

HITS group leader: ERA Chair and “highly-cited” researcher

This fall, HITS group leader **Alexandros Stamatakis** (Computational Molecular Evolution, CME) has been extremely successful as a researcher. He will receive funding of 2.4 million euros from the European Commission for an ERA Chair (European Research Area). With this, he will establish computational biodiversity research at the Informatics Institute of the Foundation for Research & Technology - Hellas (ICS-FORTH) on Crete, Greece. The new “Biodiversity Computing Group” will start its work in early 2023 and will collaborate closely with the local research centers “Hellenic Center for Marine Research” and the Natural History Museum of Crete. The CME research group at HITS led by Stamatakis and the KIT computer science faculty are also involved in the research. The goal is to develop novel and energy-efficient tools, algorithms, and models to assess biodiversity in a European



biodiversity hotspot. The project will fund several postdocs and PhD students working on all methodological aspects of biodiversity computing. Alexandros

Stamatakis will move permanently to Crete for the duration of the project. For seven years running, Alexandros Stamatakis has been named one of the most cited researchers worldwide, according to this year’s “Highly Cited Researchers” list from Clarivate. The ranking is an important indicator for the impact of a researcher’s scientific publications. He is listed in the ranking with a primary affiliation at HITS, his secondary affiliation is the Karlsruhe Institute of Technology (KIT). The ranking is an important indicator for the impact of a researcher’s scientific publications. The citations of their publications rank

cumulatively among the top one percent in their fields and publication years. 6,938 researchers from 69 countries and regions have been recognized this year, among them 369 researchers from Germany. Alexandros Stamatakis earned this exclusive distinction again, based on the number of highly cited papers he produced over an 11-year period from January 2011 to December 2021. He is listed in the category “Biology and Biochemistry.” “The ERA Chair and the Highly Cited Researcher nomination for our group leader Alexandros Stamatakis are further evidence of his outstanding position at the interface between biology, computer science and high-performance computing,” said **Frauke Gräter**, scientific director of HITS. “The phylogenetic software he and his group have developed is among the most widely used programs. We look forward to working with the Greek partners.”



Via Data

The HITS blog can be found on the “Scilogs” portal at <https://scilogs.spektrum.de/via-data/>.

HITS

Klaus Tschira Guest Professors at HITS



The Klaus Tschira Guest Professorship Program has started this year. It aims to reach internationally renowned scientists for sabbaticals or extended research stays. The first Klaus

Tschira Guest professor was the biologist **Antonis Rokas** from Vanderbilt University, USA (see “Beyond the limits”). He arrived in June 2022 and stayed until the end of September. Antonis collaborated intensively with the CME group and gave a hybrid talk in the HITS colloquium series. His successor, the astrophysicist **Sarvani Basu** from Yale University, USA, arrived in mid-September and stayed until the end of November.

The first HITS Independent Postdoc



Astrophysicist **Rajika Kuruwita** is the first Independent Postdoc at HITS. The program offers an opportunity for highly talented young scientists wanting to transition from PhD student to junior group leader. Born in Sri Lanka, Rajika completed her PhD at the Australian National University, was a fellow at the University of Copenhagen, and joined HITS in September 2022. She is collaborating closely with the SET group.

New employees and visiting scientists

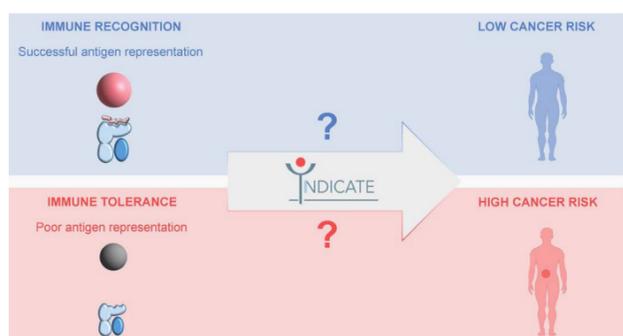
- HITS Independent Postdoc:** Rajika Kuruwita (collaborating with SET)
- Postdocs:** Felix Ahlborn (TOS), Abderrezak Torche (CCC)
- Research Associates:** Ina Biermayer (SDBV)
- Pre-docs:** Beatriz Bordaáguia (TOS), Jeong Yun Choi (TOS), Yi Fan (NLP), Jonas Müller (TOS), Francisca Macarena Espinoza Rojas (TOS), Marco Vetter (PSO)
- Master students:** Luise Häuser (CME), Jakob Niessner (MCM)
- Visiting scientists:** Shimei Pan, University of Maryland Baltimore County, Fulbright Scholarship; Peter Smillie, Heidelberg University

HITS groups (12/2022): *Astroinformatics (AIN), Computational Carbon Chemistry (CCC), Computational Molecular Evolution (CME), Computational Statistics (CST), Data Mining and Uncertainty Quantification (DMQ), Groups and Geometry (GRG), Machine Learning and Artificial Intelligence (MLI), Molecular Biomechanics (MBM), Molecular and Cellular Modeling (MCM), Natural Language Processing (NLP), Physics of Stellar Objects (PSO), Scientific Databases and Visualization (SDBV), Stellar Evolution Theory (SET), Theory and Observations of Stars (TOS).*

HITSters

New initiative to INDICATE cancer risks

Scientists from HITS, the German Cancer Research Center (DKFZ), the Heidelberg University Hospital and Heidelberg University have established INDICATE, an international collaborative initiative to unravel the role of the Human Leukocyte Antigen (HLA) type as risk modifier in individuals with a genetic cancer predisposition.



Genetic cancer predisposition is the most important measurable risk factor for cancer at a young age. The most common inherited cancer predisposition is the so-called Lynch syndrome, which affects approximately 400,000 individuals in Germany and 3.5 million individuals in Europe; carriers have a

substantially elevated risk of developing tumors of the large bowel and, in women, the uterus, early in life. However, cancer risk varies widely (among individuals even within one family). Therefore, more precise cancer risk estimates would enable a personalized approach to cancer prevention in Lynch syndrome and beyond. One crucial characteristic of Lynch tumors is the induction of a strong anti-tumor immune response. The key link in the process of

tumor cell recognition by the immune system are Human Leukocyte Antigen (HLA) molecules. “The associations of certain HLA types with disease susceptibility have been shown for virus infections, however, in cancer this aspect is poorly understood. Lynch syndrome is an ideal model to address this question for the first time in a systematic manner,” says HITS group leader **Vincent Heuveline** (DMQ). “For a systematic analysis, the use of data analysis and mathematical modeling will be key to quantify the influence of the HLA type on cancer risk”, adds

Saskia Haupt (DMQ), the coordinator of the mathematical modeling in INDICATE. To explore the role of the HLA type in defining Lynch syndrome carriers’ cancer risk, the scientists initiated an international collaborative study with the central coordination in Heidelberg (INDICATE, Individual Cancer risk by HLA Type, indicate-lynch.org). They are supported by the Klaus Tschira Foundation as part of the interdisciplinary project “Mathematics in Oncology”. So far, the researchers have published two papers: one in the International Journal of Cancer, on the interplay between the HLA system and human disease susceptibility, and the other as a report in HLA about making archival and possibly even historic samples accessible for HLA studies. The researchers are now looking forward to establishing a pipeline for future projects on cancer susceptibilities by HLA type.

Ahadovar A et al: Is HLA type a possible cancer risk modifier in Lynch syndrome? International Journal of Cancer, 10 October 2022, DOI: 10.1002/ijc.34312 <https://onlinelibrary.wiley.com/doi/10.1002/ijc.34312>

Research

Beyond the limits: Antonis Rokas, Klaus Tschira Guest Professor

He steps out onto the terrace and enjoys the view of the garden, which is bathed in soft fall light on this beautiful September morning. “HITS is really a special place,” says **Antonis Rokas**, evolutionary biologist at Vanderbilt University in Nashville, Tennessee (USA) – and the first Klaus Tschira Guest Professor at HITS. The Klaus Tschira Guest Professorship Program aims to enhance international exchange and scientific collaboration at HITS. Internationally renowned scientists are invited for sabbaticals or extended research stays. They can collaborate with scientists at HITS, develop joint research projects, and engage with the wider scientific community at the institute and in the Heidelberg region. At the end of 2022, HITS will have hosted two Klaus Tschira Guest Professors.

Antonis Rokas has used his sabbatical at Vanderbilt for this stay. “I have been in the faculty for 15 years, and we have sabbaticals every 4 years,” he says. “But I used to spend them in Nashville because we had small

kids. Actually, this is the first time away from the homebase.” In order to make the most of the time available to him, he will be spending (a total of) seven months in Europe: After four months at HITS, he will be a visiting research fellow at the University of Oxford’s Merton College. “Both fellowships cater to my scientific interests,” he says. “Germany and the UK are powerhouses of



science in Europe. At HITS I get a dose of the computational side of evolutionary biology, at Oxford a dose of the experimental side.” During his stay in the summer, Antonis Rokas has collaborated intensively with **Alexandros Stamatakis** and the Computational Molecular Evolution group (CME). “Alexi

and I have worked on a synthesis article about the challenges of evolutionary biology, with increasing datasets and millions of genomes to be sequenced.” He has also started a project with the CME group on the irreproducibility problem in computational biology where many factors are to be considered, like hardware, software, and the data involved. He also gave a hybrid colloquium talk in the Studio Villa Bosch on the ‘Incongruence in the Tree of Life’.

“For me, it has been a great experience, being back in Europe after so many years of living in the United States,” the Athens-born resumes. “Scientifically, it has been very productive. Alexi and I have worked together since 2014, and we have had the chance to intensify and expand our collaboration.” He emphasizes that he has had enough time to think and write, without distraction. “Sometimes, isolation helps,” he says, smiling. And finally, Antonis Rokas expresses another thought that is important to him: “The funding mechanism here is great. You are investing in people, not in projects – that’s the best model.”

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Beyond the limits



The Charts