

Celebrating Curiosity:
Explore Science Festival 2025

Every year, the Klaus Tschira Foundation invites young and old minds to explore their curiosity and engage with the world of science. From 25–29 June, Mannheim’s Herzogenriedpark once again opened its doors for the Explore Science festival, drawing 25,000 attendees despite the summer heat. Over five days, visitors of all ages enjoyed a wide range of hands-on exhibits and educational workshops, including those presented by HITS.



The HITS hands-on activities centered around the theme “Experiment, Tinker, Do-It-Yourself – Energy for You and Your Environment!” Visitors explored renewable energy in action, using Green Energy kits to investigate wind and solar power - supervised by members of the Computational Molecular Evolution (CME) and the Molecular and Cellular Modeling (MCM) groups. Another activity invited children to design and assemble colorful pinwheels, combining creativity with scientific interest.

A second key focus was the human liver. Supported by the Scientific Databases and Visualization (SDBV) group and the LiSyM Cancer project, one station featured a microscope offering close-up views of pathological liver tissue sections. Nearby, children learned about human anatomy by stamping and coloring the liver onto human body outlines. Explore Science will return to Herzogenriedpark from 17–21 June 2026, promising another inspiring experience around the topic: “Inventions and Discoveries.”

Via Data Blog – Sebastian Trujillo Gomez
Of HiPSters and Spherinators: Providing Answers to Unknown Unknowns
The HITS blog can be found on the “ScilogS” portal at <https://scilogS.spektrum.de/via-data/>



HITS

Bridging Generations: Highlights from the 2025 Alumni Meeting

On Friday, 4 July 2025, the HITS biennial Alumni Meeting took place on the HITS campus at Schloss-Wolfsbrunnengweg. We were delighted to welcome a diverse group of alumni – from long-standing members returning to familiar grounds to recent graduates reconnecting with the HITS community. The keynote speech of the event was delivered by Anne Schreiter (GSO* – Guidance, Skills & Opportunities) and was centered on “the lucky mindset,” in which she offered her



advice on how to attract career opportunities that are aligned with strengths and desires. Following the keynote, **Alexander Jordan** (CST) moderated a career panel featuring alumni **Isabel Kemmer**, **Nicholas Michelarakis** (both formerly Molecular Biomechanics group) and **Anna Piras** (for-

merly Computational Carbon Chemistry group). They discussed their experiences before and during their time at HITS and gave a glimpse into their current jobs. The day concluded with an informal gathering – our traditional “Sit & Sizzle” – with refreshments and continued conversations in a relaxed atmosphere. This meeting offered our alumni and current staff an opportunity to reconnect with colleagues from the past, reflect, and strengthen professional and personal ties that span across years and disciplines. It was the highlight of our HITS 15 years’ anniversary, and we’re looking forward to our next Alumni meeting in 2027.

New employees and visiting scientists

HITS Independent Postdoc: Vagrant Gautam
Research Associate: Matthew Johnstone (SDBV)
Master students: Chaitanya Sampara (MLI), Jonas Reichert (PSO)
Visiting scientists: Ke-Jung Chen (PSO, Humboldt Research Fellow - Academia Sinica Institute of Astronomy and Astrophysics (ASIAA), Taiwan), Wun-Yi Chen (PSO, (ASIAA), Taiwan), Vinicius Ávila Cabral (MCM, Universidade Federal de Ciências da Saúde de Porto Alegre, Brazil), Christoffer Kinttof Øhlenschläger (CST, University of Copenhagen, Denmark)
IT Services: Felix Bangerter (System Administrator)
Administration: Darija Stein (Team Assistant, Front Office)

HITS groups (09/2025): *Astroinformatics (AIN), Computational Molecular Evolution (CME), Computational Statistics (CST), Data Mining and Uncertainty Quantification (DMQ), Machine Learning and Artificial Intelligence (MLI), 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

Double detonation: Death of a white dwarf

An international team, including researchers and collaborators from HITS, has captured visual evidence that a white dwarf star exploded in a double detonation, rather than the typically assumed single explosion. Using ESO’s Very Large Telescope (VLT) and its MUSE instrument, they imaged the supernova remnant SNR 0509 67.5, located about 160,000 light years away in the Large Magellanic Cloud. For the first time, they’ve observed two concentric calcium shells – an outer and an inner ring – interpreted as residues of the two explosions: first the helium shell on the white dwarf ignited, and then the core detonated moments later. “The explosions of white dwarfs play a crucial role in astronomy,” says **Priyam Das** (University of New South Wales Canberra, Australia), a short-time visiting scientist in the Physics of Stellar Objects (PSO) group at HITS, who led the study. Much of our knowledge of how the Universe expands rests on Type Ia supernovae, and they are also the primary source of iron on our planet, including the iron in our blood.

Type Ia supernovae have long had an unresolved explosion trigger. This finding sheds light on how some of these supernovae can occur via alternate pathways. **Ivo Seitenzahl**, who led the observations and was a visiting scientist at HITS when the study was conducted, says these results show “a clear indication that white dwarfs can explode well before they reach the famous Chandrasekhar mass limit, and that the ‘double-detonation’ mechanism does indeed occur in nature.”

Das, P., Seitenzahl, I.R., Ruitter, A.J. et al. Calcium in a supernova remnant as a fingerprint of a sub-Chandrasekhar-mass explosion. In: Nat Astron (2025). <https://doi.org/10.1038/s41550-025-02589-5>



Tidal Forces meet Stellar Magnetism in Binary Star Systems

Binary stars behave significantly different from single ones. According to a study conducted by an international team of astrophysicists, this also applies to their magnetic activity. The study was led by former HITS researcher **Jie Yu**, together with HITS researchers **Saskia Hekker** and **Michaël Bazot** (both Theory and Observations of Stars group). They have investigated the chromospheric activity of main-sequence binary stars to constrain the impact of tidal forces on the excitation of magnetic fields. “Our work clearly shows that interactions in twin stars result in phenomena that are still unknown, which emphasizes the need to study the laws of physics in extreme circumstances,” HITS group leader Saskia Hekker sums up the results. The findings of the study have been published in *Nature Astronomy*.

Yu, J., Gehan, C., Hekker, S. et al. Enhanced magnetic activity in rapidly rotating binary stars. In: Nat Astron 9, 1045–1052 (2025). <https://doi.org/10.1038/s41550-025-02562-2>

Research

Beyond the limits – Raphael Hirschi, Klaus Tschira Guest Professor



Raphael Hirschi, Professor at Keele University, UK, joined the Physics of Stellar Objects (PSO) group in April 2025 as Klaus Tschira Guest Professor and will make multiple

long-term visits until the end of the year. In this interview, he talks about why no one is born a scientist and shares his vision for the next big breakthrough in astronomy in the coming years.

Several groups at HITS are working in astrophysics and astroinformatics. Have you had the chance to collaborate with them?
I’ve been working with the PSO group on 3D Magnetohydrodynamic simulations of massive stars. Since joining in April, we’ve set our goals and are already analyzing the first results. I regularly discuss binary stars with Fabian Schneider. With Saskia Hekker, we connect

theory and asteroseismical observations. I’m also exploring the work of Kai Polsterer’s group – it’s inspiring to see how other researchers apply machine learning in astrophysics.

As a professor at Keele University your modules – such as Physics of Fluids, Applied Physics & Emerging Tech, and Particle Physics & Accelerators – span a broad range. What skills do you think are essential for future astrophysicists?

If possible, you should try to balance deep expertise with broader impact. The topics I teach may seem disconnected, but they’re all linked: Stars are made of plasma and powered by nuclear reactions, which ties my research to nuclear and particle physics. At Keele, I’m the Director of the Digital Society Institute. When I became a professor, I asked myself: Do I just keep researching stars? That led me to explore renewable energy and how to apply my astrophysics knowledge to benefit society.

With tools like ESO’s Extremely Large Telescope (ELT), Gaia, and advanced computing power becoming available, what’s the “next big leap” in astro research in the next decade?
We live in fortunate times for science, with

powerful tools at our disposal. ESO’s ELT will let us see further, the James Webb Space Telescope reaches extreme redshifts, and the Einstein Telescope will detect gravitational waves anywhere in the Universe. The possibility of observing every black hole merger in the future is unprecedented. What was once limited to our galaxy will be extended to the entire universe.

Looking back on your journey – from your early interests to your current roles in both the UK and Germany – what has kept you inspired and curious?

People often think you’re born a scientist, but that wasn’t my path. I grew up on a farm in Switzerland, far from any scientific career. In my village, you could see the stars very clearly. I could see the Milky Way band from my backyard. That sparked my curiosity and led me to physics. What keeps me going is the beauty of physics and its universal relevance. I’m grateful to do a job that I love every day.

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Beyond the limits



The Charts