

A warm welcome: Formal reception starts off HITS 10th anniversary year

On 20 January, the institute kicked off its 10th anniversary celebrations with a formal reception in the Studio Villa Bosch. The networking event brought together more than 80 guests from academia, industry, and local politics. Managing Director **Gesa Schönberger** and Scientific Director **Wolfgang Müller** looked back over the past decade and gave a short preview of the Institute's activities in the 10th anniversary year and beyond. **Andreas Reuter**, chairperson of the HITS Foundation and former Managing Director of HITS, provided a brief historical overview of the founding years. After a lively talk on "Artificial Intelligence in Science" by astroinformatician **Kai Polsterer**, guests had the opportunity to network with HITSters over drinks and food in the Studio's foyer.



"Via Data": The new HITS Blog on "Scilogs"

The 10th anniversary year offers the blogging community a special opportunity: On "Scilogs – Tagebücher der Wissenschaft" ("Scilogs – Scientific Diaries"), all bloggers and would-be bloggers at HITS can write about how at HITS, large amounts of unstructured data are turned into computer programs, models, and simulations to develop theories about the origin of

our Universe or to illustrate complex biological processes. The blog called "Via Data" will also feature 10 research highlights from the past decade. The first post was published in February and describes the sequencing of the axolotl genome, a truly gigantic research project in many ways. Further topics will include the strongest magnets in the Universe, using artificial intelligence to create better weather forecasts, and a stress test for proteins.



The HITS anniversary blog "Via Data" can be found at <https://scilogs.spektrum.de/via-data/>.

HITS



Michael Strube is a Fellow of the ACL

NLP group leader **Michael Strube** has been appointed Fellow of the Association for Computational Linguistics (ACL) for "valuable contributions to the computational treatment of discourse, coreference, and evaluation, for sustained service to ACL in numerous roles, and for effective outreach to the public". The ACL is the international scientific and professional society for people

working on problems involving natural language and computation. The ACL Fellows program was established in 2011 and recognizes members whose contributions to the field have been extraordinary in terms of scientific and technical excellence, service to the association and the community and educational or outreach activities with broader impact.

New employees and visiting scientists

- MCM:** Giulia Paiardi, visiting scientist (University of Brescia, Italy)
- PSO:** Giovanni Leidi, visiting scientist (Heidelberg University)
- SDBV:** Ghadeer Mobasher, research associate

HITS groups (12/2019): Astroinformatics (AIN), Computational Carbon Chemistry (CCC), Computational Molecular Evolution (CME), Computational Statistics (CST), Data Mining and Uncertainty Quantification (DMQ), Groups and Geometry (GRG), Molecular Biomechanics (MBM), Molecular and Cellular Modeling (MCM), Natural Language Processing (NLP), Physics of Stellar Objects (PSO), Scientific Databases and Visualization (SDBV).

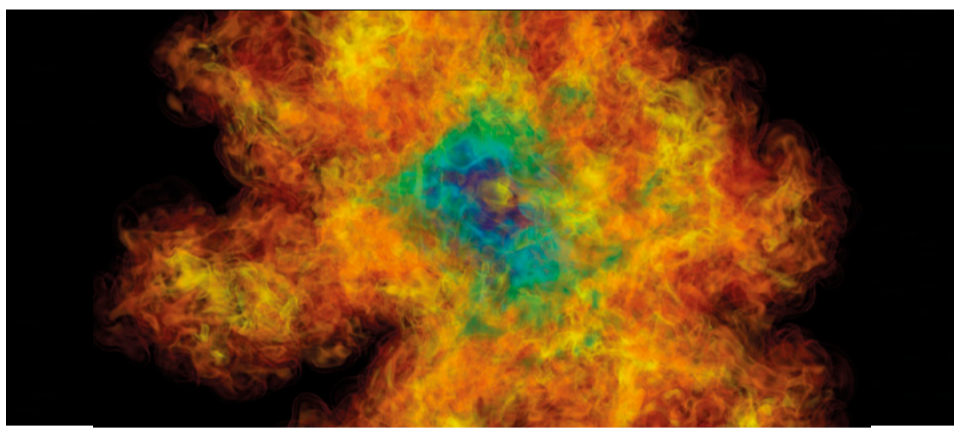
HITSters

An explosive result

Nuclear physicists from Finland, Denmark, and Germany succeeded in experimentally determining nuclear processes that operate at conditions ten million times denser and 25 times hotter than those at the center of our Sun. A result of the measurement is that intermediate-mass stars are very likely to explode and not – as previously assumed – to collapse. This discovery was confirmed by astrophysicists from HITS and the Los Alamos National Laboratory, USA, with three-dimensional computer simulations. The findings have been published in the scientific magazine Physical Review Letters. Depending on their mass, stars take different evolutionary paths. Low-mass stars, such as our Sun, eventually become white dwarfs. Massive stars, by contrast, terminate in spectacular explosions known as supernovae, which leave behind either a neutron star or a black hole. But where is the dividing line between these two options? The fate of intermediate-mass stars, which weigh 7–11 times as much as the Sun, has remained unclear. This lack of understanding is surprising since intermediate-mass stars are prevalent in the Galaxy. Their fate depends on a tiny detail – namely, how readily electrons are captured on the isotope neon-20 in the stellar core. Depending on this electron capture rate, the

star will either be disrupted in a thermonuclear explosion or collapse to form a neutron star. An international collaboration of physicists has now succeeded in obtaining the first accurate determination of this important rate through a combination of careful measurements of the beta-decay of fluorine-20 and theoretical calculations. A detailed three-dimensional simulation

demonstrates that in contrast to previous assumptions, the star is more likely to be disrupted by a thermonuclear explosion than to collapse into a neutron star. The experiment was performed by the Physics of Stellar Objects group at HITS (led by **Friedrich Röpkke**) and by HITS alumnus **Samuel Jones** (XCP division at Los Alamos National Laboratory, USA).



In the light of these new findings, the most probable fate of intermediate-mass stars seems to be a thermonuclear explosion, which produces a subluminescent Type Ia supernova and a special oxygen-neon-iron white dwarf. The detection or non-detection of such white dwarfs in the future would provide important insights into the explosion mechanism.

O. Kirsebom et al., Discovery of an exceptionally strong beta-decay transition of ²⁰F and implications for the fate of intermediate-mass stars, Physical Review Letters 123, 262701 – published 24 December 2019.

Research

Behind the Scenes: The HITS Kitchen

"Ah, that feels good!" **Elfi Klingmann** falls onto the chair in the seminar room with a sigh. It is early afternoon, and she has been on her feet for several hours now. Elfi and chef **Ralf Westermann** – both from "Küchenservice Feil" – have come for an interview for our new 10th anniversary series, "Behind the Scenes," which puts together four profiles on employees from the teams that make life at the HITS so much better in one way or another.



What does a completely normal workday in your kitchen look like?

RW: I arrive at 5:00 a.m. and get everything ready. I boot up the PC, see what food orders have come in for the day. The first supplier comes at about 5:30 a.m.
EK: I arrive around 6:30 and first get Ralf a coffee. Then, I get the dirty dishes from the collection points, take care of the coffee machine, and make sandwiches for the HITSters who have breakfast here.
RW: After that, the preparations for lunch begin. Everything is prepared as best we can since a total of three kitchens have to be supplied with food. Later, everything is processed.
EK: We also do a lot of things ourselves. For example, we always freshly prepare vegetables, and we also

make the bread for the meat ourselves.
RW: My workday ends around 2 p.m. My team – which includes three other employees – leaves at around 3:30 p.m.

What makes a good chef at HITS?

RW: You have to be able to plan well in advance – especially on Mondays because that's the day for which people tend to forget to place their orders in advance. But over time, you develop a gut feeling for how many extra meals there might need to be. And I always see what I can do to make sure that nobody leaves with an empty stomach. A strong service mentality is really important to me.
EK: I think it's good that we recycle leftovers in our kitchen as much as possible, like with salads or soups. Ralf is very creative with that, and it is also sustainable.

What are the nice things about your job?

RW: The best thing for me is always the recognition

from the people, especially when alumni come and tell me how much they miss the cafeteria. It feels really good.

How do you actually remember the names of all the HITSters who come to lunch? Do you have a system for that?

RW: I usually remember the first letter of the last name. But with Spanish names, it's not always clear to me exactly which name is the last name. (Editor's note: Maybe a Spanish HITSter would be willing to explain the Spanish name format to Ralf when he or she has a free minute?)

Have the HITSters' eating habits changed over the past 10 years?

RW: There are a lot more vegetarians today than there used to be. The number has doubled over the years. And we eat much less pork.
EK: People drink so much espresso now that I sometimes think, "Oh, man! What's going on here?!" (Editor's note: Could this be due to the increased number of Italian employees at HITS?)

How many meals have you prepared for the HITSters in the past 10 years?

RW: My rough estimate based on the Lunch Reservation System would be around 113,000 meals.

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Behind the Scenes



The Charts

2010 2011 2012 2013
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