

# Plenary Assembly with a European theme

The Max Planck Society came together in Hamburg to mark its 70<sup>th</sup> anniversary

“The European Research Area is a beacon of hope for the future,” said Martin Stratmann in his closing speech at the 70<sup>th</sup> Annual Meeting in Hamburg at the end of June. Helping to shape this community of responsibility was, he said, a central task of the Max Planck Society. For example, Stratmann champions the Dioscuri program, which

was launched in 2018 with the aim of establishing scientific lighthouses in Central, Eastern and Southern Europe. The talk by Kiran Klaus Patel, a historian at the University of Maastricht, centered around lessons learned from the history of European integration.

At the start of the Annual Meeting, the Wissenschaftspreis des Stifterver-

bands (Science Award of the Donors’ Association) was awarded to Wolfgang Baumeister, Director at the Max Planck Institute of Biochemistry. Baumeister received this 50,000 prize for developing the technique of cryo-electron tomography. A total of 32 junior scientists also received prizes, including the Otto Hahn Medal, which is awarded in recognition of outstanding doctoral theses.

Plenary Assembly at the Fish Auction Hall in Altona: having just been confirmed for a new term of office, Max Planck President Martin Stratmann called for a strengthening of the European Research Area.

## Max Planck President to continue in his post

At its session at the Annual Meeting, the Senate of the Max Planck Society confirmed Martin Stratmann as head of the Max Planck Society. “The office of President is a fantastic opportunity to shape the Max Planck Society in collaboration with its governing bodies. And the next few years will be a particularly exciting time,” said Stratmann with regard to his second term in office, which will begin in June 2020.



## Growth in Bochum and Konstanz

With two new additions, the number of Max Planck Institutes grows to 86

By May 2019, everything was in place: the Joint Science Conference (GWK) of the federal administration and its federal states gave the green light for the establishment of two new Max Planck Institutes in the fields of “Cyber Security and Privacy” and “Animal Behavior”. The Max Planck Institute for Cyber Security and Privacy in Bochum will focus on the growing challenges in relation to data protection and already has two founding Directors: Gilles Barthe, who previously conducted research at the Institute for Advanced Studies in Software Development Technologies in Madrid, and Christof Paar, a Professor at the Ruhr-Univers-

sity Bochum. The second new Institute to be established, the Max Planck Institute of Animal Behavior, emerged from a part of the Max Planck Institute for Ornithology that was formerly based in Radolfzell. In addition to the existing Departments led by Directors Martin Wikelski and Iain Couzin, Margaret Crofoot from the University of California, Davis, is also coming on board as a Director. Established in Konstanz, the new Institute will form part of a world-leading interdisciplinary research association that uses the latest technologies to investigate the group behavior of various species of animals.

# “The telescope offers enormous potential”

Peter Predehl from the Max Planck Institute for Extraterrestrial Physics on the *eRosita* mission

The largest joint German-Russian project in the field of science to date was launched from Baikonur on 13<sup>th</sup> July, when a rocket carried the Spektrum-RG observatory into space. The platform is equipped with two X-ray telescopes, one of which is *eRosita*. Developed under the leadership of the Max Planck Institute for Extraterrestrial Physics, this is intended to survey the entire sky in previously unattained spectral and spatial resolution. We spoke with Peter Predehl, the scientific Director of *eRosita*, about the mission.

*Mr. Predehl, what's so special about eRosita?*

**Peter Predehl:** First, our telescope will scan the entire sky in X-ray light without focusing on individual sources. An “all-sky survey” of this kind offers huge potential for discovery, because you're not searching for a specific object but rather keeping an eye out for something new and unexpected. Second, *eRosita* has an unlimited field of view and can therefore observe even very large X-ray sources extending over a large area on the sky. These include supernova remnants – that is, the ejected gas shells of exploded stars.

*What are the goals of the mission?*

Simulations have shown that with *eRosita*, we'll observe around 100,000 galaxy clusters. Investigating these, the largest structures in space, is our primary goal. A cluster of this kind contains up to several thousand galaxies – Milky Way systems like ours – that are bound to one another by gravity. In X-ray light, these galaxy clusters appear as compact objects. However, rather than measuring the light from individual galaxies, we measure the radiation emitted by the gas between them. This radiation surrounds the galaxies like a cocoon. All in all, galaxy clusters form a large-scale structure that resembles a cosmic web. By observing the galaxy clusters, we are pushing ahead in the field of cosmology.

*What do you mean by that exactly?*

The galaxy clusters reflect the distribution of matter in the universe. They form the threads and nodes of the cosmic web, be-

tween which there are huge voids containing virtually no matter. Space has evolved since the time of the Big Bang. With *eRosita*, we can see great distances as well as looking back in time, because the light from distant objects takes a long time to reach us. Imagine we're observing a galaxy cluster in X-ray light. We already know the direction and the brightness. If we measure the distance by making follow-up observations with optical telescopes, we can finally determine the mass. We therefore know what specific density the universe had at a certain time. From a large number of these measurements, we can ultimately derive a range of cosmological parameters.

*Can you also find out anything about the expansion of space?*

Yes, because space is expanding at an accelerated rate. The reason for this appears to be dark energy. We're therefore dealing with a hot topic in current research. I'm not saying we're going to solve the mystery of this dark energy. But we're at least on the right track.

*And is dark matter also an issue for eRosita?*

As I already mentioned, there are large quantities of hot gas between the galaxies in a cluster. This intergalactic plasma collected inside a gravitational well, which was probably generated by dark matter. It's interesting to follow how galaxy clusters have evolved under the influence of dark matter and over time.

*Why will eRosita not follow an orbit around Earth but rather be stationed far away in space?*

There are three main reasons for this: at a location around libration or Lagrange point 2, which is about 1.5 million kilometers from Earth, our planet doesn't get in the way. There's also a constant temperature out there because the instruments are not exposed to the perpetual cycle of day and night. Thirdly, the location allows constant observation of the sky.

*What was it like to work with the Russian colleagues?*



Peter Predehl

At the working level, this was generally not a problem. Of course, there are always some conflicts in collaborations. That's only normal. But we also had a lot of learning to do, because the Russians follow slightly different procedures in a space project than those of western agencies such as ESA or NASA.

*Were you nervous before the launch?*

No. I wouldn't say nervous. I was tense, if anything. But we'd done everything that had to be done. And I was well aware that if the launch went wrong, the telescope was gone. There was no plan B. Incidentally, we've been working on the project for ten years, which is a reasonable length of time for a mission of this magnitude.

*When did you get the first results?*

About three months after launch, *eRosita* arrived at the Lagrange point 2 and entered an elliptical orbit with a semimajor axis of up to 800,000 kilometers. In October the telescope entered into full science observations with all even modules and we obtained the first images.

Interview: Helmut Hornung

## Top women scientists

First Lise Meitner Group Leaders selected



LISE-MEITNER  
EXZELLENZPROGRAMM  
LISE MEITNER  
EXCELLENCE PROGRAM  
2019

Whether it's astrophysical spectroscopy, neuroplasticity or pan-African evolution: however diverse the research fields of the first Lise Meitner Group Leaders may be, these women have one thing in common – like the program's namesake, they are some of the most exceptional talents in a world often dominated by men. As part of the Lise Meitner Excellence Program, launched by the Max Planck Society in 2018, twelve female junior researchers have now been appointed as Group Leaders at a Max Planck Institute. The aim of the program is to identify highly motivated and committed female scientists in the breakthrough phase of their career. They are then given the opportunity to train for leadership positions in science and in particular at the Max Planck Society.

Almost 300 candidates from 42 countries applied for group leadership positions. The twelve successful applicants were chosen primarily based on their impressive research accomplishments to date and evidence of strong potential. Nine of them have since accepted their appointments.

 <https://www.mpg.de/lise-meitner-excellence-program>

## Flight simulation for flying disks

Max Planck Society congratulates "Jugend forscht" prizewinner in the physics category

At the 54<sup>th</sup> nationwide final of the "Jugend forscht" competition for young researchers in Chemnitz, Nils Wagner won the jury over with his creative approach and methodological breadth to scoop first place in the physics category. In his project, the 20-year-old, who is studying at the Technical University of Munich, worked on a special type of projectile: the X-Zylo is a thin-walled, hollow cylinder that is thrown like a football and can fly in an astonishingly straight line. To understand this behavior in greater detail, Wagner wrote a computer program that can simulate the X-Zylo's trajectory. He then verified the results in experiments using a self-built, catapult-like firing mechanism. The result: the calculated and actual trajectories were very similar, even though the software didn't yet take account of all of the factors affecting the projectile's flight.

The Max Planck Society was also delighted at the young researcher's success: since 2012, it has been sponsoring the prizes in the physics category of "Jugend forscht". The award was presented by Jan-Michael Rost from the Max Planck Institute for the Physics of Complex Systems.



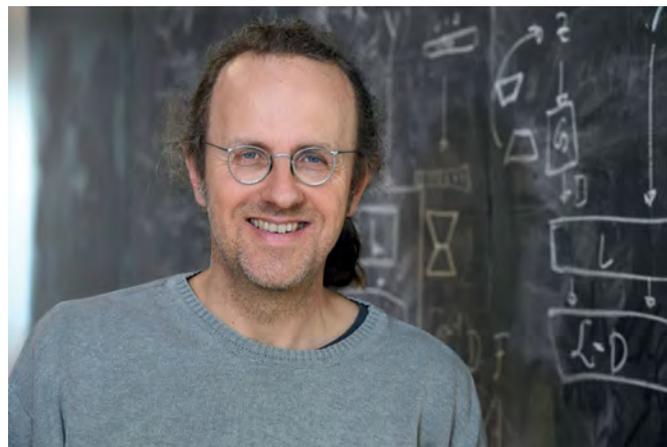
Cause for celebration in Chemnitz: Nils Wagner (left), winner of the 2019 national competition in the category of physics, with Max Planck Director Jan-Michael Rost.

# A prize for the pioneer of Artificial Intelligence

Max Planck Director Bernhard Schölkopf receives the Körber Prize 2019

His mathematical methods have played a key role in the latest triumphs in the development of artificial intelligence (AI). In recognition of these pioneering achievements, Bernhard Schölkopf, Director at the Max Planck Institute for Intelligent Systems in Tuebingen, has now received the Körber European Science Prize – which, with prize money of 1 million, is one of the world's most valuable research prizes.

“AI is at work when a smartphone automatically groups stored photos according to faces and topics such as vacations,” explains the physicist, mathematician and computer scientist. “Or when it translates texts from one language into another.” Together with his team, Schölkopf researches algorithms that allow computer programs to react flexibly to situations – in driverless cars, for example. “If, in a built-up area, a 30 km/h speed limit sign has been pasted over in such a way that it looks like a 120 km/h sign, then the AI system of a driverless car must be able to infer from the context that this sign is to be ignored,” says Schölkopf. He has established key methods for machine learning whose applications are beneficial to the worlds of biology, medicine, economics and social sciences as well as many other fields. Schölkopf is also a co-founder of the Stuttgart/Tuebingen region's “Cyber Valley”, an association of academic



Providing computers with flexibility: Bernhard Schölkopf, Director at the Max Planck Institute for Intelligent Systems and winner of the Körber Prize 2019.

and industrial research facilities that is funded by the state of Baden-Wuerttemberg. The association aims to help Germany take a leading international role in the field of AI.

## On the net



### MRI of a French horn quartet

Strange sounds in the laboratory: in July, the professional musicians of German horns visited the Max Planck Institute for Biophysical Chemistry to be filmed – while playing the horn – using real-time magnetic resonance imaging (MRI). With their performances, the horn players lent a helping hand to a project by Jens Frahm, who is conducting research into a treatment for focal dystonia. This occupational illness leads to cramps in the tongue and lips, to the extent that brass-band musicians can no longer play their instruments with the same virtuosity. You can find a video and further information on this topic at <https://www.mpibpc.mpg.de/hornists-in-real-time-MRI>

### Prestigious prize for two US researchers

This year's Max Planck-Humboldt Research Award 2019 goes to Ufuk Akcigit, Professor of Economics at the University of Chicago. The economist is recognized for his outstanding achievements in the field of macroeconomics. During his research stay in Germany he will use the prize money of 1.5 million euros to investigate an issue that continues why there still is an economic gap between East and West Germany. The Max Planck-Humboldt Research Medal 2019 is awarded to Professor Elliot M. Tucker-Drob from the University of Austin Texas for his research into life span development. <https://youtu.be/IO5YMDBUpKY>  
[https://youtu.be/IXct9odnt\\_M](https://youtu.be/IXct9odnt_M)

### The variety of life

Almost everywhere on Earth, we're witnessing a decline not only in biodiversity but also in the abundance of organisms. This special topic on the Max Planck website clearly shows how dramatically this decline is affecting populations worldwide, why biological diversity is important, and why high biodiversity has a positive effect not only on agriculture but also on global climate. <https://www.mpg.de/biodiversity>