HZB Helmholtz Zentrum Berlin

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Picture: Michael Setzpfandt

A Maestro for User Service

PORTRAIT OF ASTRID BRANDT

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IMPRINT

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Two questions for Bernd Rech

Picture: David Ausserhofer

We have started a new year. What is the most important ingredient for being successful together?

Bernd Rech (Scientific Director): I'll give you three ingredients: optimism, drive and team spirit! Let's shape the future together with optimism and great commitment.

What are you particularly looking forward to this year?

I'm looking forward to the whole year, to many great results and I'm very excited about the evaluation in May. I'm sure I'll be especially looking forward to the summer holidays then.

Picture: Michael Setzpandt

“Every application for measurement time arouses my curiosity”

Astrid Brandt is Head of User Coordination at Helmholtz-Zentrum Berlin. She and her team keep constant track of applications, measurement times and publications of the 1000 guest researchers who come to BESSY II each year. She has always been fascinated by science. But she has also never let go of her other passion, which is music.

For her first visit to the former Hahn-Meitner-Institut, Astrid Brandt got in by hiding behind the front seat of a car. “We had to stay out of sight,” she recalls. “My sister and I weren’t officially allowed in, and the gatekeepers weren’t supposed to see us.” She must have been about three years old. Her father, Peter Möller, would come in to the Wannsee campus regularly on weekends. He was a chemistry professor and, when there was no one to babysit, he would bring the children in with him. The visits made a big impression on the little Astrid: “It awoke my curiosity for science,” she says, “but by the time I was finishing high school, I had decided I wanted nothing to do with chemistry!”

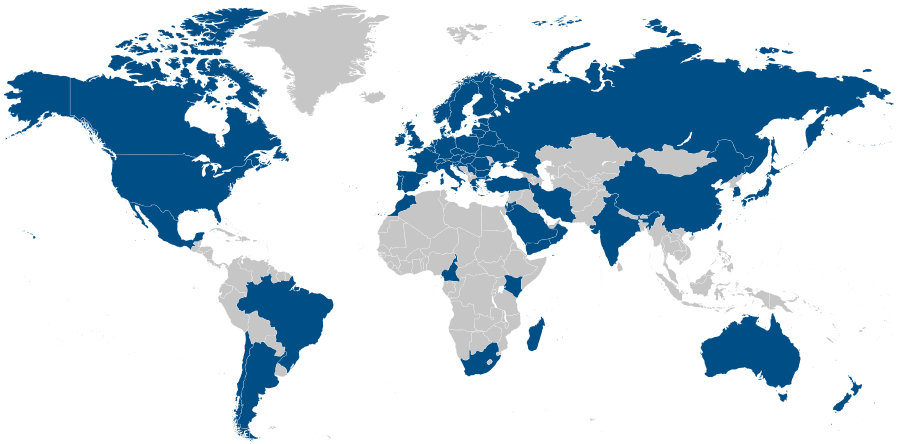
That was a few decades ago, and pretty much nothing about this resolution went the way she expected. Now, Astrid Brandt drives to the electron storage ring each day, albeit in the driver’s seat and no longer in hiding, and is Head of User Coordination at HZB. All scientific experiments that guest researchers plan to perform at the facility in Adlershof go through her.

Yet, it remains clear that, to look at her CV, one gets the clear signal that Astrid Brandt had actively gone out of her way to not become a chemist: she deliberately chose not to elect it in high school, and it was one of the few subjects she conspicuously didn’t sign up for in university. “I started in physics,” she laughs, “dabbled in business and German literature, and tried out music studies.” And yet, after two semesters, she gave up physics and switched to chemistry, “ruefully,” she adds. Only music did she never let go of once. Her mother was an opera singer who sang in the choir of the Deutsche Oper Berlin, and so Astrid Brandt spent her childhood days not only at the offices in Wannsee but also sneaking around behind the stage at the Opera House in Charlottenburg. It was a fascinating world that opened up to her there, and she got actively into it from the start: in the kindergarten choir, then the school choir, and ultimately in the church and university choir. “I wanted to sing Wagner; that was my big dream,” she says wistfully, and looks back at those parts of her school days where, three times a week, she would attend the performances at the Deutsche Oper and, from amongst the audience, dream of being up there on stage. “Heroic dramatic soprano” is the vocal range in which she sings. “Back then I could hit a high G,” she recalls. But, in the end, her dream of singing on stage at Wagner’s Bayreuth Festival was not to be.

At university: chemistry and singing

She studied both chemistry and singing up until shortly before completing her diploma, dragging out the choice between the two until the very last minute. She ultimately made her choice, with a heavy heart but a

ORIGINS OF APPLICATIONS FOR MEASUREMENT TIME



Internationally popular: applications for measurement time were submitted by researchers from 59 countries in the last ten years.

clear head: “I could keep doing singing as a hobby, but not chemistry.”
In her present-day office, on a pinboard behind her desk, is a giant poster covered with closely printed boxes in multiple colours. “That is our Entity Relationship Diagram,” she says. “Each box is basically a table in itself.” The computer programme it was printed with is the centrepiece of User Coordination, co-developed by Astrid Brandt. She points to the poster on her wall: “What you see there in light green, for example, are the institutions of our users.”

A whole slew of administrative tasks

The poster is the paper embodiment of what it is that Astrid Brandt and her team of nine do: twice a year, scientists around the world submit their applications for measurement time at BESSY II. In these proposals, they describe what they would like to measure and which methods they would use. Year after year, as many as 1000 such applications roll in and a legion of reviewers work through them. And for the whole slew of administrative tasks that come with it, the team has a piece of self-written software in which all connections between scientists, institutions and research conglomerates are listed. This finely branched tool makes sure they never lose track of the big picture.
And Astrid Brandt? She has made a habit of looking over all the applications herself. Her curiosity is simply too great, and she gets to experience, up close, what is currently being worked on. From battery research to improvements in solar cell efficiency to novel materials for computing technologies of tomorrow, there is an enormous spectrum of topics that pass over her desk.

1000

applications arrive year after year, and a large team of reviewers carefully examine them together. This way, it is assured that the best projects get the coveted free measurement time.

Excursion into quantum mechanics

The path that brought Astrid Brandt to the present-day HZB was by no means straight: she did her thesis on a quantum mechanical subject, which had nothing to do with X-rays or synchrotron radiation. “But any time I would go to my supervisor with a question, he would shoot me down: ‘You wouldn’t possibly understand!’ I didn’t want to keep working on a subject like that.” And so, for her doctorate, she went instead with small-angle scattering. For her research, she used neutron radiation and X-rays to study a class of substances that was new at the time, namely non-ionic surfactants, as are used nowadays in biodegradable detergents. This culminated in two things for her: the first is that she could share a topic of interest with her future husband, an engineer developing washing machines, and who she met through her studies. The second is that her neutron measurements brought her to the very same Hahn-Meitner-Institut she had known from her childhood.
While still working on her doctorate in 1999, she received an offer to work in support for the small angle facility at the research reactor BER II – providing assistance to users from

Picture: Michael Setzpfandt

Music is Astrid Brandt's other passion, which she occasionally gets to live out at HZB. At the User Meeting 2023, she performed on her ukulele.

other European countries, whose EU-funded projects had to go through many administrative hoops. "I found it exciting because I'm so curious, and so I always like to work on new things. The archetypal virtue of a researcher – spending a lifetime concentrating on a single thing – is something I probably just don't have," she says.

Nevertheless: when she took the position at the time, she never expected that, a quarter of a century later, she would still be working in the same department – even though the nature of the work has changed completely, not least due to the fusion of the Hahn-Meitner-Institut and BESSY GmbH in 2009.

Yet another passion

And there's no way the work could become monotonous, either. "My favourite applications have been those for projects from museums," Astrid Brandt tells us. A few years ago, for example, some pieces were found in a historical shipwreck and needed to be examined. From a scientific perspective, it was quite a simple analysis," she continues, "but the archaeologists were able to draw inferences about historical trade routes during the period of the Roman Empire. For them, the results were of incredible value."

And she loves guiding visitor groups through the experimental hall; especially those that don't come from a scientific background – for example, kids on excursion with the popular educational TV show "Die Sendung mit der Maus". Astrid Brandt say with a laugh: "You explain to a three-year-old child what a synchrotron is!"

The singing career that never began is not something that Astrid Brandt mourns over. After all, there are times when she boldly unites her two worlds, of music and science: together with her colleagues, she takes familiar songs and turns them into something new. In 2009, for example, when the research reactor BER II was shut down in Wannsee, they rewrote "Last Christmas" into "Last Beamtime" and bopped and jived to Jungle Book's German rendition of "Bear Necessities" – "Probier's mal mit Gemütlichkeit" – but in the much more applicable form, "Probier's mal mit 'nem Synchrotron". It is in moments like these when both of Astrid Brandt's worlds come together – that of research and that of music.

> "I wanted to sing Wagner; that was my big dream."
>
> **Astrid Brandt**

■ BY KILIAN KIRCHGESSNER

Picture: Silvio Steinbach

BESSY II+ IS A BRIDGE INTO THE FUTURE

With the BESSY II+ project, HZB is implementing concrete measures to maintain the accustomed world-class research and to test new concepts for the successor light source BESSY III.

17,45

Million Euros additional funding
by the Federal Ministry of Research

“We are facing new scientific challenges. Even our user base has different needs from what they had a few years ago: for example, shorter and more efficient beamtimes, the demand for tailored sample environments, or the wish for additional infrastructure,” says Antje Vollmer, Facility Spokeswoman and Project Lead of BESSY II+. “Plus, our users appreciate just how reliable our light source is, and we have a lot to do to maintain this strength for the next decade,” adds Andreas Jankowiak, Technical Director of BESSY II.

After more than 25 years of operation, the task is to keep the synchrotron light source fit for the coming years and to create opportunities for innovations. The aim is also to build a bridge to the successor source BESSY III, which is set to go into operation in the mid-2030s.

The developments of BESSY II+ will make the system into an “operando synchrotron for the energy transition” by establishing new experimental opportunities especially for operando experiments. These are the kind of experiments that allow us to watch fuel cells and batteries “at work”, for example. In addition, the BESSY II+ project is focussed on “modernisation” and “sustainability”. These three cross-cutting fields contribute to the six major task packages, which we present on the following pages.

■ BY FLORENTINE KRAWATZEK

FEDERAL MINISTRY OF RESEARCH (BMBF) IS FUNDING “INVEST BESSY II+”

“Invest BESSY II+” includes the most important investments for the project BESSY II+. While the personnel costs are covered by HZB’s own capital, this funding secures the construction of new infrastructures.

NEW INSTRUMENTS FOR SUSTAINABLE ENERGY TECHNOLOGIES

Under construction are, among other things, a beamline that offers unique measuring possibilities for catalysis research and an instrument for multimodal measurements of solar cells. [Responsible: Holger Stillrich]

NEW SUPERCONDUCTING WAVELENGTH SHIFTERS

These devices make it possible to do measurements with hard X-rays. They are indispensable for users of protein crystallography and those who perform experiments on the beamline of the Federal Institute for Materials Research and Testing (BAMline) and at µspot. [Responsible: Markus Ries]

NEW INSTRUMENT FOR BATTERY RESEARCH

In development is an instrument called SoTeXS, which stands for Soft-to-Tender X-ray Spectroscopy. “This technology allows us to gain insights into the properties of batteries or other materials for energy applications,” says Sebastian Risse proudly, who worked with a large team to design the instrument (beamline, undulator and end station). SoTeXS is especially interesting for applications in industrial research and for metrological applications used at the Physikalisch Technische Bundesanstalt. [Responsible: Sebastian Risse]

FIT FOR THE FUTURE WITH SIX TASK PACKAGES

1

NEW INSTRUMENTS, BEAMLINES AND BEAMLINE MODIFICATIONS

HOLGER STILLRICH

“Things are now really taking off,” Holger Stillrich is pleased to report. He has been working for nearly two years at HZB, among other things as Project Coordinator for BESSY II+. “The funding from the BMBF is a welcome green light for developing a new instrument such as SoTeXS .“

In total, there are seven other instrumentation projects focussing on operando and catalysis experiments. “There is a colourful bouquet of instruments planned, and in part already implemented, which can be used in many different fields. With the new construction and conversion projects, we are answering the wishes and initiatives of users.”

All are cooperative efforts with Max Planck Institutes or universities. The majority relate to research on energy issues.

2

SAMPLE ENVIRONMENT AND LAB INFRASTRUCTURE

KLAUS KIEFER

A lot is happening in the Sample Environment department, such as the automation of complex experiments. “We are opening up new fields in both equipment and software. This means we are acquiring competencies that will be indispensable for BESSY III. And we are gaining new colleagues who are providing creative stimuli,” says the Head of the Sample Environment department, Klaus Kiefer, enthusiastically.

He mentions new possibilities for long-term studies of batteries. The purpose is to observe how batteries behave when they go through charge and discharge cycles over long periods of time. “They check into a “battery hotel”, where they are continually charged and discharged. From there, they are conveyed automatically to the beamline and back again until their next measurement is due – after days or weeks.”

3

USER SUPPORT, REMOTE ACCESS, DIGITALISATION AND AUTOMATION

3 + 5

JENS VIEFHAUS

“We come from a very successful time of tinkerers and inventors, but the future presents us with new challenges. The user community is changing and it has become clear, not only from our experience with the pandemic, that we must automate more if we and our users want to continue researching at a high level,” states Jens Viefhaus, Head of the Optics and Beamlines department. “Digitalisation in combination with modernisation of instruments is an opportunity to do it right. We can automate many things more efficiently by introducing standards and machine learning, and thereby reduce the burden on the scientists who work on the instruments.”

That sets the course for the successor source. “Because BESSY II+ is a huge opportunity to implement and try out new ideas, which can then be optimised further for BESSY III.” (Keep reading: Use of AI at HZB, page 19)

4

MODERNISATION AND UPGRADE OF THE ACCELERATOR COMPLEX

MARKUS RIES

“A part of the work for our team is continually making new changes to the accelerator, thus keeping the facility fit and upgraded for the users. BESSY II+ is the opportunity for us to make the necessary longer-term plans for ensuring high-level operation in the coming years. In addition, we are testing new technologies to validate them while we are on the path towards BESSY III,” explains Markus Ries, Deputy Head of the Institute for Accelerator Operation, Development and Technology.
With his team, and together with colleagues from the Operations department, he oversees the upgrade measures on the accelerator, such as the acquisition of new wavelength shifters (see the info box on page 9).

5

MODERNISATION AND UPGRADE OF THE BESSY II INSTRUMENTS

Strategic focus of BESSY II+

OPERANDO

- Scientific focus: Energy, catalysis and green IT
- New instruments and sample environments

MODERNISATION

- Stable & reliable accelerator performance
- Improved digitalisation, automation & remote access
- Higher instrument output

SUSTAINABILITY

- Self-sufficiency of energy supply
- Reduced energy consumption

6

SUSTAINABLE BESSY

ROBERT MÜLLER

“The teams of Technical Services as well as Planning and Construction are developing concepts for sustainable research operation,” says Robert Müller, Head of Facility Management. “In the BESSY II+ project, we are in the process of implementing a heat recovery system so that we can reuse the waste heat generated at BESSY II in future.” The installation work for this began in 2023 and will be completed in 2025. The waste heat will be used to heat new buildings as well as the Verfügungsgebäude (construction started in August 2024) and the Technikum. There is also the plan to install a photovoltaic system on the roof of BESSY II.

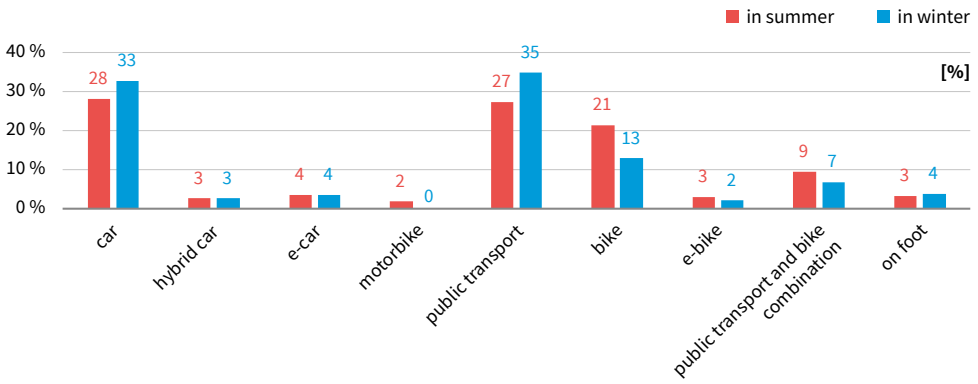
Pictures 1,2,6: Michael Setzpfandt
Picture 3: Silvia Zerbe
Picture 4: private

How do we get to work?

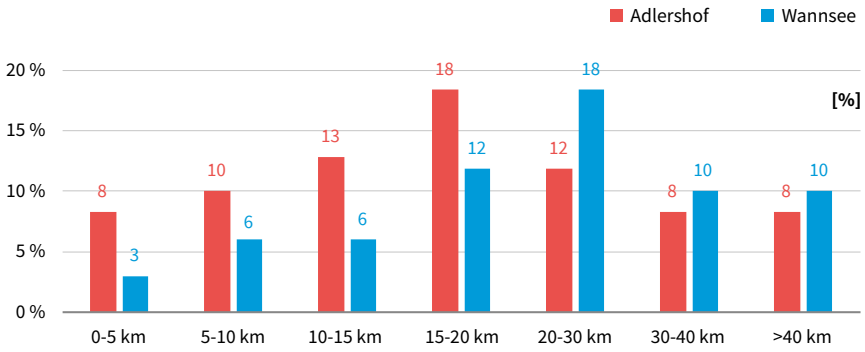
Almost 400 employees took part in the mobility survey in September 2024. A comparison of the results with the 2022 survey shows that commuting behaviour is almost unchanged. One important difference: many employees are back at HZB more often, and the number of home office days has decreased significantly.
The car and public transport play the most important role. In summer, many employees switch to bikes. Significantly more employees at the Adlershof site use bikes – however, the journey there is also shorter.

THE ROUTE TO WORK

How do you usually get to work?



How far is your daily commute?



PARTICIPATION STATISTICS

- Survey period: 4 to 24 September 2020
- 397 employees
- 47 per cent from administrative or service areas, 43 per cent from scientific areas, 10 per cent not specified
- 48 per cent of the respondents work in Wannsee, 43 per cent in Adlershof and 7 per cent at both locations

26.5

kilometres is the average commute for both locations. **Wannsee** is 29.6 km and **Adlershof** 23.4 km away.

CONTACT

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Energy Manager
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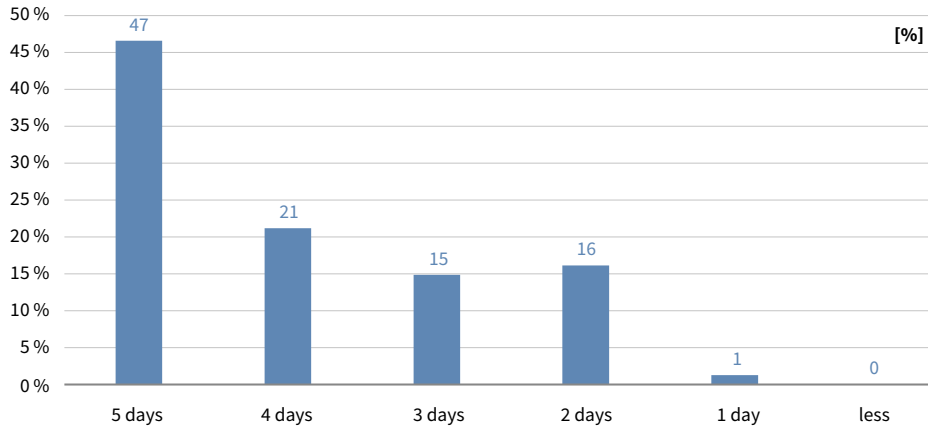
MOBILE WORKING IS IN SIGNIFICANT DECLINE

How many times a week do you go to work at HZB?



On average, employees work on site for four days.

71

per cent say that they can work remotely as part of their role.

50

per cent say that they work from home less often than once a week.

FURTHER FACTS AND FIGURES ON MOBILITY

BIKE

26

per cent say that they have already switched completely to bikes.

12

per cent would cycle to work more often if there were more and safer parking facilities at HZB.

31

per cent cycle to work in Adlershof in summer, 12 per cent cycle to Wannee.

PUBLIC TRANSPORT

89

per cent are aware of the HZB-subsidised Job Ticket for public transport; 42 per cent of the respondents already use it.

502

Job Tickets are processed by the HZB (as of 09/2024).

42

per cent of Adlershof employees use public transport in winter (with or without combining it with their bike). In Wannsee, the figure is 43 per cent.

For successful cooperation

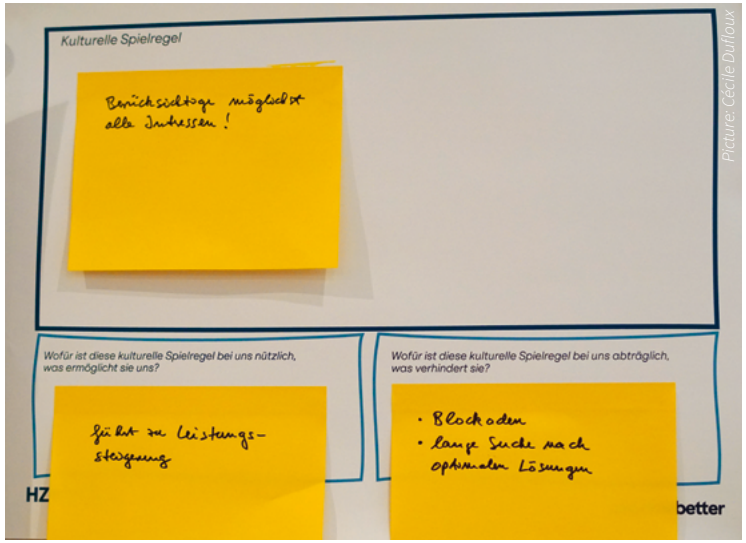
DAS PROBLEM MIT DER KULTUR: MAN SIEHT SIE NICHT, UND SIE VERBIRGT SICH HINTER (UNBRAUCHBAREN) DEFINITIONEN.

The problem with culture is that you don't see it,
and it is obscured behind (inadequate) definitions.

Illustration: becomebetter GmbH

Picture: Cécile Dufloux

In the coming months, we want to work intensively on HZB's corporate culture and, together, continue shaping the leadership and cooperation at HZB. This process began in September 2024 with a workshop for managers. Here, we describe the next steps.



Picture: Cécile Dufloux

What is actually typical at HZB?
The participants of the workshop took a look at the rules.

Anyone who stops to think about corporate culture will quickly notice it is hard to define and often unseen. The harder you try to grasp it, the further it slips away – as the picture illustrates. Above all, it is difficult to change directly. And yet it is worth being aware of its existence, and worth knowing of ways in which it can be influenced. Corporate culture affects our daily lives at work – often more than we are even aware of. New employees, for example, first have to learn "how HZB ticks", how to get along with each other on the playing field and how to achieve their goals at HZB.

But what is the playing field? What is "typically HZB"? What cultural identity does HZB have anyway? "It is precisely these questions we want to find the answers to first," says Antje Hasselberg, Head of the Director's Office and coordinator of the process. "We have picked up loud and clear that we need to look closer at our corporate culture. We often hear, for example, that different leadership would be preferred in one place or another. Managers, as much as the employees, influence the culture of an organisation. We also notice that employees' expectations of managers are ever increasing, not only at HZB but in the working world in general," Antje Hasselberg explains. And of course, it's not just the people, but also the rules, processes and structure of the organisation all defining the corporate culture. The primary goal of the process is to consciously take this all in, and for everyone to take part in shaping the leadership and cooperation together at HZB.

Tackling the corporate culture is also a declared goal of Scientific Director Bernd Rech for his second term in office. "We have been in various crisis modes for many years now. We had Covid, the cyberattack and many other issues. It is important to me that we find the time to look at how we want to define our cooperation: What do we stand for? What is our leaderschip culture? And it is very important to me that we continue this process together," Bernd Rech says.

The lead-up to this process was a workshop for managers in September 2024. In order to develop a common understanding between managers and employees, it is first important to "grasp" the culture – and then to deliberate on what needs to be done. At the workshop for managers, the 80 participants identified a first set of rules on the cultural playing field and examined patterns that define our work routine. This identified patterns that are helpful as well as some that are a hindrance to our success. "The good news is that patterns can be changed – and we want to start doing so by working on the corporate culture," says Antje Hasselberg.

A lot of positive opinions of the workshop for managers were heard in a round of feedback. "Despite the intensive preparations for the evaluations in 2025, everyone agreed in

Illustration: becomebetter GmbH

The rules of the playing field govern **communication** and **conduct**.

favour of us continuing this process." So, what do we do now, exactly? In the next step, it is important to bring the perspectives of the employees into the process. This is the only way to get the big picture.

The plan is to perform a cultural analysis, which will be done with the support of experts from "becomebetter" (formerly LEA), who are specialised in supporting the development of organisations. In the coming weeks, they will be holding individual interviews with many different employees. Importantly, these will be employees from different areas and hierarchies of HZB, and will represent different characteristics such as age, sex and origin. The selection of people from within these groups will be at random, and anonymity will be guaranteed. This approach ensures that as many different perspectives as possible will make it into the cultural analysis.

These interviews and the results of the workshop for managers will go towards creating a thematic analysis map portraying the relevant areas for action. This map will be the basis for continuing to work on the culture and for working with the managers at the annual Scientific Retreat for HZB managers in the summer of 2025. The attendees will develop the first measures for important areas for action.

The aim is, step by step, to crystallise out a common understanding of leadership because next on the agenda after the analysis will be making a concrete interdisciplinary and cross-hierarchical change. How would that be done? Interdisciplinary Sprint Teams will work on specific areas for action, develop and implement measures and check back to make sure they are on the right track.

A Project Team, which also includes the Board of Directors, will control the overall process and make decisions. This Project Team will include employees from other ongoing projects, such as "Employer Branding", in order to ensure the necessary information flow.

One thing is clear: culture cannot be changed by pulling a single lever, because corporate culture is not a mechanical process; there are internal and external factors influencing any culture. Overall, the first milestone will be reached in the course of 2025. "We have a challenging task ahead of us, but it is worth investing this time," Antje Hasselberg assures, and points out an important success factor: "In order to shape our culture of leadership and cooperation, all managers and employees need to recognise and assume their responsibility for this cooperation. I have the feeling that we already began this with the kick-off workshop."

■ BY SILVIA ZERBE

VOICES ON THE CORPORATE CULTURE FROM THE WORKSHOP

"1000 people rely on our leadership!"

"Today is the first step to becoming better."

"We reflected deeply on what and how things are going. The patterns can help us to get out of our respective ruts."

"We have to act now."

DO YOU HAVE QUESTIONS OR SUGGESTIONS?

Feel free to contact the Project Team!

Antje Hasselberg
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"CULTURE IS LIKE AN INVISIBLE FRAME"

Tanja Philippi of "becomebetter" is a consultant for organisational development and change processes who, together with Malte von Braun, hosted the workshop for managers at HZB.

What impression of the corporate culture at HZB did you get from the workshop for managers?

Tanja Philippi: For us, as cultural experts, it is still exciting to see how each company really does have its own, unique culture, which reflects the values, convictions and internal dynamics of the organisation. At the event, we gained a first impression of your corporate culture – as a basis to continue working on it together. And, even more importantly, the colleagues got to experience HZB's culture first hand on site. This gave us the opportunity to draw first conclusions about the cultural playing field at HZB. This initial exploration serves as a great starting point from which to draw a complete picture of the corporate culture with more voices and results. We are getting down to that now, and are looking forward to the outcome.

Why is it worth examining the corporate culture?

Corporate culture is like an invisible frame that shapes the way we work, make decisions and interact with each other. In an almost miraculous way, it lets us "know" how we should behave in a company without ever being explicitly told. Examining the corporate culture means gaining a better understanding of how the organisation functions as a whole. It is about revealing the unconscious patterns that shape our behaviour and way of working together. And if you are able to describe your own corporate culture, you have a basis for talking about it and shaping it, in turn.

Is it an easy thing to do, changing a corporate culture? What are some success factors for doing so?

Strictly speaking, it should be noted that culture can only ever be changed indirectly. It's not as easy as deciding, "From now on, we're going to adopt a new culture!" and putting that into practice. Why? Because culture comes from the interplay between structures, processes, values and behaviours. It is always a product of what we do. So, culture isn't some lever you can just pull, rather it is a result that can be shaped by changes in the organisational context. These become the starting points for bringing about change.

Interviewed by Silvia Zerbe.

Picture: Laura Schleicher

[AI] midjourney| generiert von Gesine Born, Bilderinstitut

Standardising experiments through the use of AI is an important goal.
Prompt* (a prompt is an instruction given to an AI tool): A black female scientist deflects a low frequency pulse wave visualised as a beam of light with a screwdriver, retrofuturism

Artificial intelligence is on the rise at HZB as well

In this day and age, artificial intelligence has already become a permanent part of research. But there are many applications for it beyond that. We present the things that are currently being worked on.

Artificial intelligence is a part of our lives now. The software DeepL makes translating easier, while other tools like ChatGPT help us to summarise or reword texts. Applications like DALL-E generate amazing pictures in an instant. Many colleagues at HZB work with such tools or are developing their own, new AI-supported software.

There are in fact several groups working on the digital transformation at HZB. “The use of AI is a current topic in Administration but, as it stands, we still have the major obstacle of privacy standing in the way of its practical use,” says Kai Godehusen from Administration. The first software in its trial phase is “GovRadar”, which should to make it easier for those in Purchasing to create tender documents.

AI USED IN EXPERIMENTS AND DATA

In the area of data management and experiment control, however, the use of AI is already indispensable. This is because experiments produce copious amounts of data, all of which need to be prepared and stored permanently in accordance with the “FAIR” principle, “Findable – Accessible – Interoperable – Re-useable“. Every dataset therefore gets its own identifiers and metadata. Managing research data efficiently over the entire data lifecycle is made considerably easier by AI.

Each department has different needs: where can or can’t AI tools be put to best use? “We are using a Large Language Model, or LLM, to make the electronic logbooks on the instruments searchable at last,” explains Gregor Hartmann, a data scientist at HZB. Scientists will be filling these logbooks with masses of different information over the course of years. “The aim is, in the case of a fault, for example, to be able to simply search for: when did the fault last occur and what caused it at the time?”

AI can also help in managing the beamlines: a core task is adjusting the many parameters for controlling the photons at each individual instrument. “We are currently training an artificial neural network in this task,” Hartmann says. “The beamline scientists generally have to spend hours on optimising these settings; the neural network will be able to do this considerably faster.”

A digital model of a storage ring can simulate the behaviour of the real storage ring in less time and without risk. “Simulations can be done easily, while real measurements always require a lot of effort and are thus more expensive,” says Markus Ries of the Institute for Accelerator Operation. He and Hartmann are therefore training a neural network with millions of possible configurations of the parameters in the storage ring. “The position of the electron beam is determined at 121 places in the storage ring, and it can be shifted using magnetic dipoles and quadrupoles,” explains Hartmann. “We can now predict these shifts very reliably.” This project, which is currently running for BESSY II, can also be very helpful in the development of BESSY II+ and BESSY III.

“At the same time, we are working on automating certain parts of the experiment and

[AI] midjourney | generiert von Gesine Born, Bilderinstitut

A digital model of the storage ring can simulate the behaviour of the real storage ring.
Prompt* (a prompt is an instruction given to an AI tool): A cute minature foto of a three female scientists standing in a accelerator tunnel with a flashlight. Out of the flashlight is coming a low frequency pulse wave visualised as a beam of light

*For transparency reasons, it is recommended in scientific communication to cite the prompt and the AI model together with the picture that was generated.

enabling remote control in order to use the research infrastructures even more efficiently," Hartmann reports. The Helmholtz Association started the project ROCK-IT for this purpose. Presently, remote control is already possible for macromolecular crystallography, standard powder diffractometry and microtomography, and the aim is to add complex in-situ and operando experiments to the list. For this, a number of workgroups are developing software tools and remote access protocols, while Gregor Hartmann and a team are working on real time data analysis using machine learning. In particular, they are developing algorithms for intelligently optimising and controlling beam guides and experimental stations. This should make it possible to analyse data already during the ongoing experiment and optimise the experimental parameters as needed, in order to gain more insights.

"As data scientists, we first have to look at each problem critically and decide: does it make sense to use an AI model here, and what insights could it deliver? If we don't understand why an AI model decides this way or that (explainability), then we won't learn anything new," Hartman emphasises.

APPLICATIONS IN SCIENCE

Predicting fingerprints of molecules

Chemist Annika Bande uses machine learning to predict spectral "fingerprints" of certain molecules and then use this to correctly interpret experimental (X-ray) data. "Machine learning and associated methods were adopted very quickly in computational chemistry," she tells us. The insights gained through AI methods represent, for her, a fourth level of scientific knowledge gain: the empirical research, theoretical models and computer-aided methods of the 21st century are now followed by the ability to train neural networks from data and thus forge powerful tools for data analysis as well as prediction. Annika Bande heads the joint research group "Theory of Electron Dynamics and Spectroscopy" at Helmholtz-Zentrum Berlin and is a professor at the University of Hannover.

SPECIAL MODELS FOR RESEARCH

Foundation models are trained on massive and broad datasets, ready for later adaptation to specific jobs. They are far more powerful and more flexible than conventional AI models in a given niche. The Helmholtz Association is currently funding seven pilot

projects. Working groups at HZB are involved in two Helmholtz Foundation Models.

AI for new material combinations

One of the two pilot projects is SOL-AI, which aims to bring solar cell development to a whole new level. In cooperation with three other Helmholtz Centres, a foundation model is being established in SOL-AI for analysing and integrating starkly different datasets on photovoltaic materials. The goal is to develop new materials for solar cells, increase manufacturing process efficiency and ultimately accelerate the energy transition.

Eva Unger, one of the leading materials researchers in the field of perovskite solar cells, is involved in SOL-AI at HZB: “We are at the point where we really appreciate that transferring the heterogeneous data into a common database is no easy task,” she says. This is where Kevin Jablonka comes in, who is Head of the Carl-Zeiss Foundation Junior Group “Polymers in Energy Applications” at HIPOLE Jena. His research focuses on data-driven techniques that make materials development more systematic and thus more targeted. His contribution lies above all in the AI-driven integration of very dissimilar data – from atomic structures to production parameters – into SOL-AI. “In SOL-AI, we can develop entirely new AI approaches and combine them with materials research,” Jablonka says. “That is important for creating the basis for more sustainable solutions in photovoltaics.”

Predicting the behaviour of proteins

Proteins are the building blocks of life. Today, it is already possible to predict the three-dimensional structure of a protein with the help of AI. The PROFOUND project aims at overcoming a major hurdle that AI models are still facing: they are limited to static protein structures. In reality, however, proteins are like nanomachines that are constantly changing shape in order to do their biological work. PROFOUND will let us find out what shape changes they go through. PROFOUND will use large-scale molecular dynamics data to create an AI model that can predict these dynamic behaviours. This approach will make it possible to develop proteins that not only fulfil specific tasks, but also adapt over time like dynamic enzymes and programmable molecular machines.

■ BY ANTONIA RÖTGER

AI for all at HZB

In the Helmholtz Cloud, there are AI applications available for use by employees of all Helmholtz Centres. One example is Blablador, which is an application for analysing or creating texts. Blablador itself writes: “It is important that you use Blablador as a complement to human expertise and creativity, and not as a substitute for human decisions and review.”

It is just the same for the renowned language model ChatGPT. “In the IT department, we are planning workshops to see how we can use AI language models for simple enquiries to the Helpdesk, for example, or for improving search results in the Intranet,” says Danilo Seidler, Head of the Helpdesk at HZB.

So, always use language models with caution. They can occasionally make things up or make false connections. The person using the language model is always responsible for the content and for data protection.

https://helmholtz.cloud.de

Picture: Michael Setzpfandt

“We want to bring the people more strongly into focus.”

Petra Eisert has been Head of the People Operations department (A-PO) at HZB since March 2024. In the interview, she tells us what things she would especially like to get rolling.

What made you decide to take over the management of People Operations?

Petra Eisert: The working world is changing, and we want to be ready for it. For example, we have increasingly flexible work, employees with different cultural backgrounds and big differences between the generations. So, there are different expectations placed on us, as employers, and on the working conditions. From what I used to do at HZB, I got to know the needs and processes very well, and just somehow successively grew into the role of mover and shaker. The Board of Directors also gave me the chance to attend the Helmholtz Leadership Academy. There, I learned new methods and tools and got to network within the Helmholtz Association. As Head of A-PO, I can now get lots of projects rolling that are especially important to me.

What were the biggest challenges in the first months?

The whole Administration division has been going through organisational consulting for the last two years. This has resulted in a number of restructurings, including here in People Operations. We have conferred the responsibility for SAP and payroll matters to a new team, “Controlling & Services”. Another team, “Talents & Benefits”, is concentrating on the areas of personnel marketing, training, qualification, the School Lab, work-life balance and company onboarding management. With the new structure, we have taken an enormous workload off the people managers, meaning there is more time for consulting and discussion. We have gained and onboarded new employees in the past few months, so the new structure of A-PO will become properly robust. As of last autumn, our teams are nearly complete and are ready to take on new tasks.

What else has the assessment by the organisational consultants revealed?

In interviews and departmental meetings, we have reflected on our self-perception and identified needs for optimisation, both in our own department and regarding the needs internally to the center and at the interfaces. The transformation at A-PO is now focussing on the issues of digitalisation, interfaces, leadership and talent. We want to continue to place people strongly in the focus of our work, and design our processes in such a way that they do justice to the people in our organisation. This will require a change in mindset. Our digitalisation strategy is another important success factor in our transformation. Digital processes enable greater transparency and efficiency: we want to ensure that the far-reaching digitalisation of our processes allows everyone involved to see what stage a process is at and what the next steps are at any time. This also creates an understanding of the workflows. We also want to avoid efficiency losses due to media disruptions and duplicate data entries.

Projects like that can’t just be done on the side. How prepared is A-PO to tackle them?

We are well prepared thanks to the new structure. We now have the right people on board, who bring a wealth of expertise and fresh ideas with them. We are witnessing great motivation to tackle the projects on our roadmap and to optimise the processes. Nevertheless, it will be a great challenge to implement the projects we have set ourselves while continuing day-to-day operations. We

> “As an employer, we have many plus points we can advertise. We would like to make this better known.”
>
> **Petra Eisert**

have planned the involvement of key stakeholders in all projects, so I am confident that we will achieve good results together.

In times of a shortage of skilled labour and the retirement of baby boomers, how does this affect HZB and what measures is A-PO taking to attract qualified employees?

A-PO has been heavily involved in the joint creation of a talent management concept that will determine our future course and prepare us for the challenges of the future. We are thinking in terms of the phases “Get, Keep and Develop”. Filling key positions and transferring knowledge are important steps in ensuring a smooth transition and the transfer of knowledge across generations at HZB.

Employer Branding also plays a major part for us. The Board of Directors has set up an interdisciplinary working group under the leadership of Cathleen Strauch and Ina Helms, in which we are involved and whose results we will implement. There is also an Employer Branding campaign in the Helmholtz Association, which helps us as one of their Centres. As an employer, we have a lot of plus points we can advertise. We offer an exciting working environment, a secure job, opportunities for further training, an international atmosphere and lots of creative opportunities. We want to make this better known and increase our visibility on the job market.

232

Job advertisements edited in the last twelve months

Diversity is a goal at HZB, especially in the administrative and technical areas. How can diversity be increased?

Diversity is a core issue, and our aim is to appeal to as many different people as possible and to raise awareness of the value of diverse teams. Diversity is not a single measure, rather it’s something to consider in all activities. By the way, it is not enough just to recruit diversely. You also need to ensure that the jobs and tasks are set up to meet different needs.

AI is rapidly changing the working world. Are there plans in place to make employees fit in working with AI?

AI is also currently a topic of discussion in the Helmholtz Working Group “Human Resources” and is an integral part of the future plans. I see great potential for the use of AI, and we want to develop specific courses for this in our training programme. But, at the same time, the legal framework and ethical issues still need to be clarified. We are working on a common solution within the Helmholtz Association.

How can we promote dialogue on current topics at HZB?

For A-PO, I can say that we definitely want to strengthen the dialogue with employees. Recently, for example, we organised a “Lunch & Learn” event on the topic of “job descriptions”. That is more helpful than circulating long e-mails or explanations on the intranet. Such initiatives can promote communication within the center and generate new ideas. We need to think much more outside the box and work together on an interdisciplinary basis. To do this, each and every one of us has to be prepared to leave our own bubble.

Interviewed by Silvia Zerbe.

Picture: Kevin Fuchs

New radiotherapy: destroying cancer with even greater precision

The proton accelerator at the Wannsee site has been used successfully for over 25 years to treat specific eye tumours. More than 4,800 patients have benefited from the therapy so far. Now, the proton accelerator is opening up new possibilities for preclinical research: in November 2024, a 'Mini-Beamline for preclinical Experiments' (Minibee) was set up together with the University of the Federal Armed Forces in Munich. The Proton Therapy department developed the beam guidance and control system for this, while the University of the Federal Armed Forces installed a platform for image-guided irradiation of biological samples. Minibee can be used to investigate how changes in parameters and settings of the proton beam affect the treatment. In addition, innovative methods such as ultra-short proton pulses (FLASH therapy) or needle-fine beams (beamlets) are to be tested. The aim is to combat tumours even more effectively and to better protect healthy tissue. *(arö)*

Picture: Rasche, GenaU Netzwerk

20 YEARS OF THE SCHOOL LAB!

In November 2004, the School Lab was established on the Wannsee campus. Looking back, the idea proved to be visionary. Today, it is more important than ever to get children directly involved in science.

“We impart critical thinking”

For the 20th anniversary of the School Lab, we spoke with Ulrike Witte. She built the School Lab up in Adlershof in 2010 and has managed the location since.

20 years of the School Lab – is that a reason for you to celebrate personally, too?

Ulrike Witte: Definitely! It is more important than ever for us to have School Labs these days. We notice this in our work every day. In the last 20 years, we have had constant support from the Board of Directors at HZB – that’s reason enough to celebrate. We also have a great team, which fills the School Lab with life.

Why are School Labs so important?

Young people need to experiment in order to understand things. That starts when they are very small, and keeps going during school. Many children only know of experiments from YouTube videos, but have never conducted any of their own. It’s absurd. You don’t need expensive equipment or materials to experiment around. Unfortunately, schools often don’t have the time for good scientific teaching. That is where we come in, with the School Lab. In our upskilling programmes for teachers, we show that experimenting is not so difficult.

Each year, a lot of kids attend the School Lab. Have the interests and abilities of the children changed?

Yes, we observe that the manual skills of the children have declined in the most recent years. Many are amazingly adept with their thumbs – when typing on a smartphone, that is – but skill with a pair of scissors is often lacking. They find it difficult to do experiments because they are not used to just getting started. The kids are constantly surrounded by digital devices these days, which has an effect on their attention span. We respond to all that, of course.

Picture: Silvia Zerbe

“Many children only know of experiments from YouTube videos, but have never conducted any of their own.”

Ulrike Witte

How exactly do you respond to these changes?

We let every child work at their own pace. And we feel it is important that kids truly understand things, rather than just rushing through the prescribed quota. If the time runs out, or concentration starts to fade, we can always leave out a station here or there. We also take more breaks. Our advantage is that we don’t have to stick to a fixed curriculum. We can concentrate on a small selection of topics and adapt these properly to the target group – from the primary school classes to the advanced courses in physics.

How are the project days at the School Labs received?

In most cases, the kids leave our School Lab

feeling excited. It does happen that sometimes teachers will tell us later that the kids grumbled on the way to HZB, but also that they worked with such concentration that the teachers barely recognised them anymore. For us, the best thing is when we notice that our experiments are well received and that the enthusiasm catches on. Especially when the kids start thinking critically. In times of fake news and disinformation, it is especially important to foster this critical thinking.

What would you wish for, for the next 20 years?

I would wish to continue receiving so much support and to have enough staff. We would like to develop new project days – we have a lot of ideas in store. Also, we want to collaborate more closely with our researchers, so that we can bring their latest insights into our project days. At the moment, we unfortunately don't have the time for it, but that would be a dream.

Interviewed by Silvia Zerbe.

20 YEARS OF THE SCHOOL LAB IN FIGURES

130

employees since its founding

100

student interns

Picture: Nina Lemke

Picture: Silvia Zerbe

800+

teachers take part in the upskilling programmes.

38.000

visitors

FORMATS

- Project days
- One week of holiday for the kids
- Student internship
- Student workgroups
- Teacher upskilling
- "Jugend forscht" competition
- The Long Night of Science
- Girls' Day
- Day of Little Researchers

TOPICS

Picture: Stefanie Kodalle

- Solar energy
- Superconductivity
- Light & colours
- Interference & diffraction
- Energy conversion
- Magnetism
- Materials science

Picture: Silvia Zerbe

The School Lab celebrates its 20th anniversary. Dirk Lohmann (left) and Ulrike Witte (2nd from left) lead the team. They are supported by teachers, student assistants and employees absolving their gap year in science and technology (FJN).

"For us, the best thing is when we notice that our experiments are well received and that the enthusiasm catches on."

Ulrike Witte

Picture: Michael Setzpfandt

Tino Müller

Department Front Office and Helpdesk, Media Technology

Tino Müller was self-employed for 15 years as an event technician and worked as a master technician for video technology in the event branch before he came to HZB in 2022. Since then, among other things, he has installed new conference equipment at HZB and instructed the colleagues on how to use it.

What does a typical day look like?

Tino Müller: Usually, I first look to see what help tickets or emails have come in. Mostly, it's about giving instructions or quick support on the media equipment. But there are larger projects, too, such as re-equipping the auditorium. In those cases, we all deliberate on which acquisitions would make the most sense. I spend quite a lot of time preparing and supervising events. There are days when I get to the office, dump my bag in a corner in the morning and then spend the rest of the day on my feet.

What is the best thing about your job?

No day is like the other; there are lots of things that come in spontaneously, and so I often suddenly have to solve a new problem, just like that. I like this variety. It gives me a lot of contact with people. And I often learn something new, like recently at an introduction event for students in accelerator physics, for example: I was only there as emergency backup. Everything went well, and I got to listen in, and I found it totally fascinating!

What surprises have you had at HZB?

When I switched from self-employment to the public sector, I was afraid things would be somewhat more formal here. It surprised me that there are almost no barriers. It's a sympathetic environment. Maybe that has something to do with the fact that it's all about science here; it's its own culture.

If you could spend an evening with anyone, who would it be and what would you talk about?

The photographer Steve McCurry, who photographed the girl with the green eyes from Afghanistan. Everyone knows this picture. I'd love to spend an evening at a pub with him, and ask him all about how he got started: what was the first picture he took with his first camera?

Interviewed by Antonia Rötger.

Many employees ensure everything keeps running smoothly at HZB. In our series, we present the people of HZB, and would like in this way to say a big Thank You for their often invisible work!

CONGRATULATIONS


Picture: Oliver Bensch

ANNY MARIA GORA

wrote her master's thesis in accelerator physics at HZB. For this, she received the Berlin Physical Society Study Prize in July 2024. In December 2024, she was awarded the Lise Meitner Prize by the Friends of the Institute of Physics at Humboldt University Berlin.


Picture: private

SONAL PATEL

At the August 2024 SRI conference, Sonal Ramesh Patel's poster received a honourable mention from the Lightsources.org review team, in the category Science Communication Poster. Her poster deals with the topic 'FAIR data at BESSY II'.


Picture: private

DAVID MEIER

won third place at the Lightsources.org - Science Communication Poster Competition at the SRI conference in Hamburg with his poster on the parameters of the MeTRIX beamline.


Picture: private

IVO NISCHANG

(HIPOLE Jena) was honoured with the Cölfen Early Career Investigator Award for his contributions to analytical ultracentrifugation. The method is used to characterise polymers.


Picture: Nils Lucas

LEA ZIMMERMANN

The doctoral researcher from the Perovskite Tandem Solar Cells departement won a poster prize at the International Tandem PV Workshop in Amsterdam in July 2024.


Picture: private

KSENIIA VOLKOVA

has won an early career award at the workshop 'Single Molecule Spectroscopy and Super-resolution Microscopy' in October 2024. She is a doctoral researcher in the department 'Spins in Energy Conversion and Quantum Information Science'.

Picture: Nils Lucas

SOLARCITY AWARDS 2024 FOR FIVE HZB-SCIENTISTS

In the Solarcity competition, three doctoral theses by HZB-scientists were honoured: **Peter Tillmann** (formerly of the Solar Energy Optics departement) received 1st place, **Dorothee Menzel** (Tandem Solar Cells departement) was awarded 2nd place, and 3rd place went to **Marlene Sophie Härtel** (PVcomB). The category 'Bachelor's/Master's Theses', **Lea Zimmermann** was honoured with 1st place, **Nicolas Otto** received 2nd place. The awards were given to research with the potential to contribute to the solar transition in Berlin.

PERSONALIA

Picture: Kevin Fuchs

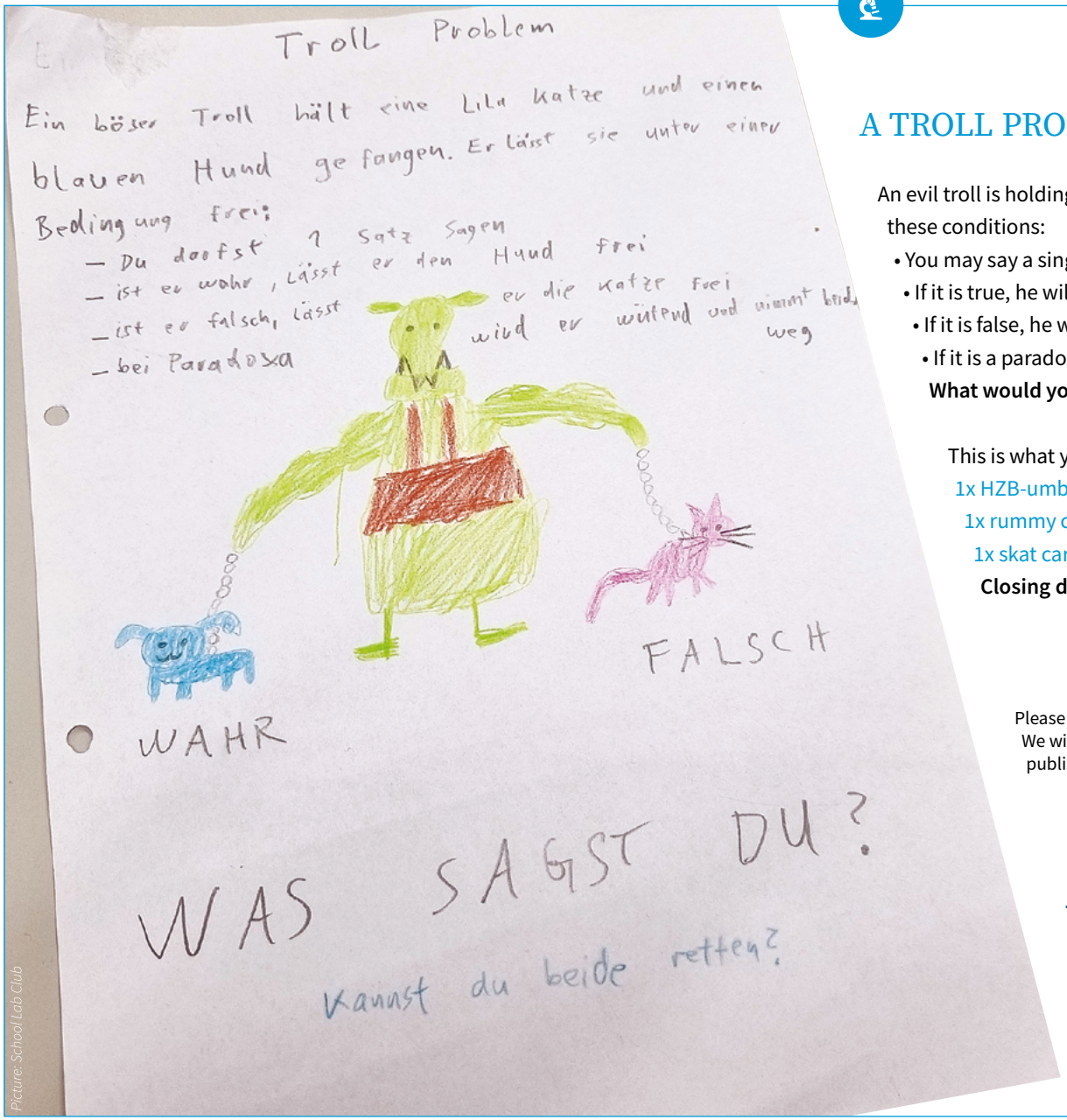
RUTGER SCHLATMANN

was re-elected as Chairman of the 'European Technology and Innovation Platform for Photovoltaics (ETIP PV)'. The committee advises on energy policy and the expansion of photovoltaics in Europe.

Picture: David Ausserhofer

BERND RECH

At the launch of the 8th Energy Research Programme, Federal Minister Robert Habeck appointed an expert advisory board of ten renowned specialists from science and industry who will advise the Federal Ministry for Economic Affairs and Climate Action (BMWK) on the management of the programme. Bernd Rech is also a member of the honorary committee. The focus is on which specific research objectives contribute to the energy transition.



Picture: School Lab Club

A TROLL PROBLEM

An evil troll is holding a purple cat and a blue dog captive. He will release them under these conditions:

- You may say a single sentence.
- If it is true, he will release the dog.
- If it is false, he will release the cat.
- If it is a paradox, he will get angry and take both away.

What would you say? Can you save both animals?

This is what you can win:

1x HZB-umbrella
1x rummy card set “Bright Minds”
1x skat card set “Bright Minds”

Closing date: 01.03.2025

Please send your solution by email to **lichtblick@helmholtz-berlin.de**.
We will notify the winners by email. By entering, you agree to your name being published in the next issue. There is no right of appeal.

THE WINNERS OF THE LAST ISSUE – THE DRAW HAS DECIDED:

1st place: Ana Palacios Saura
2nd place: Jan-Philipp Hoffknecht
3rd place: Marianne van der Merwe

RECIPE FROM
THE NETHERLANDS

Hete bliksem met spruitjes

Hot lightning with brussel sprouts by Kitty Hendricks


Picture: Kitty Hendricks

Ingredients for 4 persons
250 g brussel sprouts
4 onions
3 crisp-sweet apples
4 tbsp olive oil
1 kg slightly floury potato
4 (vegan) sausages
150 ml (vegan) milk

Eet smakelijk!

Preheat the oven to 200°C. Prepare the brussel sprouts by cleaning and halving them. Cut the onions into thin wedges. Core the apples and cut the flesh into 2 cm cubes. Arrange the brussel sprouts on one half of a baking tray lined with parchment paper. Spread the onions and diced apples over the other half and drizzle everything with ½ of the olive oil. Roast for approximately 30 minutes in the oven.
Meanwhile, peel the potatoes, cut them into equal pieces, and cook for 20 minutes until tender.
Heat the remaining olive oil in a frying pan over medium-high heat and cook the (vegan) sausages for 7-8 minutes, turning regularly.
Drain the potatoes, return them to the pan, and add the (vegan) milk. Mash with a potato masher until coarse. Stir in the roasted onions and apples, and season with pepper and optionally salt. Divide onto plates and top with the roasted brussel sprouts and the (vegan) sausages.

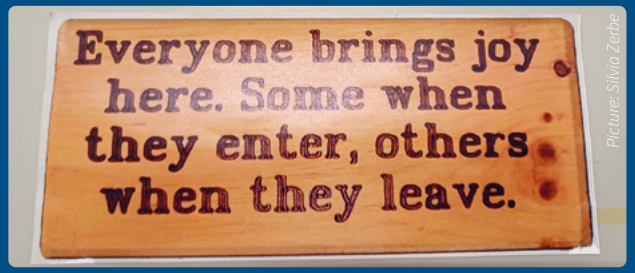

Picture: Silvia Zerbe

Kitty Hendricks
Group Young Talent Promotion

"I jumped into the Graduate Center in 2022 right after finishing my biophysics doctorate in Berlin. Now, I'm the main contact person for anyone doing their doctorate at HZB, making sure they are supported every step of the way. We are all about organising useful trainings and networking events to help doctoral researchers kickstart their careers."

Notes of HZB

True insights into human nature



Picture: Silvia Zerbe

Findspot: Wannsee

Fire door guards

Picture: Silvia Zerbe

Findspot: P-buidling Wannsee

What funny notes at HZB catch your eye?
Please send them to: lichtblick@helmholtz-berlin.de

The great void

Picture: Silvia Zerbe

Findspot: in the experimental hall at BESSY II

Good wishes

Findspot: in an office in the E-building in Wannsee