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A passion for antique craftsmanship



# Editorial



## Dear readers,

You are holding the latest issue of our magazine #FAUpeople in your hands. It is dedicated entirely to the people who make our FAU one of the best universities in the world.

The examples in this issue show how lively and diverse our research is, the commitment of our students, and the work in the scientific support areas.

A highlight is certainly our new Cluster of Excellence “Transforming Human Rights,” which we were able to secure this year as part of the Excellence Initiative. Researchers from various disciplines, from law to geography, have joined forces here to rethink human rights and explore their potential.

Follow our scientists into laboratories and workshops, where they make potatoes climate-resistant, develop pocket-sized quantum computers, teach robots social behavior, or reconstruct ancient ships and cannons. In distant libraries, they unlock occult knowledge, question the influence of wealthy benefactors, and reinterpret our view of religious practices.

However, a university would be nothing without its students: They develop vertical take-off aircraft, impress with outstanding achievements at the Paralympics, or help young patients overcome their fear of white coats in the Teddy Bear Hospital.

And let’s not forget the people who work at our university or remain closely connected as FAU alumni. Join them at the Children’s University, watch a TV series with an FAU alumna and Grimme Award winner, or find out what a perfect day looks like for a CEO.

I hope you enjoy reading, discovering and experiencing the fascinating world of our FAU!

Sincerely,

  
**Joachim Hornegger**  
FAU President

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# Potatoes for climate change

Potatoes are one of the most important crops in the world. Sophia Sonnewald and her team from the Chair of Biochemistry would like to modify potatoes to adapt to the consequences of climate change.

In Germany, potatoes are one of the most important crops and not only end up in any number of shopping carts, but are also processed into many different products like French fries and potato starch. Potato starch is not only an important ingredient in cooking and baking, it is also used to make biodegradable “plastic” bags and adhesives.

However, only few people will have heard of the protein SP6A that plays a decisive role in growing potatoes. This role may become even more decisive when heat and periods of drought increase as a result of climate change, leading to smaller yields or even the destruction of the entire harvest. Late blight also has an adverse effect on potatoes. While there are pesticides that are effective against its pathogen, the fungus *Phytophthora infestans*, such drastic chemical measures are not welcomed by organic farmers. The Federal Ministry of Agriculture and Food is therefore investing a total of 2.8 million euros into cultivating new types of potato that can cope under organic farming conditions with late blight and the more frequent periods of drought and heat. One of the partners involved in the project “Cultivating potatoes for organic farming that are tolerant against stress and suitable for processing,” KarOLa for short, is the team led by Sophia Sonnewald from the Chair of Biochemistry at FAU.

### Heat and drought stress potatoes

For the FAU researcher, this project is a further milestone in her academic career. “I actually have always worked with plants,” Sophia Sonnewald remembers. She completed her schooling in 1989, the last class to graduate from high school in the GDR, and then studied biology at Humboldt-Universität, first of all in East Berlin and then in the unified city. “I focused on plant physiology and ecology.” After completing her doctoral degree – also at

Humboldt-Universität and naturally on the topic of plants – she moved to the Leibniz Institute of Plant Genetics and Crop Plant Research (LPK) in Saxony-Anhalt as a postdoctoral researcher in 1999, before transferring to FAU in Erlangen at the beginning of 2005.



Dr. Sophia Sonnewald takes leaf samples to analyze genetically modified potato plants.

After being cultivated in a sterile culture, the cuttings continue to grow in the earth.

Her research focuses on the potato, a plant that is fairly robust but that is increasingly suffering from the consequences of climate change. For example, it is not uncommon for phytophthora infestans to ruin the harvest. The fungus penetrates into the plant and switches off its victim’s immune system. As it multiplies, the pathogen destroys the tissue, and eventually the whole plant, including the tuber. The pest can spread particularly rapidly when the potato plants are weakened by environmental stress, for instance heat. “It is not only the fungus that is afflicting the potatoes,” explains Sophia Sonnewald. “Higher temperatures lead to fewer and smaller tubers in general.” This is where the structural protein SP6A comes into play: It activates the formation of tubers, at least under

climate conditions like those that have been common in Central Europe to date. During longer periods of hot weather, considerably less SP6A is formed. The consequences are lower yields, or in the worst case scenario a failed harvest.

### Genetic engineering helps cultivate robust varieties.

“With our research, we hope to find out which processes in the plant’s cells play a role with coping with stress,” says Sophia Sonnewald. The research focuses on identifying genetic information for various characteristics of potatoes. “The better understanding we have of these properties and the mechanisms in the cells, the more we can narrow down our search for varieties that cope better with heat waves and are resistant towards pests.” Using traditional genetic engineering methods, the Sonnewald team is altering the genetic factors that play a role in the production of SP6A, thereby increasing or blocking its production. How do the plants react? Do they cope better with heat and produce more SP6A? How does this affect yield, and how much starch is contained in the tubers?

As the potatoes that are the focus of the research take several months to grow in greenhouses, they are kept as cuttings in tissue cultures. This enormously accelerates their reproduction and analysis. The researchers hope that their findings concerning the inner mechanisms in the potato cells will allow new varieties to be developed that cope well with the heat waves brought about by climate change and their side effects. At the same time, they should produce good yields, and last but certainly not least, they should taste good. “It may take quite some time, this research requires a lot of patience,” explains Sophia Sonnewald. The race of research against climate change has already begun for potatoes.

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# Hunting down deep fakes

Christian Riess and Sandra Bergmann are working together with secunet AG to develop a tool that automatically and reliably detects AI-generated fake images.

**A**t first glance, the case seems clear: A long crack runs through the conservatory window. Damage: around 3,000 euros. The claimant sent a photo of the evidence by email. As a precaution, an insurance claims handler verifies the image and looks for traces indicating that it was AI-generated. If that is the case, it is likely a blatant case of insurance fraud. "It might sound like science fiction, but image verification is already used by insurance companies," says Christian Riess. "A few years ago, we started a collaboration with Nürnberger Versicherung and developed such a program, which we are continuously refining." Unfortunately, the general issue at stake is that developers are always one step behind, because almost every month new image generators come onto the market that they need to respond to.

## Fakes are difficult to detect

Riess is head of the Multimedia Security research group at the Chair of IT Security Infrastructures at FAU. He is one of the top experts in Germany when it comes to image forensics, that is, examining images that have been manipulated for criminal purposes. As a doctoral candidate in Erlangen, he already researched new technologies to improve banknote fraud detection. Christian Riess has been pursuing image manipulation for many

years. In the vast majority of cases, there is no criminal intent behind using AI to generate images: They are created to illustrate journalistic and scientific articles, but even more often to entertain the social media community. "Photos and videos with manipulated content are spreading rapidly, and they look increasingly authentic," says Sandra Bergmann, a doctoral candidate in the Riess group. "Often, fakes are no longer recognizable as such." Images of the Pope as a DJ might be harmless but it is far more problematic when politicians or celebrities are placed in compromising contexts. In a project launched in 2024, Bergmann and Riess are working on a solution to this problem: In conjunction with secunet Security Networks AG, the IT specialists in Erlangen are developing a universal prototype that should reliably detect deepfakes created by various AI generators. The project is funded by SPRIN-D, an initiative of the Federal Ministry of Education and Research which is an incubator for breakthrough innovations. SPRIN-D is funding the project with 725,000 euros.

## Telltale traces

The tool will recognize characteristic signatures of AI image processing. "Most generators currently on the market use diffusion models," explains Bergmann. "They gradually transform random noise into realistic-looking images after

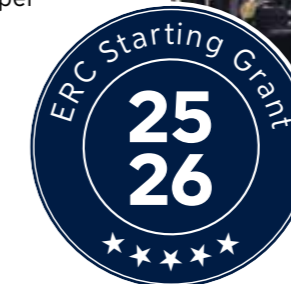
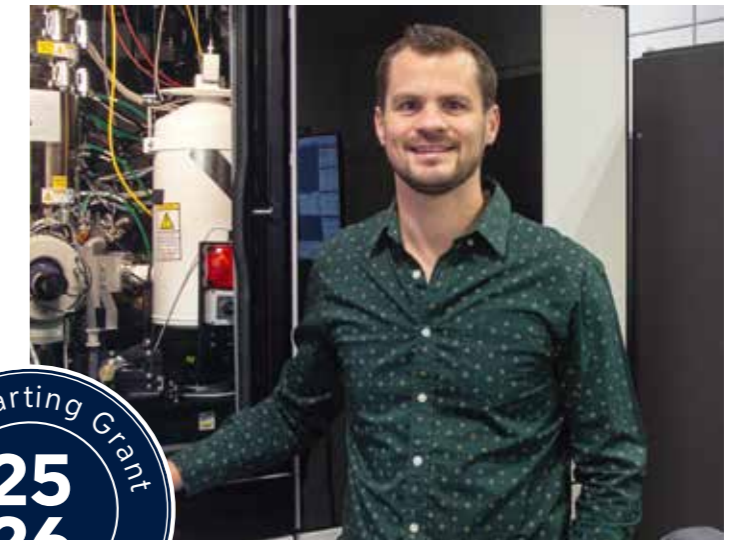
# Making the invisible visible

Philipp Pelz develops imaging methods that make material properties visible at the atomic level without detours. His research is supported by an ERC Starting Grant.

**K**illing two birds with one stone isn't enough for Philipp Pelz. He wants to answer as many questions as possible at once with a single approach. With electron microscopes, he wants to examine materials in such a way that you can immediately see which elements they are made of and how they are structured in three dimensions. "That is one of the great dreams of materials science," says the Professor of Computational Materials Microscopy at FAU. In the Hyper-ScaleEM project, Pelz is working on imaging and analyzing even large material samples three-dimensionally at the atomic level. "That is anything but trivial," he says. "Very light elements like hydrogen and oxygen are hardly detectable with existing methods. Alloys whose components show very similar contrast have also been difficult to characterize so far." Another focus is nano- and quantum electronics: Here, the properties of the materials depend crucially on the exact position of individual atoms. Pelz also wants to make these structures visible. And finally, the challenge is to actually derive reliable and useful information about the materials from the highly complex data.

## AI makes technology more autonomous.

To achieve these goals, the physicist is optimizing both the detection technology and the imaging algorithms. His research is being funded with an impressive 2.3 million euros as part of a Starting Grant from the European Research Council (ERC). "Part of the money goes into expensive equipment, such as a spectrometer or cameras that can record



electrons directly without the detour via light signals," Pelz explains. The grant also enables him to strengthen his team – with two doctoral students and a postdoc. "Such a project would be impossible alone. It is only through the work of the team that the vision of Hyper-ScaleEM can become reality." When it comes to imaging algorithms, the team relies on artificial intelligence to merge different channels and to make the electron microscopes work more and more independently. The ERC project offers Philipp Pelz the ideal opportunity to connect his academic interests. He focused on electron microscopy during his doctoral degree, after studying physics and computer science in Munich. "For me, it's the perfect combination: you need physics to understand how the data in the microscope comes about, and computer science to extract information from it." ■ mm

Combining applied physics with computer science: Prof. Dr. Philipp Pelz.

learning from large amounts of data what certain objects and scenes look like." With text-to-image generators like Stable Diffusion, this process is guided by text input; a new image is created based on this prompt. In the process, generators leave telltale traces in the image frequencies, which can be made visible in two-dimensional spectrograms. However, not all image generators work according to this principle, and it is also impossible to predict what image manipulation technologies will be developed in the coming years. That is why the detection tool the FAU researchers have developed is trained on vast amounts of real and AI-generated photos. Large pre-trained neural networks are also used to extract relevant image features. The goal of the FAU researchers is to combine as many detectors and data traces as possible for a robust prototype. Performance and reliability are the most important aspects of the project. Further, the program is designed so that it can be easily integrated into existing IT infrastructures. When everything is up and running, fake DJs could be quickly unmasked – as could fake cracks in conservatory windows.

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## AI image generators create images from prompts

AI image generators can establish connections between a text description – the prompt – and an image. AI programs are first trained with a vast amount of sample images from databases or the internet and learn to recognize shapes, colors, and patterns. When the prompt is sent, the AI begins to generate a new image from a random set of data, known as noise. To gradually improve the generated images, the tool uses certain feedback mechanisms, such as "Generative Adversarial Networks," or GANs for short. Here, two neural networks work together – the generator and the discriminator. The discriminator assesses whether the generated images look real or artificial and helps the generator to create increasingly realistic images.



Sandra Bergmann and Prof. Dr. Christian Riess are working on a program that automatically detects image fakes.

# Qubits for your pocket

Vojislav Krstić carries out research into quantum computers that work at room temperature instead of having to be cooled down to an energy-guzzling minus 273 degrees Celsius. That would be a huge step forward toward widespread use.

**V**ojislav Krstić is not prone to emotional outbursts, on the contrary: "Training as a physicist trains your patience and stamina," says the Professor of Applied Physics at FAU. This is all the more so if you are involved in fundamental research like Krstić. And yet he can hardly conceal his excitement when he mentions the impressive commercial funding of roughly 900,000 euros: "That is a lot of cash for our work." He believes his research is pioneering in Germany. However, the US investors will still not be able to get their hands on a turnkey prototype after the two years project duration.

## Quantum computing at room temperature

Krstić and his team of four researchers are working together with US colleagues on nano particles with a diameter of between 500 and 1,000 nanometers. A human hair is up to 200 times thicker. Their research focuses on topological insulators; fascinating materials with a crystal structure that means that they are only able to conduct electricity and transfer information on their surface. If the crystal layer is thin enough, the electricity is even just conducted at the edges, without being disrupted in any way by external influences, in other words protected by topology.

The second key aspect is symmetry-breaking in the system. For this, nanoparticles are twisted like a spiral so that they no longer align with their mirror image counterpart. The scientific term for this is chirality. "One example is the left and right human hand," explains Krstić. The aim is to break symmetry in this manner and combine the above-mentioned edge currents, creating a two-state system. The idea behind the research is that a quantum bit, known as a qubit, that is protected by topology can be used in quantum computers irrespective of external influences such as the room temperature.

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"Qubits can represent very many different states at once. That saves time. Compared to a conventional computer, a quantum computer is 10,000 to 100,000 times quicker."

Prof. Dr. Vojislav Krstić

### Game changer for the digital greed for energy?

The classic bit, the fundamental element of all everyday digital computational processes, is a zero-one pair. Heads or tails, if you want to compare it to a coin. Qubits, on the other hand, can represent all the different states in between, like a spinning coin. That is what makes quantum computers so much faster. In principle, quantum computing at room temperature could prove to be a game changer for the growing digital greed for energy. Quantum computers would be able to be operated with a fraction of the energy that is currently required at their current state of development. "Marketable solutions in the size of a tablet or a smartphone might over-compensate the energy-saving effect by the huge number of devices," warns Krstić. But even if that is not the case: It is still a long way to go until we have quantum computers that fit in your pocket. ■ tt



Topological insulators under the microscope: Will they revolutionize quantum computing?

## Quantum computing: a quantum leap for technology

Quantum physics describes the behavior of minuscule matter such as electrons or photons. Completely different rules apply than in classical physics: Objects are both particles and waves at the same time.

An international group of researchers led by Vojislav Krstić has succeeded, for instance, in confirming an over 150 year old research approach concerning the propagation of photons in chiral material, known as the Chiral Faraday effect. This demonstrates how chiral-magnetic interactions can influence photons in nanoscale materials. Understanding such effects help in the research and development of innovative new materials for quantum technologies.

### Time savings through parallelization

Quantum computers take a parallel and not a sequential approach to tasks. Krstić explains the concept of quantum supremacy as follows: "qubits allow extremely many states to be shown at once. Conventional computers can only deal with one at a time. This parallelization leads to considerable time savings. Compared to a conventional computer,

a quantum computer is between 10,000 and 100,000 times quicker." In addition, the computing power doubles with each additional qubit.

### Fascinating phenomena in quantum physics

"Time is not money." Krstić, born in 1972 in Mannheim, has learned this during his career as a researcher. He explains, money can always be found from somewhere, but additional time cannot. That is what makes quantum supremacy so fascinating. Krstić has always been interested in nanophysics and phenomena in quantum physics, even when working on his degree and as a doctoral candidate at the Max Planck Institute for Solid State Research. "For me, symmetry and chiral symmetry-breaking at the nanoscale are highly exotic and fascinating concepts. I have always been driven by this intrinsic curiosity and fascination."



# Robots with empathy

18 Mechatronics engineer Jörg Franke and psychologist Cornelia Niessen are researching a new generation of robots. These robots are intended to master social behaviors and become assistants for humans.

Imagine coming home in the evening. Your robot greets you warmly, tells you that your dinner is on the table, and can already tell from your response whether you need comfort or peace today. Jörg Franke would like to make this vision reality in the medium term. A future in which smart machines accompany people in everyday life, ease their burdens, and perhaps even put a smile on their faces. "Whether it's space travel, motorcycles, or cars, technology has fascinated me since I was a teenager," reveals the head of the Chair of Manufacturing Automation and Production Systems (FAPS). After studying manufacturing engineering and earning his doctoral degree at FAU, he then moved into industry. In his various positions – including at Bosch, ZF, and Schaeffler – he led hundreds of employees at numerous locations in management roles. In 2009, he accepted the call to the FAPS chair and succeeded his doctoral supervisor. Under Franke's leadership, the Chair grew to nearly 100 employees. At 61, he not only wants to guide the researchers, but to inspire them.





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Can robots be taught social skills? Prof. Dr. Cornelia Niessen is working on it.

Above all, he wants to “encourage young engineers to bring great technologies to market in their own start-ups.” His goal as an engineer is to research disruptive technologies. These also include social robots. Their development is to be advanced within the research consortium “FORSocialRobots,” for which he serves as spokesperson and coordinator. The project, which will run until 2027, involves research institutions, companies, and users. “Humans and robots are to work together in flexible teams. New robot applications are to be researched and developed in several subprojects,” explains Jörg Franke. While industrial robots have been taking over monotonous tasks for decades, their “new colleagues” are meant to adapt to humans: for example, to make contact with them, be empathetic, and help when needed – whether in care, manufacturing, or the service sector. The technology is based on image processing and large language models. The participants want to use a digital twin to simulate and

validate appropriate software modules that enable robots to predict human behavior and proactively adjust their own actions.

#### Social skills required

However, some challenges must first be overcome: “Social behavior requires a complex understanding of empathy and communication. In order to master the unwritten rules of human interaction, robots would have to ‘read’ gestures, facial expressions, language, and context and respond accordingly,” explains Cornelia Niessen, whose Chair of Work and Organizational Psychology is participating in the joint project. Cornelia Niessen’s interest in psychology has accompanied her since her school days. After graduating from high school, the Wilhelmshaven native went abroad, as she has always been interested in new experiences. She found the work experience – but above all, meeting people in Israel, Egypt, and Italy – enriching. She then studied at TU Berlin, where she also earned her doctoral degree. After

“Robots would have to ‘read’ gestures, facial expressions, language, and context and respond accordingly.”

Cornelia Niessen

positions at TU Braunschweig and the University of Konstanz, she took over the newly established Chair of Work and Organizational Psychology at the Institute of Psychology in Erlangen in 2011. Niessen researches questions such as how people deal with change and what enables them to remain healthy, capable of action, and adaptable during transformation processes. Within the research consortium, she and her team want to explore how robots can support people at work. To make this a reality, robots must be able to act socially and respond to situations appropriately. “The challenge is to design and understand robot interactions in such a way that they are perceived as socially adept and ethically acceptable,” the psychologist describes. She also wants to investigate the effectiveness and acceptance of robots among potential users – for example, whether care staff see robots as colleagues or more as tools. Another aspect concerns the autonomy of the robots: To what extent will people accept that a social robot not only performs tasks on command, but also takes on tasks proactively – that is, independently seeks out and completes certain tasks? Whether such self-initiated actions are perceived as helpful or as an



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#### AI and quantum technology: Robotics at FAPS

Robotics is one of eight research areas at the Chair of Manufacturing Automation and Production Systems – FAPS for short. In numerous individual projects, researchers are working on linking artificial intelligence with mechatronic components, perfecting cable-driven robots for positioning tasks on construction sites, and making unmanned aerial vehicles quieter and more energy efficient. Research on social robots focuses on increasing their autonomy on the one hand, and on making them more empathetic on the other, in order to boost users’ trust and acceptance. At FAPS, researchers are also investigating how future quantum computers can be integrated into computer architectures to enable real-time data processing. This would make robots even more powerful.

intrusion into work routines depends largely on the robot’s communicative and emotional skills and its understanding of social situations. The path to empathetic helpers is a long one. After all, science has not yet fully explained social behaviors in humans. The research project aims to provide answers so that human abilities can later be transferred to automated systems. According to the two researchers, the decisive factor for the use of social robots is not technical feasibility or cost. Which tasks should remain with humans is ultimately an ethical question that society must address in depth.

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# Grim humor

From radio studio to Grimme Award: FAU alumna Jana Forkel shows how humor and integrity can help approach even the toughest topics.



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Jana Forkel looks proudly at the silver shimmering trophy, its many surfaces skillfully interwoven, sitting atop a small black base. In April 2025, she won the Grimme Award for the screenplay of the German series "Angemessen Angry" ("Appropriately Angry"). How has she experienced the time since receiving the award? "Not all that different from before," she says. And yet: "The moment of the award ceremony was definitely a highlight of my life." The Grimme Award is the most prestigious honor for television programs in Germany. And Forkel has received it twice: in the categories "Fiction" and "Audience Award." She could hardly have dreamed of this success while studying at FAU. In Erlangen, she studied Theater and Media Studies as well as English and American Studies. "I didn't really know yet what I wanted to do," she says. She was quickly drawn to "funklust," the campus media at FAU. "That's where I realized: journalism is cool, but for me personally, it's even cooler to tell my own stories through images."

### Back to the Berg every year

"Appropriately Angry" tells the story of sexualized violence against women, a difficult topic that Forkel and her co-author Elsa van Damke deliberately approached differently. "We wanted it to be entertaining. If we were going to do this, then in a way that lets people catch their breath now and then." The humor, she says, is not a cheap gag, but a kind of declaration of solidarity. "We wanted to make a series by survivors for survivors."

The project came about through a competition by the German broadcaster RTL. Elsa van Damke had the idea, both of them developed the concept further – and even before the Grimme Awards, they received a guaranteed production contract from the broadcaster. "You could say we actually won three awards," Forkel jokes. She remembers the later Grimme Award ceremony in Marl, a city in the northern Ruhr area, well. "It was really relaxed, not fancy at all, and there was vegan currywurst at the reception. Everything was very warm and welcoming." Although Forkel now lives in Hamburg, it doesn't mean she has forgotten Erlangen. "I come back to the Berg festival in Erlangen almost every year, it's a must for anyone who's studied there." During her time as a student in the city, she enjoyed a lot of freedom. "I was able to try things out, do internships, figure out what I want – and what I don't want." Today, she works in a collective of writers. "Most of the time, we stare at the wall together and hope ideas will come," she says dryly. A lot of time passes before actual assignments finally come in. Jana Forkel mostly writes exposés, and not all of them are paid for at the moment. But that's exactly what appeals to her: finding stories that no one else is telling. "I want to create pure cinema someday, like David Hasselhoff's square pectorals in the SpongeBob movie." With future projects, above all, she wants to always have fun. "Everything I do has to be a passion project for me. Or I make sure it becomes one. That way, I don't have to slog through just any assignments, and I hope that in ten years I can say: I didn't sell my soul."

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# Breaking down spacetime

Until now, quantum theory has not been applicable to gravitation. Wolfgang Wieland has developed a theoretical approach that provides a quantized upper limit for gravitational waves.

**W**olfgang Wieland sits in his office on Erlangen's Staudtstraße, a coffee cup beside him, a white wall behind him. He does have a computer, but he prefers to work with pencil and paper. With these, he sketches ideas and calculations that could revolutionize our understanding of the universe. "The problem with physics," he says matter-of-factly, "is that its two central models, quantum mechanics and relativity, still do not fit together." Wieland is working with leading researchers at the Chair of Theoretical Physics III on a theory of quantum gravity with which they hope to resolve this contradiction. If they succeed, they will have cracked the toughest nut of modern physics. In his general theory of relativity, Albert Einstein defined gravitation – that is, gravity – as the curvature of spacetime. It determines the distribution of galaxies in the universe and keeps planets in their orbits. The best way to describe spacetime is as an invisible, elastic net that is deformed by masses and forces light rays to follow the resulting curvature.

## Universe versus microcosm

However, general relativity cannot explain the processes in the microcosm of elementary particles. Here, interactions occur in tiny portions, so-called quanta. Like some of his international colleagues, Wieland has been working for some time to "integrate gravitation into a quantum model and thus describe all fundamental forces." This could finally allow gravity, like the other forces of nature, to be broken down into tiny packets of energy. Even as a student, Wolfgang Wieland was interested in mathematics and physics. He was influenced by the American science fiction series "Star Trek". According to Wieland, the phenomena in Star Trek were "fascinating, but from a scientific perspective not tenable." After graduating from high school, he studied theoretical physics in Innsbruck and Vienna. Wieland, who was born in Austria and grew up near Innsbruck, first dealt with quantum gravity during his doctoral studies at the University of Marseille.

**Infinite values**

During his postdoctoral positions in the USA, Canada, and Austria, he explored the subject in greater depth. In 2023, he moved to FAU, where he has been funded since 2024 as head of a junior research group through the DFG's Heisenberg Program. With his theoretical work, Wieland also aims to explain extreme states such as the Big Bang or black holes. In these phenomena, spacetime curves to infinity, and the density of matter also becomes infinite. Mathematically, singularities such as these cannot be solved, since infinite values appear in the equations. "Maybe it's not gravitation that is quantized, but space and time," the researcher speculates. The basis for this is the theory of loop quantum gravity. This theory assumes that space and time consist of tiny, discrete units – like a fabric that, under a microscope, appears as a net-like mesh of nodes. In this model, the geometry of spacetime is not only curved, but also entangled in loops – that is, quantum mechanically connect-

ed. "If you break down space and time into quanta, the infinite values that have so far overwhelmed mathematics disappear," the physicist explains, while also emphasizing: "Under certain circumstances, the solution could be less spectacular than some might hope."

**Planck power sets the limit**

Wieland's approach is exceptional because it directly links the quantization of spacetime with the measurable power of gravitational waves. He bases this on what is known as Planck power, which indicates how much energy can be transmitted per unit of time at most. With it, it would be possible to demonstrate that gravitational waves cannot transport unlimited power, but that there is a "quantized upper limit." "I hope that future gravitational wave detectors, such as the planned Einstein Telescope, will provide evidence of quantum gravity," the researcher explains. ■ **et**



Dr. Wolfgang Wieland writes his thoughts on quantum theory on a chalkboard.

# Taming immune cells

Andreas Ramming, Professor of Immunology of Organ Damage and deputy director of Department of Medicine 3 – Rheumatology and Immunology at Uniklinikum Erlangen is developing a new therapy for chronic inflammatory diseases.

**O**ur immune system is similar to the police force of a big city. There are cells that patrol and keep an eye out for dangerous intruders, response units that arrive to provide reinforcement when needed and special forces with a license to kill. There's even a fingerprint database. It is this diversity of protective mechanisms that has fascinated Andreas Ramming since his student days. "The immune system works like a well-oiled machine," he says. "At least in the ideal case." Unfortunately, the body's own law enforcers sometimes overshoot their target. They go after bacteria and viruses with such force that they end up damaging healthy tissue. Normally, doctors then try to suppress the immune response with medications like cortisone. But that's like taking away the police's firearms – in a bank robbery, they'd be at a real disadvantage.

**Activating self-protection**

Ramming wants to tame the defense forces in a different way. Body cells actually have protective mechanisms that prevent them from being attacked by mistake. If these don't work well enough, chronic inflammations like rheumatoid arthritis, asthma, Crohn's disease, type 1 diabetes, or possibly even Alzheimer's disease can result. "We want to reactivate this tissue-specific protection," explains the immunologist. Thanks to support from the EU, this goal is now much closer. Ramming was recently awarded a "Proof of Concept" grant from the European Research Council (ERC). With this financial backing, he now wants to conduct an initial study in humans. "The advances in immunology already allow us to treat many diseases much better than before," he says with no small amount of pride. "Our approach can



Immunologist Prof. Dr. Andreas Ramming has been awarded a Proof of Concept Grant from the ERC for his research.

be another strategy for this. And that's exactly what drives us: To help patients whom we could not treat before or only with limitations. If we succeed, it's extremely rewarding." ■ **fl**

# Everything in its place

Whether tools in the hardware store or cows in the barn: With the start-up Pelora, Johanna Geiß is developing a system that precisely locates objects and devices. It is research that makes everyday life easier.



**D**r. Johanna Geiß leans back in her chair in a relaxed manner. She is currently on a break between many meetings. She proudly talks about an award ceremony at the Munich Residenz. In April, she received the Hightech Award Bavaria in the "Graduate Award" category for her doctoral thesis. "It was magnificent, and the best part was being able to bring my research from the university into a different environment. I also received feedback that what I'm doing is actually something meaningful." In her doctoral thesis, Geiß investigated why sensors in cars sometimes misidentify obstacles and how workshops can fix these errors. Previously, also at FAU, she studied medical engineering for her Bachelor's degree and later completed a Master's degree in electrical engineering. At the time, she didn't want to pursue a doctoral degree. The fact that she ultimately decided to do so is due to her enthusiasm for her field of research, with which she is making a major contribution to greater road safety.

#### Position data from Bluetooth signals

But research alone is not enough for her. She founded Pelora with her colleagues after her doctoral thesis – a start-up based at the Chair of Microwaves and Photonics. The name was not chosen by chance: "A pelorus is a maritime device that is used in navigation. Since we specialize in helping people find objects inside buildings, it fits perfectly." Pelora is developing an infrastructure that can convert Bluetooth

signals from standard devices into precise position data. Warehouses, supermarkets, barns – the possible applications are diverse. "We were told about cases where it took three hours to locate a sick cow to treat it. With the Pelora tracking modules, it could have been found in minutes." The device could also potentially be used to track customer behavior anonymously in supermarkets. But the road to get there is intense. Geiß currently spends a lot of time at her desk as well as in the lab and holding meetings with potential clients. At the same time, she is acquiring partners for pilot projects: "We place our receiver modules on ceilings and under roofs in different environments to collect important data during tests." Dr. Erik Sippel and Dr. Patrick Gröschel also belong to the Pelora team. The start-up emerged from Sippel's doctoral thesis. When she's not working with radar sensors and positioning systems, Johanna Geiß often has a camera in her hands. "During my Master's degree, I also photographed weddings, as a creative outlet." And she remembers many hours spent at "Strohalm," the former music bar at Martin-Luther-Platz in Erlangen. These days, she often goes straight home from the office. But she doesn't really unwind there, either. "My mind is always working on something." And yet, the desire to create something together as a team outweighs everything else. "I think we have to keep reminding ourselves of what we've already accomplished. We've turned a research project into something that people out there can really use." ■ ses

# High-speed Helma and Turbo Alex

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The supercomputers Helma and Alex housed at FAU are among the most powerful computers in the world. Petra Imhof and Gerhard Wellein support research groups from all over Germany in harnessing this concentrated computing power for scientific projects.

**T**he room is bathed in pale neon light, and a loud humming makes conversation almost impossible. The interior is not very inviting either: walls of bare concrete, a tangle of water pipes on the ceiling leading to a few dark gray cabinets. Behind their perforated fronts, green and yellow LEDs are blinking, providing a few sparse splashes of color. The cabinets house a computer that FAU is quite proud of. It consists of 192 connected compute nodes, each of which is powered by four high-end Nvidia GPUs. The cluster goes by the charming name of "Helma" – after Wilhelmine, Margravine of Brandenburg-Bayreuth, whose husband Friedrich founded the University of Erlangen in 1743 and who later bequeathed her private library to the university.



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He heads the Erlangen Center for National High-Performance Computing, she is an expert in atomistic simulations: Prof. Dr. Gerhard Wellein und Prof. Dr. Petra Imhof.

And “Helma” is incredibly fast: on the list of the world’s most powerful computers, the cluster currently ranks 51st, and among supercomputers at German universities, it is at the very top. Research groups across the entire country can take advantage of this concentrated power. That’s because Helma – just like her brother Alex, currently ranked 290th worldwide – is part of the National High-Performance Computing Alliance, abbreviated NHR. A total of nine centers have joined together in this network, which aims to help meet research’s ever-growing demand for computing power. The project is funded by the Federal Ministry for Research, Technology and Space (BMFTR) and the states involved.

#### Simulation of large molecules

“But the money doesn’t just go into hardware,” emphasizes Gerhard Wellein, who heads NHR@FAU, the Erlangen branch of the NHR. “Computing power is one thing – using it profitably is another.” Each site needs research-

ers who know how to configure the computers for scientific questions in the most efficient way possible. And who, thanks to their expertise, are able to help other users solve problems. “Here at FAU, for example, we have colleagues who are extremely knowledgeable about calculating molecular dynamics,” says Wellein. “Or who train large AI models for specific applications. They have an enormous wealth of experience that other research groups can benefit from.” One of these experts is Petra Imhof. The professor of computational chemistry has been working for years on atomistic simulations, a key focus area of NHR@FAU. “We want to understand how the atoms within molecules move relative to each other,” she explains. Molecules are not rigid, as the ball-and-stick models from chemistry class might suggest. For example, groups of atoms can twist around

“Computing power is one thing – using it profitably is another.”

Gerhard Wellein

a bond. How they do this depends on the attractive and repulsive forces at work within the molecule. These forces also determine the three-dimensional shape a molecule will take. At NHR@FAU, not only are such processes simulated on the computer, but also the interactions between different molecules. “Sometimes we’re dealing with hundreds of thousands of atoms, all interacting with each other at the same time,” explains the chemist. That’s what makes atomistic simulations so computationally intensive. At the same time, they are extremely important: they can be used to modify pharmaceuticals at the digital drawing board and to predict whether these changes will make them more effective.

#### AI in medicine

Another focus at NHR@FAU is training AI models. Artificial intelligence is particularly adept at detecting certain anomalies in data. In this way, it can help to diagnose diseases like cancer earlier and treat them more precisely. “The Free State of Bavaria is extensively promoting this technology and has financed a large part of Helma as part of its High-Tech Agenda,” explains Gerhard Wellein. The Department of Artificial Intelligence in Biomedical Engineering established at FAU in 2019, is also largely funded by the Bavarian state. Here, research is being conducted on AI systems that can support doctors in analyzing image data, whether it’s MRI scans of tumors or ultrasound videos of the heart.



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#### NHR Alliance: bundled power

The National High-Performance Computing Alliance (NHR) has existed since 2021. On the one hand, the NHR provides computing capacity free of charge to scientists at German universities; on the other hand, it supports users, especially through consulting and training, in the use of high-performance computing in their fields of application. Within the alliance, university computing centers at the following locations work together: Aachen, Berlin, Darmstadt, Dresden, Erlangen, Göttingen, Karlsruhe, Mainz, and Paderborn. The federal and state governments provide more than 60 million euros annually for the work of the NHR. The alliance is managed by the Association for National High-Performance Computing e. V.

The Helma cluster plays a central role in this. “Its computing power makes it possible to analyze image data from far more patients than ever before,” explains Prof. Dr. Bernhard Kainz, Head of the Intelligent Data Exploration and Analysis Lab at FAU. “This will also benefit the accuracy of the AI results.” However, Helma is only an intermediate step on the way to even more computing power: in the coming years, a new high-performance computing center with state-of-the-art infrastructure will be built at FAU. The Free State plans to invest up to 270 million euros to ensure that the University continues to play in the top league on this important issue. ■ f

# High-flyer

FAU student Ediz Osman is passionate about aviation technology and even builds functional jet prototypes, which helped him to win the national finals of "Jugend forscht."

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The surface area increases quadratically and the weight cubically. So you always need significantly more power than the additional surface area you gain." When Ediz Osman talks about the relationship between weight and transport surface during the takeoff of one of his self-built jets, his eyes light up. The 21-year-old is studying mechanical engineering at FAU and has been building model airplanes since childhood. He is currently working on an environmentally friendly VTOL jet, short for "Vertical Take-Off and Landing." Aircraft with the ability to hover already exist in principle. But the innovation of Osman's work is that he is designing jet aircraft that can hover. He entered the "Jugend forscht" competition with a prototype that he designed himself and advanced through all stages of the competition. First, he won the regional and state championships in Bavaria and ultimately won the national finals in the technology category. Part of the prize includes an invitation to the "European Union Contest for Young Scientists." "My goal from the beginning was to become the national champion. But I also know that my model is difficult to implement in reality," he reflects. When he talks about fluid dynamics or power electronics, it's immediately clear: Ediz Osman has delved deeply into the subject matter. "I taught myself everything using books, YouTube, and trial and error."



What's special about his project: The engines of his VTOL models can swivel 90 degrees, allowing the machine to both hover like a helicopter and fly like a jet. He 3D-printed, wired, and tested everything in his parents' basement. "From the very beginning, I paid close attention to maximum efficiency when choosing materials. They have to be affordable, as well as light and stable – otherwise they won't even take off." VTOL jets don't need a runway for takeoff and landing, which means they can reach any destination within their range, independent of airports.

### Big visions for the future

Osman was born in Bulgaria, has Turkish roots, and came to Germany with his family when he was eight years old. To learn German in another setting besides school and to make connections, he went to an adventure playground. There, a helper made paper airplanes with him, and his

passion for technology began. "I wanted to know how airplanes work, so I read everything about them." Today, he speaks fluent Turkish, Bulgarian, English, and German – a huge advantage at international competitions. "Sometimes I switch languages in the middle of a sentence if a technical term comes to mind faster in another language." At FAU, he is now expanding his theoretical foundation. "Mechanical engineering in

Erlangen is especially broad and helps me advance my ideas." He is especially fascinated by the subjects of materials science and production engineering. Both subjects have a direct connection to his work with the models. He uses practical seminars to optimize his models. "Someday, I want to build a real VTOL jet that allows people to travel sustainably and efficiently." When he's not tinkering or studying, Osman rides his road bike and draws to unwind. Looking to the future, he is already thinking about incorporating hydrogen cells and solar power into his models. For a third-semester student, that's quite an altitude.

■ ses

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# Magical and hidden

Long-forgotten texts, instruments, and practices are a true treasure for Petra Schmidl. Oftentimes, occult knowledge and modern sciences are much closer than one might think.



**P**etra Schmidl opens a dark red box and takes out a round, brass-colored plate that resembles a compass. Rotatable disks, fine scales, and grid lines adorn the solid tool. "People used an astrolabe to determine the position of celestial bodies and the time," Schmidl explains, placing it in front of her on the table with a dull, metallic sound. Historical instruments like this allow Schmidl, as a science historian, to immerse herself in past eras and provide insights into how our current knowledge has developed. In her project "MOSAIC," short for "Mapping Occult Sciences Across Islamicate Cultures," Schmidl is therefore working together with colleagues from Belgium, Italy, and the USA to study historical sources on the occult sciences in cultures shaped by Islam, including alchemy, astrology, magic, and prognostics. For this, the team has received an ERC Synergy Grant from the European Research Council worth nearly ten million euros, of which almost 2.3 million will go to FAU. Schmidl's focus: Prognostic practices. Schmidl is examining instruments and historical texts from the eighth to the fifteenth century that describe these practices. "Most of them are written in Arabic script and, in their structure, resemble instruction manuals," she explains.

## Back at FAU

Since 2012, Schmidl has repeatedly worked at FAU, mostly on a project basis for short

Historian Dr. Petra Schmidl presents a replica of an astrolabe, modeled after 16th-century originals. One of these originals is now housed in the Germanisches Nationalmuseum in Nuremberg.

periods. The new funding would have allowed her to go to other universities as well. But she chose to return to Erlangen. "I have met wonderful colleagues here who have supported me time and again," she says. Schmidl discovered her passion for her field of research while studying medieval and modern history in Frankfurt am Main. "In seminars, we examined completely unexplored manuscripts. Finding and deciphering these treasures fascinated me," she says.

**Astonishing discoveries**

Currently, Schmidl is searching libraries and museums for Islamic and Eastern Christian sources that deal with occult knowledge. "There are wonderful libraries in many countries, but for political reasons we are unable to visit many of them. That is unfortunate, but most of the time we find an alternative through our contacts." That is why she started with the manuscript collections in Berlin, some of which she can access digitally. She translates, comments on, and examines these with questions such as: How did prognostic practices work? Who used them, and why? How relevant were they at the time? To what extent did they influence modern science? The team has already made remarkable discoveries. "Recently, my colleagues used an old alchemical recipe to silver-plate a five-cent coin," Schmidl reports. She herself has also come across extraordinary finds: In two museums, Schmidl discovered two almost identical astrolabes, one of European and one of Arab origin. "The Arab piece, however, was significantly older – it must have served as a model, despite the spatial and temporal distance," Schmidl says enthusiastically. With her basic research, Schmidl aims to expand the understanding of modern science to include aspects of the occult sciences and their influence. "These practices and subdisciplines were regarded as science at the time. And they have had a strong influence on our current catalog of sciences. I want to find out



Paper model of an astrolabe calculated for the latitude of Erlangen. It was created for the Humanities Festival "Glimpses into the Future" in 2021.

exactly how by closely examining sources that have so far received little attention," she says. "I hope this will help to break down the barriers between occult and modern sciences a little." Another goal: to balance the disparity between European and Islamic sources, since the latter have hardly been studied so far. The researcher therefore wants to help ensure that these are given greater consideration. Above all, Petra Schmidl wishes for one thing: more openness and more critical engagement with sources. "I hope that my research will raise awareness of where our knowledge comes from. And that we learn to question and contextualize this knowledge. That is especially important today." ■ li

# Moving with the organs

Jana Hutter wants to adapt MRI imaging to the movement of tissue and organs. That would significantly improve the diagnosis of diseases. Her research has been awarded a Starting Grant from the ERC.

**W**hen patients go for a scan in the "tube", they only have one job: not to move. If they remain still, the MRI can produce razor-sharp images which doctors can use to assess, for example, how far arthritis in the knee has progressed. But MRI is also used to examine internal organs, and in those cases, keeping still can be counterproductive," says Jana Hutter. Hutter is Professor of Smart Imaging and Data Profiling at FAU. She studied applied mathematics in Erlangen and Rennes, France, and researched MRI technologies at Siemens during her doctoral degree. She then went to St. Thomas' Hospital, which collaborates with King's College in London. "In London, I worked on projects that mainly focused on the development of fetuses and newborns, as well as the placenta," she says. "It was always important to me to work with patients as well."

**Supported by sensors and AI**

She has continued this work at FAU since 2024, focusing on diseases of the intestine and uterus in the EARTHWORM project. In adenomyosis, for example, endometrial tissue embeds itself in the muscle tissue, which can lead to severe pain and bleeding. "If an MRI is performed at all, the uterus is basically paralyzed with medication in order to obtain high-resolution images. However, important information is contained in the natural movement, which we lose this way." Hutter hopes to



develop MRI technology further until this immobilization procedure is no longer necessary. She is combining traditional MRI scanners with sensors that react within milliseconds to movements of the organs and adjust the imaging process accordingly. The process is supported by artificial intelligence: "We will train the AI with thousands of MRI images," says Jana Hutter. "Machine learning helps us detect anomalies, distinguish them from interference signals, and thus obtain meaningful findings." EARTHWORM is supported by the European Research Council with a coveted Starting Grant worth 1.49 million euros. Jana Hutter is also involved in the new joint project EndoKI, which aims to develop improved ultrasound for a related disease, endometriosis, and is being funded by the Free State of Bavaria with 2.9 million euros. ■ mm

With current MRI technology, important information is lost. Prof. Dr. Jana Hutter wants to change that.

# Full of energy

With her Master's thesis on innovative energy storage, Tamara Hein won the Hightech Prize Bavaria.

The doctoral candidate is researching how sustainable energy can be used more effectively.

**W**hen Tamara Hein was informed by email about her nomination for the Hightech Prize Bavaria, she could hardly believe it. "I didn't even realize that the dean of the Faculty of Engineering had nominated my work," the 28-year-old says. She hadn't expected to be among the five best graduates in Bavaria, alongside Johanna Geiß. At the award ceremony in April, she was supposed to spontaneously present her research topic to a large audience. "It's not often that you have to explain scientific topics in simple terms."

In her Master's thesis at the Chair of Chemical Reaction Engineering, she supported the development of plate catalysts for releasing hydrogen from so-called LOHC compounds. These liquid organic hydrogen carriers make it possible to store hydrogen more efficiently than in its gaseous form. When energy is needed, the hydrogen can be released from the compound again. By reusing the LOHC molecules, a cycle is created that is suitable for ensuring a sustainable energy supply.

## From secondary school to cutting-edge research

Her scientific career began unconventionally: Hein transferred between German secondary school systems and even repeated a grade. "Chemistry has always been one of my favorite subjects," she says in retrospect. In 2017, she began studying chemical engineering at FAU. For her Master's, she specialized in chemistry and process engineering. When she saw the posting for a Master's thesis on LOHC as part of Phillip Nathrath's doctoral project, she was immediately enthusiastic. Two students had already done preliminary work on plate catalysts to optimize their design and to generate as few byproducts as possible during dehydrogenation.



"A few years ago, I was sitting in the seminar room myself and everything was still quite abstract. Now I use these things every day."

Tamara Hein

## Experiments under real-world conditions

Hein worked on her Master's thesis for seven months. She is especially proud of the dynamic experiments, which were not originally planned. "That corresponds much better to real-world conditions," she explains. This is because energy consumption fluctuates throughout the day, so the system must be able to release varying amounts of hydrogen.

The result: Her reactor concept also works under fluctuating conditions and is more efficient than conventional fixed-bed reactors. Since February 2024, Hein has been pursuing her doctoral degree in the research group "Catalytic Systems for Chemical Energy Storage" led by Patrick Schühle, and is now exploring alternative ways of producing hydrogen from biomass. At the same time, she teaches the "chemical reaction engineering" lab for Bachelor's degree students. "It's cool to see that a few years ago I was sitting in the seminar room myself and everything was still quite abstract. Now I use these things every day." For the future, Tamara Hein is keeping all her options open. She can imagine switching to industry after completing her doctoral degree. "Research is really a lot of fun, but industry is also important." She has not yet decided whether she will remain committed to hydrogen or turn to other chemical processes. ■ lk



Diversity

# Transforming Human Rights

Strengthening human rights in a critical time and breaking new ground in research: The new Cluster of Excellence at FAU shows that human rights and inter- and trans-disciplinary human rights research are not obsolete.

**O**ur goal is to shed new light on the potential and the limits of human rights," emphasizes Katrin Kinzelbach, Chair of Human Rights Politics. Together with Prof. Dr. Markus Krajewski, Chair of Public Law and International Law, she forms the spokesperson team of the new FAU Cluster of Excellence "Transforming Human Rights," based at the interdisciplinary FAU Center for Human Rights Erlangen-Nuremberg (FAU CHREN). "Around 30 million euros in funding for the Cluster of Excellence over the next seven years, plus seven million euros for strategic investments to be used across disciplines to support early-career researchers and promote internationalization: That is a great success for human rights research at FAU," says Markus Krajewski. But above all, it is a team success. This is because the researchers who submitted the application were actively supported by the university administration and leadership throughout the lengthy and demanding process. And even so, success was not guaranteed.

**Water under the bridge?**

One question from the review panel, which Krajewski and his FAU colleagues had to address at the end of last year, particularly stuck with the legal scholar: Isn't it a bit late to want to research and work so intensively on the topic of human rights? At a time when they are not only violated every day, but are also being fundamentally questioned more and more openly? His answer: The human rights crisis is serious. Nevertheless, there are still good reasons for confidence in human rights, and engaging with them is anything but water under the bridge. Not least because there are still plenty of stakeholders around the world who continue to uphold, demand, defend, and further develop human rights today – despite all the predictions of their demise. There is still much to understand and to question in human rights research, especially now. "In the end, it was the internationally oriented ambitions of our cluster project that convinced them," emphasizes Krajewski.



What guidance can human rights offer for the future? This is being discussed intensively in the new Cluster of Excellence

They are part of the cluster team: sustainability researcher Prof. Dr. Almut Schilling and cultural geographer Prof. Dr. Georg Glasze (right-hand picture).

**Megatrends and interdisciplinarity**

It focuses on five megatrends: autocratization, the fragmentation of economic globalization, international migration, environmental crises across the planet and digitalization. "We want to explore how these megatrends are changing human rights norms, institutions, and practices, and how human rights, in turn, can and should change the megatrends," explains Kinzelbach. The focus here is on interdisciplinary collaboration in terms of methodology. For example, Georg Glasze did not become a geographer because he wanted to research human rights topics. And yet, as part of the cluster, that is exactly what he is doing. Together with anthropology, computer science, law, and political science, he contributes his perspective on how human rights thinking can be translated into the digital age and, in doing so, provides guidelines for shaping an increasingly technologized world. But it is not only technological advances that are raising new questions for human rights. Climate change, species extinction, and environmental pollution are also bringing the rights of future generations into focus. At the same time, it is becoming clear how closely humans and nature are intercon-



nected. "Geography makes these connections visible and asks which aspects of nature we want to protect in the future and how human rights can help address these challenges," says the professor of cultural geography. His thoughts: "Human rights are one of the few normative anchors we have. That is why we need to think together about how they can be further developed so that they can continue to provide guidance in the future."

**Applying insights from practice**

Almut Schilling-Vacaflor is also part of the cluster. One of her main tasks is to promote

**"Human rights are under pressure, but they are not in retreat."**

A conversation with Harvard Professor Dr. Kathryn Sikkink. The pioneer of human rights research and honorary doctorate recipient of FAU discusses the Cluster of Excellence "Transforming Human Rights" and the challenges facing human rights research.

**You closely observe developments in the field of human rights research worldwide. How do you view the Cluster of Excellence "Transforming Human Rights"?**

I find it extremely encouraging that a research cluster of this scale and thematic depth is dedicated to human rights. The cluster will be a place where not only existing questions are addressed, but also new impulses are generated.

**To what extent can such a cluster topic provide a counterpoint in light of developments in the US and worldwide?**

Especially from the perspective of the US, where academia is increasingly coming under political pressure, it is significant when institutions like FAU commit themselves to strengthening human rights research. The Cluster of Excellence at FAU shows how rights can emerge, be defended, and also be lost.

**How great is the danger currently facing human rights research?**

It is under pressure, yes. Above all, in places where authoritarian regimes deliberately take action against critical scholarship. But even in democracies, researchers are increasingly coming under attack. Nevertheless, I remain hopeful. Human rights research today is more extensive, more interconnected, and often more resilient than in the past.

**To what extent do you see human rights in general as being at risk?**

We are experiencing setbacks, for example in the US – including in migration policy – as well as in the treatment of refugees at the EU's external borders. But: The history of human rights has always been accompanied by challenges and setbacks, and that is why I remain optimistic. As a scholar, I deal with the emergence and enforcement of norms. In my lifetime, I have witnessed many examples of norm violations – such as the genocides in the Balkans and in Rwanda in the 1990s, as well as in Darfur in the early 2000s, or



the torture practices of the US during the George W. Bush administration. There just hasn't been a glorious era of human rights in the past. Human rights have always been contested, and protecting human rights requires constant effort and vigilance – including through research.

**Are there examples that give you hope?**

There have been many advances that long seemed unlikely – such as the strengthening of women's rights or the LGBTQ+ community. What gives me hope today, above all, are young people. Students, activists, and scholars all over the world who are deeply committed to human rights, often under difficult circumstances. The willingness of many universities to preserve or create new spaces for human rights research as here in Erlangen and Nuremberg is also a positive sign.



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The Excellence Cluster "Transforming Human Rights" brings together many perspectives – from law to social and sustainability research to cultural geography.

and strengthen methodological diversity. Transdisciplinarity is a particular concern for the Professor of International Business, Society and Sustainability – that is, the joint production of knowledge not only across various academic disciplines, but also in close exchange and dialog with practitioners. Because that is also what the Excellence Cluster "Transforming Human Rights" stands for. To be able to draw on knowledge from practice, human rights activists as well as organizations and companies are also involved in the research work. "We are also interested in their perspectives and solutions when it comes to strengthening human rights," emphasizes Almut Schilling-Vacaflor. For Katrin Kinzelbach, Almut Schilling-Vacaflor, Markus Krajewski, Georg Glasze, and the other 23 professors from a wide range of academic disciplines, working in the cluster is a project close to their hearts. They are all united by the ambition to make a difference across departmental boundaries and through international collaboration – in a field of research that is far from obsolete. ■ **mk**

### An obituary: Michael Krennerich, pioneer of human rights research at FAU

Michael Krennerich dedicated his life's research to human rights. The university lecturer and scholar, who passed away on December 28, 2024 after a long and serious illness, played a decisive role in shaping the development of the Chair of Human Rights and Human Rights Policy at FAU from the very beginning. This applies both to the role of the Chair within the institute and to the extensive cooperation structures that extend beyond faculty boundaries. Krennerich was a driving force behind the establishment of the Center for Human Rights Erlangen–Nuremberg (FAUCHREN). He also played a key role in advancing the FAU project "Transforming Human Rights" on its path to becoming a Cluster of Excellence.

# Research meets management

Since the beginning of 2025, Maria Hammer has been heading the administrative office of the Energie Campus Nürnberg (EnCN) and the Nuremberg Campus of Technology (NCT)

**H**ow can we contribute to the development of sustainable energy? For Maria Hammer, this question is critical. Together with a strong, cross-university network, she drives forward projects that accelerate the technological transformation of the energy transition. Her path to a position of responsibility began as early as third grade in the rural Upper Palatinate. It was there that Maria Hammer discovered her enthusiasm for electrical circuits and tinkering. Later, she chose physics and biology as advanced courses, laying the foundation for her current career path.

The campus is paving the way, for example, for research on organic solar modules, which can be produced much more easily and cheaply than conventional silicon cells – and which, with an efficiency of 14.5 percent, brought the world record in this field to Nuremberg. Work on storage systems is also especially important to Maria Hammer – they are intended to make solar energy, which is particularly abundant in summer, available for times with less energy.

■ **rk**

### Preparing for the energy transition

"I thought that physics would provide clear answers to solving the problems of climate change and environmental pollution," Maria Hammer explains today as she describes the background to her decision to study nanostructure engineering in Würzburg and to see her studies through. With a focus on energy technology, electronics and photonics, she was already preparing for the energy transition back then, and in both her diploma and doctoral theses she investigated organic and inorganic semiconductors that play a crucial role in solar cells. As a scientist at the University of Oldenburg and later at FAU, she gradually shifted from cutting-edge research toward science and technology management of the energy transition, until she reluctantly gave up her own research at the beginning of 2025. At EnCN, Maria Hammer is working to help shape an energy future that will make our world more sustainable.



Dr. Maria Hammer has been head of the Energy Campus Nuremberg since 2025.

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# In the rich man's world

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Silke Jansen wants to take a new look at wealth and philanthropy. Her international project is being supported with 1.5 million euros from the Volkswagen Foundation.

**N**ot everyone will be familiar with Douglas Tompkins. People are more likely to know the clothing brands "The North Face" and "Esprit," with which he made billions. The American, who died in 2015, stands not only for successful entrepreneurship, but also for his special commitment to nature conservation: After selling his companies, Tompkins began acquiring hundreds of thousands of hectares of grassland, rainforest, and coastal areas in South America to turn them into national parks.

"Basically, that sounds good, but there are also reservations and resistance to projects by philanthropists like Tompkins," says Silke Jansen. Conservation projects have a strong impact on the people living there, because, for example, they may have to be relocated or nomadic groups can no longer move about freely. "In the Global North, we like to cling to a romantic notion: Nature is where there are no people. Those affected locally may see things very differently."

Prof. Dr. Silke Jansen wants to investigate how charity projects are received by the people affected.

## Conversations with stakeholders and those affected

The professor of Romance linguistics and chair of the Bavarian University Center for Latin America BAYLAT (see info box) wants to shed light on these different perspectives together with a research consortium. She launched the project "Nature's Wealth or Nature for the Wealthy? Philanthropism and Ecotourism in the Global South," which is being funded by the Volkswagen Foundation with 1.5 million euros. "Inequality research mostly focuses on poverty," she says. "Discourses about wealth and the question of what it means to do good are rarely examined." The project is international and interdisciplinary: In addition to linguist Silke Jansen, researchers from geography, sociology, economics, and tourism studies from Austria, Chile, Tanzania, and Ecuador are involved. In regions where conservation philanthropists and luxury tourism providers are active, they will speak with various social groups – with the philanthropists themselves, with foundations, associations, politicians, travelers, and of course with the local people. Some of the contacts with research partners were established through BAYLAT (Bavarian University Center for Latin America).

## Text analysis: How is philanthropy constructed linguistically?

However, a significant part of the project will be carried out in Erlangen: Over the next four years, Silke Jansen, together with project collaborator Erika Rosado Valencia, will compile and analyze a corpus of publicly accessible texts dealing with the topics of philanthropy and luxury tourism. "The benefactors themselves usually operate in the background, but their NGOs and foundations communicate quite assertively: through websites, social media channels, trade fair appearances, and press releases," Jansen explains. In addition, the Latin America experts want to examine what images of nature the luxury tourism industry constructs. Ultimately, the subprojects are intended to create an overall picture that shows what conservation philanthropy and luxury tourism

are all about and how they affect different places at different levels. The topic also touches on the fundamental question of what gigantic sums of money in the hands of individuals can accomplish. "Wealth has the potential to undermine democratic decision-making processes," says Silke Jansen. "Nevertheless, we do not want to conduct political research – but we do want to take a critical approach." ■ mm

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## Bridge to Latin America

The Bavarian University Center for Latin America (BAYLAT), established in 2009, promotes networking between Bavarian and Latin American universities and research institutions. "We connect people, provide seed funding, and award scholarships to students from Latin American countries," says Silke Jansen. "All of this is very low-threshold – any academic institution in Bavaria can contact us when it comes to unbureaucratic support." As chair of the board, Jansen herself is often a guest at Latin American universities – most recently in June 2025 in Santa Clara, Cuba, where she was appointed honorary professor at the Universidad Central "Marta Abreu" de Las Villas (UCLV).



# Between lecture hall and peak performance

They are studying full-time and competing in sport at the highest level: Lilly Sellak and Josia Topf share what life looks like between medals and module exams – and what hurdles there are to combining sport and study.

## Law, medicine – and sport at the highest level. How do you manage to juggle all that?

**Lilly Sellak:** Time management. Absolutely. You have to set priorities and be very well organized. I love sport, but I also love my studies. And if you want both, it works – but with compromises. With medicine, it's especially difficult. I'm really only allowed to miss class once during the whole semester. At the same time, I'm regularly at competitions or training camps. I constantly have to explain why I'm absent so that I'm allowed to make up the dates. One time, I traveled eight hours from training camp to an exam, took the exam the next morning, and then had to go straight back to training – with just three minutes to change clothes.

**Josia Topf:** There are days when everything goes according to plan, and then there are the others. When you're just hoping the pieces fall into place. We train twenty to thirty hours a week, and at training camp it quickly becomes forty. Preparing for an exam during that time is difficult.

## Is there even any room left for relaxation?

**Lilly Sellak:** During the semester? Hardly at all. I'm often on the go nonstop. But during semester break, I can catch my breath a bit. I spend as much time as possible with my family and friends then. That gives me support.

**Josia Topf:** In law, there are a lot of written assignments, so my months without lectures aren't really free either. Just one day after the Paralympics, I was back working on an assignment. Of course, I still have training. There's hardly any room left for anything else, like seeing my friends. I have a calendar where my friends can sign up. Still, half of the meetups get canceled.

## How did you get into your sport?

**Josia Topf:** My father taught me to swim when I was six. He was very clear that I had to be able to swim like any other child, whether disabled or not. In the water, I don't feel my disability – I'm just myself. I'm also a very

competitive person and really wanted to be part of a club. That's how I ended up swimming.

**Lilly Sellak:** When I was sixteen, I had an accident on my way to school. Since then, I've been paralyzed from the waist down and rely on a wheelchair. At that point, the chances that I would ever walk again were zero. Sports have always played a big role in my life, and it was clear to me from the start: A life without sports is not an option. I first came into contact with wheelchair basketball while I was still in the clinic. That's because the local wheelchair basketball club trains there to connect newly injured people with those who have been injured for a while. That helped me a lot. Two days after I was discharged, I went to a tryout.

## Did you already know before your accident that you wanted to study medicine?

**Lilly Sellak:** That actually only came afterward. During rehab, I had the opportunity to get to know everyday life in the clinic and see behind the scenes. I quickly realized how much it interested me.

Josia Topf won a complete set of medals at the Paralympics in Paris. At the Para Swimming World Championships in Singapore at the end of September, he added two golds, one silver, and one bronze.



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"You have to set priorities and be very well organized. I love sports, but I also love my studies. And if you want both, it works – but with compromises."

Lilly Sellak



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Lilly Sellak and Josia Topf study at FAU and competed in the 2024 Paralympics in Paris.

#### And what made you choose to study law, Josia?

**Josia Topf:** It was clear to me that I had to do something where I could use my mind. I've always enjoyed debating, so law was a natural fit. I also like that I don't have to commit to a specific career path.

#### Have the Paralympics been the highlight of your sports career so far?

**Lilly Sellak:** Definitely. The Paralympics have been my biggest international tournament so far. There was so much going on – it was just incredible. My family was there, my friends. I love thinking back on it and looking at the pictures.

**Josia Topf:** I can't even find the right words. If you weren't there, you can't really understand what we saw and felt. It was loud, intense, emotional. The arena was shaking – we could barely hear our coaches. It was like a short trip into another reality. What moved me most was the sense of community among the athletes, across nations.

#### How did you feel about the media coverage?

**Josia Topf:** Paris was a whole new level. The French really embraced the Paralympics.

What I find unfortunate is that the attention is already fading again, or is only focusing on individuals like Lilly and me. There would be so many ways to give Paralympic sports as a whole a stronger presence in the media.

**Lilly Sellak:** Especially during the Paralympics, there was a huge amount of media coverage. Just the fact that the Paralympic symbol was included in commercials: many people aren't even aware, for example, that we don't use the rings as our symbol. There were also significantly more livestreams. But of course, there's still a long way to go before we reach equality with the Olympic Games. We athletes have to do our part, be visible, and show ourselves. For example, at events.

■ mw

Josia on the FAU Instagram channel [fau.info/topf](https://www.instagram.com/fau.info/topf)



A video about Lilly on YouTube: [fau.info/sellak](https://www.youtube.com/watch?v=fau.info/sellak)



# A new perspective on **distant rituals**

What do the terms “esoteric” and “alternative” mean? Who uses these terms to describe whom, and how does that affect politics and society? Giovanni Maltese and the CAS-E research group are investigating this.

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**H**is office at the university is plain and businesslike. No cross or mandala on the wall suggests that a scholar of religion works here, and no Buddha on the desk hints that the researcher is engaged with “alternative rationalities and esoteric practices from a global perspective.” But both apply to Giovanni Maltese: Since April 2024, he has been Chair of Religious Studies and Intercultural Theology at FAU and, from day one, has brought his expertise to the research group known as CAS-E, which is funded by the German Research Foundation.

“In recent years, German media have reported extensively on spiritually tinged far-right groups, ‘Querdenker,’ and conspiracy narratives,” says Maltese. “Often, the word esoteric comes up, and there is talk of alternative worldviews or religions.” But what exactly do these terms mean, and what are the effects – for example, in society and in the media – when people are labeled this way? “I am interested in how discourses about religion and alternative worldviews influence social and political processes,” explains Maltese. He mainly examines evangelical and Pentecostal-charismatic as well as reformist Islamic and mystical movements, and he focuses a lot on Southeast Asia, since he lived and conducted research in the Philippines for several years during his studies.

## **Ritual masters from Taiwan in Erlangen**

His findings were also of interest to sinologist Michael Lackner, scholar of religion Andreas

Three Taoist ritual masters celebrate spirit writing, a form of divination. The Taiwanese were guests at FAU in July.



Sinologist and CAS-E founder Prof. Dr. Michael Lackner is spontaneously included in the ceremony.

Nehring, and cultural and social anthropologist Dominik Müller. The CAS-E founders immediately brought their new colleague on board, and in 2025 Maltese succeeded Nehring as director. "At the beginning of our work, we observed that different rituals are practiced around the world to predict, control, or manipulate life events," says Michael Lackner. "In China there is Feng Shui, in West Africa Vodun, in Israel Kabbalah Ma'asit, in India Vastu, in the Caribbean Brujas, and in Germany ritual magic." The list of different methods worldwide is extremely long, but so far has been neither comprehensively documented nor mapped. The research group aims to change that with its large-scale interdisciplinary project and, for this purpose, occasionally invites ritual masters from around the world to Erlangen. At the beginning of July, a delegation from Taiwan visited and performed a "Writing with the Phoenix Stylus" ceremony: Three Taoist ritual masters in long white robes invited Michael

### CAS-E: new perspectives

Teachings and rituals such as Feng Shui, Kabbalah Ma'asit, Vodun, or Bomoh encounter little understanding in our Western-oriented scientific and technical discourse. The Center for Advanced Studies – Erlangen "CAS-E" aims to overcome distorting Eurocentric stereotypes and to examine alternative practices in comparative studies. The goal is to create synergy between cultural and social anthropology, religious studies, regional and literary studies, as well as social and political science. The research group, funded by the DFG, began its work at the end of 2022.

Lackner to stand between them, held a large red wooden staff over his head, murmured softly to themselves, and finally used a special stylus to draw Chinese characters into a bowl of sand. "This so-called spirit writing is a popular form of divination practiced both in Taoist temples and in temples of Chinese folk religion," explains Lackner. "With the phoenix stylus, the ritual masters receive messages from a god or spirit and write them down." Whether such rituals and other practices around the world have something in common, how they

"It's also about how society debates knowledge and truth."

Giovanni Maltese

can be studied comparatively without contributing to Eurocentric stereotyping, and how we can gain access to the knowledge of practitioners, were long at the center of CAS-E's work.

#### How are truth and knowledge debated?

"Our perspective has since evolved," emphasizes Giovanni Maltese. "Our focus is increasingly shifting to analyzing who labels something as esoteric or alternative, when and where this happens, what interests are behind it, and what social, political, or ideological goals are being pursued. It is also about how knowledge and truth are debated in society." The new director of CAS-E is tackling these central questions together with researchers from other disciplines. "We want to question the often stereotypical attributions and neither romanticize nor generally disparage them," he explains. "But of course, we are also taking a close look at why since the coronavirus pandemic esoteric

practices have become increasingly intertwined with anti-democratic, inhumane, or far-right ideologies, have gained significant traction, and why conspiracy narratives can reach so many people."

So, it is a much-discussed and emotionally charged topic that the scholar approaches in a theoretically and methodologically transparent, critical way. After all, his goal is to make a nuanced and responsible contribution to the status of science in times of "alternative" facts.

■ ez

Researches esoteric practices from a global perspective: Scholar of religion Prof. Dr. Giovanni Maltese.



# Breaking the silence

Christoph Safferling has researched the Nazi history of the Federal Ministry of Justice. Now he is dedicating himself to a project right on his doorstep: transforming the former asylum in Erlangen into a memorial site.

**A**s a child, on his way to school, Christoph Safferling walked past the building behind the high wall on Maximiliansplatz every day. "What's happening behind there?" he wondered at the time. The old house with the strange staircase and all the ivy gave off an eerie feeling to him. Today, several decades later, Safferling teaches at the Chair of Criminal Law, Criminal Procedure, and International Law, just a few hundred meters from that same building. The former asylum in Erlangen known locally as the "Hupfla," still occupies his thoughts. This time, however, as the head of the steering committee, he aims to transform the site of National Socialist "euthanasia" crimes into a place of remembrance and learning by early 2030.



## Memorial trail: Stations of remembrance

Not only the historic buildings of the former asylum are to become a place of remembrance and learning. A central part of the memorial site is also the outdoor park, which will be transformed into a memorial trail. The aim is to make the crimes associated with the “Hupfla” apparent to people as they walk across the campus grounds – not just through actively seeking out the exhibition. Planned elements of the trail include an inclusive café and various pavilions that invite people to discuss, listen, and congregate. At the same time, they reference the history of the site, which was once equipped with many covered, open pavilions. Along the entire route, memorial stones will commemorate the specific fates of people who fell victim to the Nazi “euthanasia” crimes. The remaining elements of the wall that surrounds the grounds will also be incorporated into the concept as witnesses to the past. And finally, the “Path of Disability Rights” will be integrated into the memorial trail: It makes the UN Convention on the Rights of Persons with Disabilities accessible and sends a clear signal that this is not only a place of remembrance, but also a place relevant to the present.

The entire feasibility study  
can be viewed at:  
[fau.info/hupfla](https://fau.info/hupfla)



“Demolition or not, the opportunity to create something meaningful was there and had to be seized.”

Christoph Safferling

### A childhood question becomes a lifelong mission

The criminal law professor has long been engaged with the culture of remembrance. His first investigation was in 2005 with an expert report on the Nuremberg Trials. In 2012, the Federal Ministry of Justice commissioned him to research the agency’s Nazi past. This led to the “Rosenburg File,” a study on the continued employment of former Nazi jurists in the postwar ministry. “For me, it was a response to the fact that I am German and that Germans committed the worst crimes in human history,” Safferling explains his motivation. “This is my personal attempt to deal with it.” The discussion about the former asylum (Hupfla) in Erlangen arose shortly before the demolition of the side wing. But it was only afterward that he decided to become actively involved. “All those involved are willing to create something there. Demolition or not, the opportunity to create something meaningful was there and had to be seized.”

### Remembrance, learning, living

In January 2025, the steering committee presented the feasibility study titled “Remembrance, Learning, Living.” For Safferling, remembrance means “silent reflection or mourning in the face of the monstrosity of the crimes.” This remembrance must be given the necessary space both inside and outside the area. When it comes to learning, he envisions



Prof. Dr. Christoph Safferling, head of the “Hupfla” steering committee, with a model of the hospital grounds.

“It’s important to include everyone and to have as open and transparent a process as possible.”

Christoph Safferling

something modern: “I can imagine an electronic archive, so that visitors can read up on the biographies.” This should not happen in a traditional, lecture-style format; instead, visitors should be able to reflect together through workshops and discussion groups. “It is important that the building is accessible and that visitors feel the responsibility that ultimately each individual carries in their own life – namely, respect for the dignity of human life in all its wonderful diversity,” he says.

**Between negotiation skills and trust**

Work in the steering committee requires diplomatic skill. Many stakeholders with different interests need to be brought to the table. “It’s important to include everyone and to have as open and transparent a process as possible,” Safferling emphasizes. There’s no denying that the topic is an emotional burden. “The more you know about the individual fates, the more intense it becomes,” he says. His strategy is to talk about it. The historic building now stands amid modern structures where scientists conduct cutting-edge medical research. For Safferling, it is “like a pinprick”: “It’s a reminder that there are also dangers associated with this field of research.” Thanks to funding from the Free State of Bavaria in the amount of 600,000 euros, the project can now be implemented. As early as fall 2025, the steering committee will set up an office to work purposefully toward the vision of a place that evokes empathy but, above all, highlights the responsibility of each individual. This way, we can ensure that what happened behind the wall is never forgotten. ■ lk

# “If you don’t love what you do, life is too short”

Bernd Montag, CEO of Siemens Healthineers, on passion, balance, and loyalty

**H**e is one of the leading minds in medical technology: FAU alumnus Dr. Bernd Montag, CEO of Siemens Healthineers. He studied physics at FAU, where he also earned his doctoral degree in theoretical multi-particle physics. In this interview, he shares the values that guide him as a CEO, his lasting connection to FAU, and what makes a day feel truly successful to him.

**What has stayed with you most from your time at FAU?**

Here is where I truly discovered—though it’s a big word—my love for theoretical physics: the clarity, simplicity, and beauty of the interrelationships. And that’s something I would never want to miss.

**Which three words would you use to describe yourself?**

Since we’re talking about physics: protons, neutrons, and electrons.

**You now lead a team of over 70,000 employees. What is particularly near and dear to your heart in your work?**

A company plays a crucial role these days because I believe there are many issues that affect us socially, both nationally and globally. For example, how does social cohesion work, how does international collaboration function? And how do we deal with sustainability, how do we ensure good healthcare? These are extremely important issues in the current environment. For me, it’s important that we as a company really try to address all of that—so that I, as an employee, feel I have a great opportunity to contribute, that I can identify with the company, and that there is a sense of mutual loyalty between the company and me.

**What makes the perfect day for you?**

The most important thing is to have had a good conversation—at least. For me, a good conversation means that you’ve genuinely learned something from someone, and I think it’s great when that happens. Beyond that, it’s personally important for me to feel balanced: to have the sense I’m making progress in the company, that I’m happy within my family and that I’ve had time to recharge. I also tell my younger colleagues: Take care of yourselves! Because if you risk your health, your relationships, or your family—if you don’t take care of your health, don’t get enough sleep, or don’t spend enough time with your children—that becomes a burden for the future. ■ nb

The full interview is available as a video at [alumni.fau.de](https://alumni.fau.de)



Studied at FAU and obtained his doctorate there: Bernd Montag.

# Knowing what moves people

A conversation with the president of FAU about dialog, communication, and the attempt to reach 50,000 people.

**A**nyone who leads a university with 50,000 people does not have an easy time keeping track – let alone maintaining a sense for everything happening within their organization. Between strategy meetings, committee sessions, and representational duties, there is often little room left for personal conversation. But Joachim Hornegger, who has been president of FAU for more than ten years, wants exactly that – to be close to all members of the university. FAU Magazine spoke with him about ways of communication at FAU. And about the art of listening.

Not just for a cup of coffee: during his visits, FAU President Hornegger wants to get to know the new scientists better in conversations such as this one with Prof. Dr. Oliver Schnell.



**Mr Hornegger, the German government and the boards of major corporations are often accused of being too far removed from the people. How do you manage to keep a sense of what people think and need at a university of this size?**

You are absolutely right – with 50,000 people, it is not easy. Students, staff, researchers, administration – a university thrives on its diversity. And everyone has different expectations. Of course, it is impossible to meet all of their needs, but I see it as my job to keep my ear to the university. Especially in times when difficult decisions have to be made, it is crucial to keep the conversation going and to sense the mood.



### A Cup with the President

Since the start of the format, Joachim Hornegger has already visited more than 30 newly appointed professors at their workplace. For an hour and a half, the president and the host at the department or institute talk to get to know each other better. Sometimes there is also a tour of the lab. And of course, there are group photos as well as a post about each meeting on FAU News and on LinkedIn. What fascinates the president about these visits is not only the passion with which the newly appointed professors present their work, but also the variety of exciting places he gets to see – from clean rooms to forensic medicine.

### And how do you put that into practice?

That can only work through intensive communication. I want to talk to everyone, from our researchers to our administrative staff. Of course, I can't walk through all 300 locations and look into every office. But together with our communications team, I have developed formats that enable real exchange.

### What are these formats?

FAU Dialog is a particularly successful format. We launched it shortly before our 275th anniversary in 2017. But it proved to be especially valuable during the coronavirus period. People were looking for guidance, wanted to know – who knows what is right and wrong, what should they do? At the FAU Dialog, there is a short introduction from me or a member of the university leadership on a



### Random Lunch

To get to know at least some of the more than 14,000 employees from research, teaching, and administration at FAU better, to exchange ideas with them, and to be accessible to people, Joachim Hornegger invites them to a Random Lunch once per semester. A small group of six to eight people from various areas – from professors to staff at the departments, from administration or technical services to trainees – meets with the FAU president in his office for lunch or coffee and cake.

key topic – construction projects, AI, science communication. After that, we have an open discussion. Questions are expressly encouraged, and sometimes there are breakout sessions to explore topics in more depth. Depending on the topic, there are sometimes 300 participants, sometimes 60. We vary the times. It is important to me that as many people as possible have the chance to participate – even though it will never be everyone.

### Are there also formats that appeal to smaller groups?

Absolutely – for example, the Random Lunch. We introduced that in 2016. Employees are randomly selected and invited to my office. Usually, six to eight people come, and it is always highly interesting. You might have a secretary, a library inspector, a research associate, and a professor sitting together – people who would otherwise rarely sit at the same table and passionately exchange ideas about FAU. I learn an enormous amount from these meetings, but they also get to know each other. That creates understanding and closeness.

### You also want to bring FAU to the top internationally in terms of research. In that case, close contact with professors is especially important...

There are already many natural points of contact, from appointment negotiations to exchanges on proposals and collaborative projects. And many of them follow me on Bluesky and LinkedIn, where I am extremely active. But I have also developed a format for personal conversation there: A Cup with the President. I visit all newly appointed professors at their workplace – with my FAU mug in hand (laughs) – and have them show me what they are working on, where there are challenges, and what they need. These conversations are incredibly enriching for me. Many come from other universities, with different structures and experiences. This fresh perspective brings additional innovation to our FAU.

### FAU Dialog

The FAU Dialog offers employees a platform at irregular intervals to help shape FAU's strategy together. All members of FAU have the possibility to discuss current developments, the University's strategic approach and future goals with the Executive Board. The topics of the FAU Dialog are diverse – from digital teaching and sustainability to strategic partnerships.



### That sounds like a lot of personal interaction with employees. But how do you get into conversation with the students?

That is certainly the biggest challenge – a heterogeneous community of 40,000 young people, all about 30 years younger than I am. But of course, the students are especially close to my heart. Whenever my schedule allows, I still teach myself – simply to maintain contact. Then there are the conversations with the student representatives. And we also interact at events and sports activities, such as the Run Against Cancer. But yes – I would also like to have a format where I can listen to individual perspectives and not just hear political demands. We used to have a format called Cola and Pizza with prospective students. I would like to revive something like that. An informal meeting where everyone can openly say what's on their mind. Especially now, when our students have to be so patient – because of construction projects, cost-cutting measures, and everything that goes along with it – this honest feedback is more important than ever. ■ **bm**

# Antiquity and practicability

68 Professor of Ancient History Boris Dreyer does not limit himself to the study of ancient written sources. He tests Roman designs, which have been reconstructed using ancient manufacturing methods, for their practical usability and increases public interest in antiquity.

**C**aesar defeated the Gauls. "Didn't he at least have a cook with him?" asks Bertolt Brecht in one of his poems. What he means by this: Isn't our view of history shaped too much by rulers and intellectual elites? And is the contribution of ordinary people, especially craftspeople, being overlooked? After all, most contemporaries of antiquity did not belong to the privileged groups; their lives were shaped by hard manual labor. Whether legionaries or merchants, Romans or Celts – trade and change in antiquity depended on the functionality of handcrafted tools, vehicles, or weapons. "If we want to precisely examine the functionality and performance of ancient designs, trying is better than studying," says Boris Dreyer. Since 2017, the professor of ancient history has rebuilt three Roman boats: the "Fridericana Alexandrina Navis," a Roman patrol boat from the first century AD, the "Danuvina Alacris," a boat from the fourth century, as well as a Roman transport boat, the "Alchmona rediviva." Dreyer and his team have so far reconstructed two artillery pieces from

different periods and a catapult from the fourth century, an oven, 22 shields, as well as a Celtic chariot and a Roman travel wagon.

### Smartphone and chisel

"For weapons and vehicles of this kind, there are of course no manufacturers who could be commissioned and paid by the university through a bureaucratic tendering process," says Boris Dreyer. Although he has now become quite adept with saw, plane, paintbrush, and blacksmith's hammer, his most important tool for reconstructing ancient equipment is his smartphone. With it, Dreyer brings together students, volunteer helpers, fellow professors, boat builders, sailmakers, artisan blacksmiths, performers, educators, government officials, politicians, tourism experts, sponsors, journalists, and documentary filmmakers at breathtaking speed and awakens their interest in experimental archaeology.

Experimental archaeology does not focus – like "living history" or "reenactment" – on the subjective experience of history, but instead



69 Prof. Dr. Boris Dreyer and his team also reconstructed a Celtic chariot.



“90 to 95 percent of the material and written records from antiquity have been lost.”

With the reconstructed Roman artillery, Dreyer and his team tested firing accuracy and rate of fire (top left).

Boris Dreyer is often at the helm of his boats. The ancient historian obtained a sailing license for this purpose (top right).

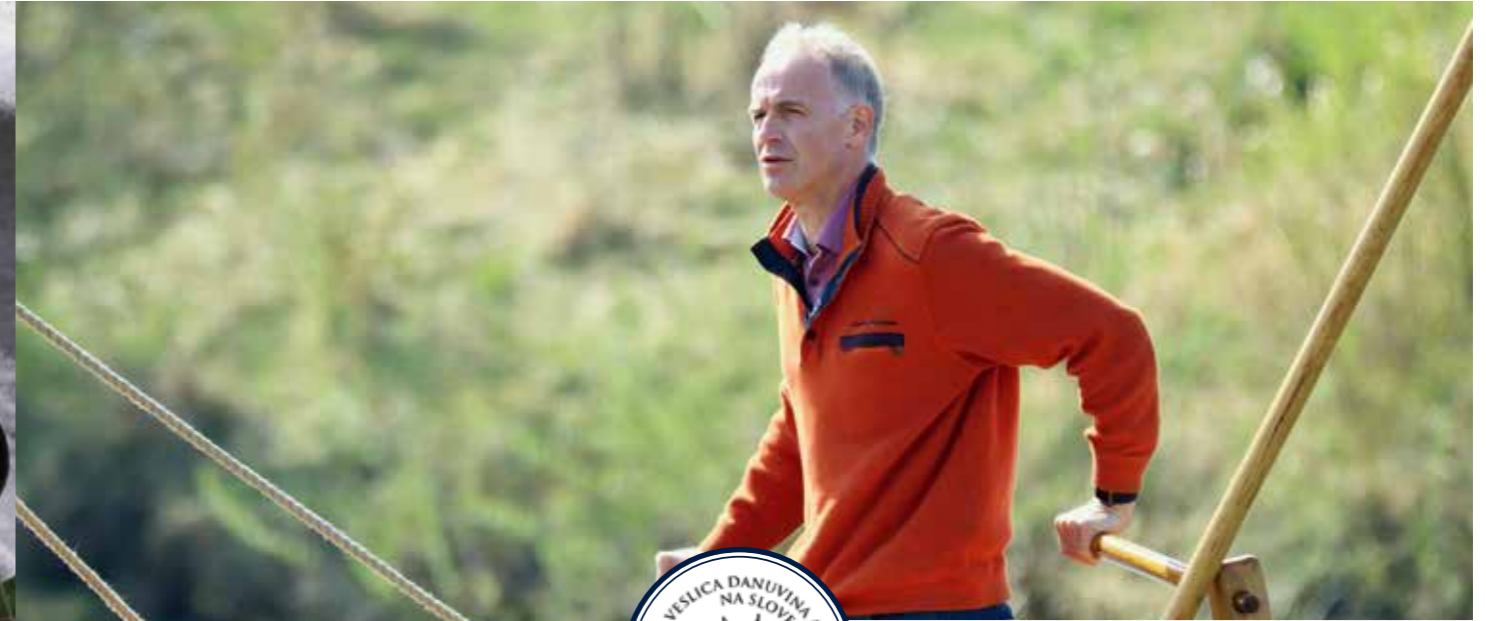
The second Roman boat was honored with a postage stamp in Slovakia during its ongoing Danube journey, which began in 2022.

Boris Dreyer

follows a strictly scientific approach. The basis for the reconstructions is archaeological finds, contemporary visual representations such as reliefs or wall paintings, and, where available, written sources. Nevertheless, the state of the sources presents Dreyer with a problem: “About 90 to 95 percent of the material and written records from antiquity have been lost,” he says. That is why new knowledge can only be generated through reconstructions and functional tests. “There are no records from ancient shipbuilders; presumably, they passed on their knowledge only orally. Roman writers and artists, on the other hand, generally had neither practical experience nor were they interested in technical details,” Dreyer explains further.

**Practicability turn and public outreach**

Since the 1970s, classical studies have increasingly focused on ordinary people, but their designs have not been subjected to any historically plausible performance tests. That is exactly what Dreyer wants to change with the concept of the practicability test which is part of the “practicability turn” in research. In this way, he and his team discovered that a trained crew can fire up to twelve bolts per minute at an average speed of around 280 kilometers per hour with a field artillery piece. Or that the Onager catapult can hurl a 4.3-kilogram stone 130 meters. Test runs with the “Fridericana Alexandrina Navis,” or “F. A. N.” for short, showed that the boat is easier to maneuver with a spritsail or lateen sail than with a square sail, which is the only sail type depicted in the sources. And tests showed that a certain shape of the bow allows the boats to glide more stably through the water. “By now, the insights gained during construction and testing fill numerous qualification and Master’s theses as well as a variety of other publications,” says Dreyer. For the future, he hopes for a dual degree program



in which students of ancient history can also earn a trade qualification at the same time. Boris Dreyer does not shy away from being present in the media. Boat races, trade fair appearances, as well as Roman and rowing events attract public interest; his projects are featured in well-known popular science magazines and international documentaries, and he himself is a sought-after expert on Roman technology. “For my teachers, public outreach and serious scholarship were still incompatible,” he says. That has changed: Dreyer himself now sees public outreach as an integrative task that ultimately also fosters understanding and support for this type of research. ■ mo

Would you like to learn more about the projects?  
[fau.info/lebendigeantike](http://fau.info/lebendigeantike)



Test drive on Lake Altmühl: How easy is the F. A. N. to maneuver (above)?

What looks like fun serves a scientific purpose: how well suited are Roman boats for landing on enemy riverbanks (right)?



# Teddy bear doctors in action

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Volunteering: medical student Alexandra Bittner is a "Teddy Bear" doctor at the Teddy Bear Hospital.

They examine stuffed animals in the Teddy Bear Hospital, helping to take away children's fear of the doctor. Now the student teddy bear doctors have been honored with the Alumni Association's Volunteer Award from the Faculty of Medicine.

**T**hey do X-rays and vaccinations, perform ultrasounds, apply bandages, and put on splints. If necessary, they also perform surgery and prescribe medication. Around 30 students from FAU in medicine, dentistry, pharmacy, and medical engineering make up a "bear-strong" team that comes together once a year to run an extraordinary clinic in the Schlossgarten grounds. "We also fix toothache," says Alexandra Bittner, a medical student in her tenth semester. "There's a pharmacy and a lab, and you can check out a real ambulance." The clinic is visited by children aged three to eight – along with their stuffed toy patients.

#### 40 locations in Germany

The co-organizer of the Teddy Bear Hospital has been one of the teddy bear doctors since 2021, and she loves this role very much: "In medical school, there's no time to learn how to explain things to young patients or how to deal with the anxious ones later on in your career," says the future doctor, who is considering specializing in pediatrics. "As teddy bear doctors, we practice these interactions, and the children get used to visits to the doctor's office or clinic, white coats, and the medical equipment." There are Teddy Bear Hospitals at 40 locations in Germany. Alexandra Bittner became aware of the project, which was initiated by the German Medical Students'



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Association, through a friend who was already part of the organizing team in Erlangen: "I thought the idea was great, and it's a lot of fun working with the little children," says Bittner. And this enthusiasm is contagious: The Teddy Bear Hospital has no shortage of new recruits.

#### An important social purpose

For the alumni association, the team's ongoing volunteer commitment was the deciding factor for the award. The award praises the teddy bear doctors' dedication to such an important and social cause alongside their studies. ■ **stm**

At the Teddy Bear Hospital, children between the ages of three and eight can have their stuffed toys examined – or get involved themselves.

# Guardian of history

For more than 25 years, Clemens Wachter has been engaged with the history of Friedrich-Alexander-Universität Erlangen–Nürnberg. As an archivist, Wachter manages the university archive and ensures that the past is preserved for us.

**A**lthough Clemens Wachter deals with the past on a daily basis, his work as university archivist has a direct impact on the future. After all: He decides which documents are relevant for the further historiography of the university. “Of course, that is not an unimportant decision, because it lays the foundation for how the university’s history can later be evaluated.” In the vast majority of cases, however, it is quite clear what is archived and preserved, and what is not, says Wachter. After all, he has been doing this long enough, and there are many opportunities for exchange with colleagues at other university archives. Wachter’s fascination with the history of the region has accompanied him since his studies. The historian earned his doctorate in Franconian regional history in 1999, after previously studying German studies and history at FAU. And his passion remains unbroken to this day: “University history is truly interesting, especially at FAU as one of the oldest universities in Bavaria. You can learn a lot about how academia develops in different political systems,” explains Wachter. “Even if there were unpleasant incidents, which can be found in every university’s history, it is an opportunity to learn from them.” Currently, the university archive is actively supporting the team responsible for planning the memorial and learning site on the grounds of the former asylum in Erlangen. The researchers involved in the project are working with numerous sources that are only accessible in archives.

## Advancing digitization

On his shelves, Wachter houses not only highly official documents, but also records that provide insight into personal destinies. The historian particularly recalls a document from 1933 about a Jewish student “who was pushed out because she supposedly drew too much attention to herself.” According to the records, the student always sat in the best seat and dressed conspicuously. As a result, the other students wrote an open letter – with success. “When you read that almost 100 years later, that someone was really bullied for ideological reasons – today we would call it that – those are documents that really move you.” A large part of Wachter’s work consists of answering many inquiries from researchers from all over the world. “In the past, it was rather rare to receive an inquiry from overseas,” he says, but now it is almost an everyday occurrence. Thanks to the advancing digitization of the archive, these inquiries can often be answered quickly. This wasn’t always the case. Wachter recalls that at the beginning of his career, he had to type out documents sentence by sentence, as historical originals could not withstand the heat of a copier: “A huge effort back then!” In this sense, digitization is indeed a great relief, but at the same time, archiving has also become significantly more complex. “A paper file in 100 years? Easily readable. A PDF file from today in 100 years? That will be interesting.” So for Clemens Wachter, too: Nothing is as constant as change. ■ mj

He manages the records of the university’s history: FAU archivist Dr. Clemens Wachter.



# FAU duo awarded for outstanding teaching



Although Mario Liebensteiner and Katharina Oft's research priorities could not be further apart, they have one thing in common: Their teaching is outstanding.

**W**hen the Dean of Studies congratulated him on his award before a department meeting, Mario Liebensteiner was completely taken aback. He spent a long time wondering what the award was for, even searching for clues in his emails. But he didn't find anything there either. Katharina Oft had a similar experience. She also received completely unexpected congratulations in March. No wonder, since neither the research associate at the Chair of Classical Philology nor assistant professor of Energy Markets and Energy Systems Analysis applied for an award. Nevertheless, they were honored: with the "Prize for Excellence in Teaching." Every year, the Bavarian State Ministry of Science and the Arts honors instructors at Bavarian universities and colleges for exceptional achievements in knowledge transfer. What makes it special: It is an award ultimately given by the students of FAU. The two candidates whom the university president nominates to the ministry are selected by the students' representatives.

“The students help shape the seminars themselves. I make a rough plan in advance of what I would like to do, and then discuss it with the students at the beginning of the semester.”

Katharina Oft



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#### Awakening self-motivation

And they deserve it. For both Katharina Oft and Mario Liebensteiner, good, practical, and innovative teaching that is oriented toward the needs of their students is a given. “I want students to receive an education that inspires and encourages them to continue engaging with the topics,” says Mario Liebensteiner. Awakening self-motivation in his students has become his mission.

He is always happy to try new approaches to achieve this. He conveys complex topics – such as international electricity pricing or the effects of phasing out nuclear power – in an understandable way, seasoned with a pinch of humor, including in videos on his YouTube channel. What originally started as a hobby during a vacation has now become a permanent part of his teaching. His goal: To present research and teaching content in such a way that it is not only interesting for scientists, but for everyone who wants to learn more about his areas of expertise.

And in the seminar room? For both Mario Liebensteiner and Katharina Oft, it is important that, above all, the students have their say and help shape the seminars themselves. This happens in group discussions as well as in presentations, where students present teaching content that they have previously prepared together. Both of them see them-

selves primarily as experts who know their field very well and whom students can “pick the brains of” in every respect. Creating a learning environment where students feel valued and have the courage to ask all the questions they may have is equally important to both award recipients. They also want to show students that researchers are just regular people and use the same methods the students are currently learning. For Katharina Oft, it is especially important to address the individual needs of her students: “The students help shape the seminars themselves. I make a rough plan in advance of what I would like to do, and then discuss it with the students at the beginning of the semester.”

In the end, Katharina Oft and Mario Liebensteiner want their students to remember their time at university as inspiring, with teaching that challenged and supported them. This went so far that Katharina Oft could not take part in the awards ceremony as she was on a field trip to Rome with some students. ■ **mk**

Philologist Katharina Oft and economist Prof. Dr. Mario Liebensteiner have been awarded the Bavarian Teaching Prize 2025.

Further information on energy markets can be found on Mario Liebensteiner’s YouTube channel: [fau.info/energiemaerkte](https://www.youtube.com/channel/UC...)



# The art of craft

Brewing beer is the perfect way to put the theory of bioprocess engineering into practice, says Kathrin Castiglione. The practical courses at the Chair's own Röthelheim Brewery are highly sought after – and so is the beer.

**N**ot much can really go wrong. Once the malt is milled and mashed, the fermentation vessels are disinfected, and the hops are boiling, the most important steps are done. After the yeast has been added, it takes time for fermentation, then the beer can be bottled or filled into small kegs. "The most critical point is when students miscalculate the sugar content for bottle fermentation," says Kathrin Castiglione. "If too much carbon dioxide forms, the tasting can quickly turn into a foam party."

#### Stainless-steel brewmasters

Castiglione holds the Chair of Bioprocess Engineering and offers one of the most sought-after practical courses at FAU: Each semester, 30 to 40 students have the opportunity to brew beer: Helles, Weizen, Bock, Porter, various ales. The handmade specialties, called craft beers, are labeled with the "Röthelheim-bräu" brand. In the former riding hall at the



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Left to right:

Prof. Dr. Kathrin Castiglione manages the brewery.

Hops aren't just bitter: New varieties provide exotic flavors.

In 2024, "Röthelheim-bräu" got a new brand design.

Quick check with the "master brewer": is everything going according to plan?

brewery location in Erlangen's Röthelheim, everything needed for brewing beer can be found: Grain mill, hop scale, and the Braumeister brewing units, in which the entire fermentation process takes place and can be monitored on a digital display. Five of these stainless steel containers, each holding 50 liters, allow five different types of beer to be brewed at the same time. The Röthelheim Brewery has existed since 2009, founded by Castiglione's predecessor Professor Rainer Buchholz. In 2018, Kathrin Castiglione took over the project. "Right at my interview, students asked me if I would continue running the brewery," she says. "I didn't have to think long, because brewing beer offers the ideal opportunity to understand bioprocess engineering and put it into practice. And what could be better than not only documenting the result, but also tasting it?"



### Hops with a white wine note

While only beers brewed according to the German Purity Law are made during practical courses, things are a bit freer in the brewing club: The members – students and research associates at the Chair – also experiment with exotic additions, such as coffee extract or orange peel. "Many things can now also be flavored with new hop varieties or special yeasts," explains Castiglione, whose passion for craft beers has grown with each year at FAU and who is now even considering training to become a beer sommelier. "For example, we brew the 'Helle Köpfchen' FAU beer with a New Zealand hop that brings subtle white wine notes. Some hop varieties are reminiscent of grass, others of citrus fruits. My current favorite is 'Mandarina Bavaria'." However, the department's scientific interest in hop breeding is not limited to flavoring. Two doctoral projects are focused on how the antiviral and antibiotic effects of hops can be used for organic animal feed. Luisa Kober and Marco Dürsch, both passionate members of the brewing club, want to continue the millen-

nia-old tradition of using hops as a medicinal plant. Kober is researching the use of hop compounds as an alternative to conventional antibiotics in poultry farming, in order to curb the spread of resistant germs. Dürsch is testing the antiviral effects of hop extracts in aquaculture, especially against koi herpes virus, which mainly affects farmed carp in this region.

### Röthelheim beer sells out quickly

Back to the beer: Around 200 liters are produced with each brew. Since 2024, the Chair has held a license to bottle Röthelheim specialties for beer fans who are not involved in the brewing process. "The limited quantity of bottles and 20-liter kegs are always gone quickly," says Kathrin Castiglione. Fans have a better chance of getting a taste at events where the brewing club presents its creations, such as summer festivals, Christmas and graduation parties, or the Long Night of Science. And if you prefer something a bit stronger, you can head to the annual Martini gathering on the Erlangen Berg: When the strong beer is called for there, FAU is also represented with a keg. ■ mm



### Tax-free home brew

Brewing beer at the university has a long tradition in Erlangen. When FAU was founded in 1743, professors were granted a curious privilege: They were allowed to brew their own beer without paying taxes. This was done by an Erlangen brewmaster, who was granted university membership for this purpose. This tax privilege ended in 1814.

# Why, how, what for?

A day of studying like the grown-ups: This fall, the Children's University at FAU is back again. For organizer Laura Knepe, the most important thing is that the children develop a love of science.



It all starts at nine o'clock – with a welcome and handing out the “study booklet”. The morning program begins at 10 am, and at 11:30 am it's time for lunch in the cafeteria. At 12:30 pm, the afternoon courses begin, before everyone meets at 2 pm for a joint closing event, where the first diplomas are awarded. Admittedly: A short university day, but one that really challenges the children. Because in the seminar rooms and lecture halls, the topics are magnetic nanomaterials, robotics, AI, environment, media, or emotions. These are subjects taught at the university, but of course specially adapted for children.

### Understandable for the kids

“Technology and sciences are the big hits – really, any subject where you can do experiments or build things,” says Laura Knepe, science communication staff member at FAU and head of the Children's University. For the events, she needs instructors who can share their expertise in a way that's easy to understand. At FAU, she can draw from a large network: During onboarding sessions, professors who are new to FAU learn about the opportunity to participate in the Children's University. In the very first conversation, she finds out whether the instructors in mathematics, environmental engineering, medicine, or psychology are able to distill their topics down to the essentials and present them to the very young students in an exciting way. “This is where ideas are needed,” says Knepe. “It could be a detective game, a quiz, or a scavenger hunt – the main thing is that it's suitable for children.”

### Personal highlight

She probably has one of the most exciting jobs at FAU, because Laura Knepe opens up the university to everyone. The communications science graduate selects topics from FAU that might be interesting to the general public, thinks up a suitable format, and puts it into practice. This includes the Long Night of Science, #FAUwissenwollen, and of course the Children's University – Laura Knepe's personal highlight of the academic year. When the media expert came to FAU in 2021, she learned that there was already a Children's University in Nuremberg, but not in Erlangen! Laura Knepe,

herself a mother of two, wanted to change that quickly. “Why don't we make use of all the resources FAU already has? Great scientists, lecture halls, labs, the botanical garden, the clinics – perfect conditions for the Children's University,” was her first thought.

### Collecting ideas in Vienna

As part of an Erasmus project, Knepe visited the University of Vienna, which is considered a beacon across Europe with its 800 programs for children. “I was amazed by the variety and got lots of inspiration,” she says. In 2023, the Erlangen Children's University started as a pilot project, initially only for the children of FAU staff. The first “real” Children's University then took place on a school-free day in 2024. The rush was enormous: Six minutes after registration opened, all the spots were taken. A total of 111 children took part in various morning and afternoon courses or a full-day course. “The budding scientists had a fantastic time with the program, and they participated enthusiastically. The kids even filmed a report about the event as part of one of the courses.”

Her wish is to expand the Children's University to include non-academic families as well, in order to introduce as many children in the region as possible to university life and research. ■ **stm**



A day to get a taste of university life: The children join in with great enthusiasm.

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# FAU Schlossgartenfest

## A party for the whole city!

An unforgettable event in the picturesque Schlossgarten in the heart of Erlangen, offering a varied program of music, art, culinary delights and fireworks. The FAU discovery trail offers exciting insights into the world of science. Surrounded by the impressive backdrop of the historical Schloss and the Orangerie, the party is not only a highlight for the FAU community, but for the whole of the Erlangen and Metropolitan region, an event that breathes life into the close connections between FAU, the city and the region.

## 70th Schlossgartenfest 06 | 27 | 26

Tickets available at [schlossgartenfest.de](https://schlossgartenfest.de)

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# Spotlight on FAU

With its motto “Moving knowledge”, FAU stands for innovation, diversity and passion. Discover more about FAU’s values, its key research priorities and what it offers students and the general public:



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