the survival chances of the exposed ant. The helper ants are then also protected from infection by "social vaccination". In their *PLoS Biology* publication, the Cremer group investigated the mechanisms behind this social immunization. They showed that helper ants develop microinfections, which are sub-lethal but induce the expression of a specific set of immune genes and so increase the helper ants' capacity to fight the infecting pathogen. This enables colonies to recover from an infection more rapidly.

While co-operation is key in containing disease, rivalry between males of the small tropical ant *Cardiocondyla obscurior* is a brutal affair. Wingless, aggressive males scour the colony in search for emerging rivals. In the



immediate attack, they grab their opponent and mark him with a chemical substance, which causes worker ants to kill the marked male. The researchers showed that newly emerged males are helplessly vulnerable in these attacks. A different picture is seen after two days - the young male is on par with the older one and fierce battles with mutual chemical marking ensue, sometimes killing both males. While winged, peaceful males protect themselves from attack by chemically mimicking females, the current work shows that wingless males lack the ability to "hide" by such mimicry but instead signal their identity already shortly before emerging from the pupa.

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

The dynamics of male-male competition in *Cardiocondyla obscurior* ants | Cremer S, Suefuji M, Schrempf A & Heinze J, 2012 | *BMC Ecology* 12, 7

## AWARDS

### ERC Starting Grant for Christoph Lampert

Christoph Lampert has been endowed with an ERC Starting Grant. The grant for Lampert, who works on Computer Vision and Machine Learning, is funded with € 1.5 mio for the duration of five years. This is the eleventh ERC Grant for the IST Austria faculty of 24 professors.

The goal in Lampert's project "Life-Long Learning for Visual Scene Understanding" is to develop and analyze algorithms that use continuous, open-ended machine learning from visual input data in order to interpret visual scenes on a level comparable to humans. The project is based on the hypothesis that to significantly improve the state of the



art in computer vision, scientists need to give the algorithms access to background and contextual knowledge about the visual world. The most feasible way to obtain such knowledge is by extracting it (semi-)automatically from incoming visual stimuli. Consequently, at the core of the project lies the idea of life-long visual learning. The techniques developed can help give "common sense" to automatic learning systems that so far have none.

## UPCOMING EVENTS

**September 12** | IST Lecture  
(4.30 pm)

**Arnold Levine**, of the Institute for Advanced Study, Princeton, will give a lecture on how the Influenza virus escapes the immune system.

**November 28** | Opening of the 2<sup>nd</sup> Laboratory Building

Ceremony to open the second **laboratory building for experimental research** on the IST Austria campus, and to lay the foundation stones for a new service building (Lab 3) and laboratory building 4. Details will be announced on the IST Austria website.

**All events are open to the public and free of charge.**

## HONORS AND AWARDS

### HERBERT EDELSBRUNNER



has received a **EU FP7 Cooperation Grant** for his project on Topological Complex Systems. FP7 Cooperation grants are sponsored by the European Commission and support collaborative research on strategic topics. Partners in this project are at the Jožef Stefan Institute in Ljubljana, the Royal Institute of Technology in Stockholm, the Jagiellonian University in Krakow and the Technion in Haifa.

### JIŘI FRIML



has been awarded the **EMBO Gold Medal 2012**. With this distinction, EMBO highlights the quality of molecular biology research being performed by young European scientists. The EMBO Gold Medal is awarded to only one scientist a year and is regarded as one of the most prestigious European awards in the field of molecular biology.

## NEWS

IST Austria has set up **ISTFELLOW**, a program to attract outstanding postdoctoral researchers. The program is partially financed by the EU and will fund 40 postdoctoral fellows for a period of two years each.

ISTFELLOW is open to qualified applicants from all over the world. In keeping with the spirit of IST Austria, ISTFELLOW will give preference to scientists who have a strong interest in cross-disciplinary approaches. Fellows will be selected twice a year in October and April. For further information, please visit [ist.ac.at/istfellow](http://ist.ac.at/istfellow).

## COLLOQUIUM SPEAKERS

PAST SPEAKERS (MAY - JULY): **Jürgen Knoblich**, Institute of Molecular Biotechnology of the Austrian Academy of Sciences | **Stephanie Wehner**, National University of Singapore | **Terence Hwa**, University of California

UPCOMING SPEAKERS: **Daniel E. Gottschling**, Fred Hutchinson Cancer Center (Sept 3) | **Naama Barkai**, Weizmann Institute of Science (Sept 10) | **Karsten Kruse**, Saarland University (Sept 17) | **Idan Segev**, The Hebrew University of Jerusalem (Sept 24)

## SELECTED RECENT PUBLICATIONS

**Limits to the rate of adaptation in sexual populations** | Weissman D B & Barton N H, 2012 | *PLoS Genetics* 8, e1002740

**Transcription factor kinetics and the emerging asymmetry in the early mammalian embryo** | Pantazis P & Bollenbach T, 2012 | *Cell Cycle* 11, 2055-2058

**Robustness of structurally equivalent concurrent parity games** | Chatterjee K, 2012 | *LNCS* 7213, 270-285

**The molecular evolution of acquired resistance to targeted EGFR blockade in colorectal cancers** | Diaz L A, Williams R, Wu J, Kinde I, Hecht J R, Berlin J, Allen B, Bozic I, Reiter J G, Nowak M A, Kinzler K W, Oliner K S, Vogelstein B, 2012 | *Nature* 486, 537-540

**The dynamics of male-male competition in *Cardiocondyla obscurior* ants** | Cremer S, Suefuiji M, Schrempf A & Heinze J, 2012 | *BMC Ecology* 12, 7

**Message authentication, revisited** | Dodis Y, Pietrzak K, Kiltz E & Wichs D,

2012 | *LNCS* 7237, 355-374

**Hierarchical ordering of reticular networks** | Mileyko Y, Edelsbrunner H, Price C A & Weitz J S, 2012 | *PLoS ONE* 7, e36715

**Persistent Homology: theory and practice** | Edelsbrunner H & Morozov D, 2012 | *6th European Congress of Mathematics*

**Add isotropic Gaussian kernels at own risk: more and more resilient modes in higher dimension** | Edelsbrunner H, Fasy B & Rote G, 2012 | *ACM Proceedings of SoCG'12*, 91-100

**The most persistent soft-clique in a set of sampled graphs** | Quadrianto N, Chen C & Lampert C H, 2012 | *International Conference on Machine Learning*

**Approximating marginals using discrete energy minimization** | Korč F, Kolmogorov V & Lampert C H, 2012 | *ICML Workshop on Interactions between Inference and Learning*

**Optimizing information flow in small**

**genetic networks. III. A self-interacting gene** | Tkačik G, Walczak A M & Bialek W, 2012 | *Physical Review E* 85, 041903

**Geometry of maximum likelihood estimation in Gaussian graphical models** | Uhler C, 2012 | *Annals of Statistics* 40, 238-261

**Discounting and averaging in games across time scales** | Chatterjee K & Majumdar R, 2012 | *International Journal of Foundations of Computer Science* 23, 609-625

**Parallel repetition of computationally sound protocols revisited** | Pietrzak K & Wikström D, 2012 | *Journal of Cryptology* 25, 116-135

**Lumpability abstractions of rule-based systems** | Féret J, Henzinger T A, Koepl H & Petrov T, 2012 | *Theoretical Computer Science* 431, 137-164

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

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