

# hermann

News from the Helmholtz Association



Dear Readers,



The debate regarding the future of the science system is in full swing. Politics and both university and non-university research institutions voice their opinions regarding challenges and

potential solutions to maintain successful research in Germany also in the future. The universities' central role in this is an undisputed fact. Yet so far, their funding purely depends on federal state budgets. A change to the German Basic Law, that is, the abolition of the co-operation ban, would allow the federal government to fund the universities on an institutional level. In particular after the suspension of tuition fees, this would help to ease their financial burden. Moreover, co-operation between universities and extramural research institutions equally benefiting all those involved would be much facilitated. What are the expectations and concerns on part of the universities with respect to the Helmholtz Association and the other extramural research organisations: this is the question we intend to discuss within our new event series "Helmholtz&Uni", starting at the beginning of May at the Goethe University in Frankfurt.

*Yours faithfully, Jürgen Mlynek, President*

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## A Robot with Feeling

*The human being is its model. It has strong legs, slightly thinner arms, but as yet no face: the walking robot TORO of the German Aerospace Center (DLR). Its creator is Christian Ott, a doctor of engineering, who has set himself the goal of teaching TORO how to walk - step by step. In more precise terms, the aim is the art of "flexible walking".*

Mastering this is prerequisite to the robot's ability to move along in unknown territory. If TORO was to fall over at every impact instead of absorbing them, the engineer's ambitious goal would remain unattainable: one day, humanoid robots are intended to be employed in the service provision sector as well as for performing dangerous tasks, for example, in disaster zones. Present day robots usually have a stiff walk and move only in well known environments. Owing to the efforts of Christian Ott and his team, TORO, however, becomes increasingly sensitive and approximates the human way of walking more and more. Since December 2011, Ott heads the Helmholtz Young Investigators Group "Dynamic Control of Legged Humanoid Robots" at the DLR-Institute of Robotics and Mechatronics in Oberpfaffenhofen.

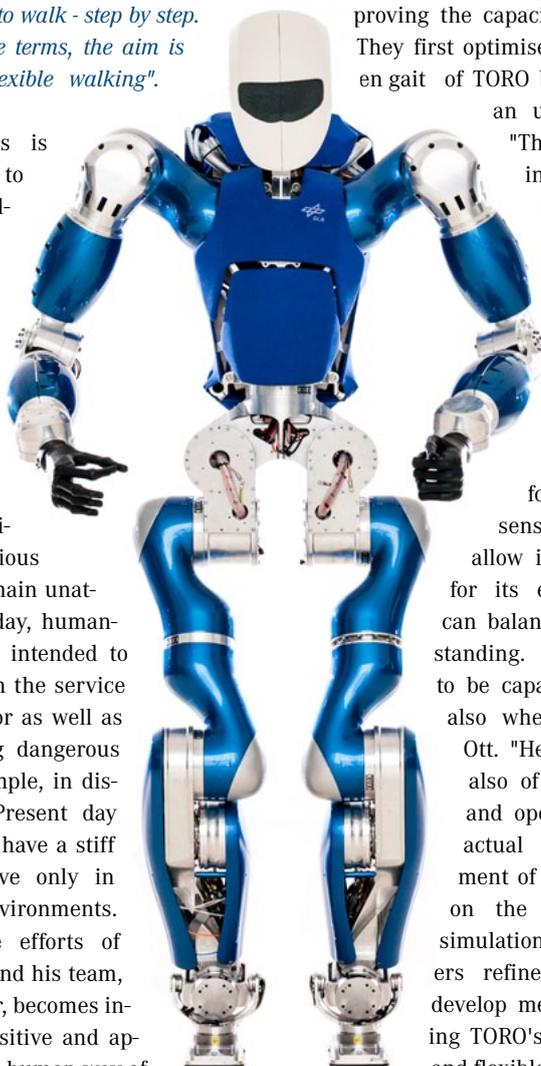


Photo: DLR (CC-BY 3.0)

Yet his endeavours with TORO date back to an earlier time: Ott began his work in 2009 with the model of an arm which he evolved into a walking apparatus - without an upper body and shoulders attached to the hip. Ott and his team focus on improving the capacity of ambulation. They first optimised the power-driven gait of TORO before they added an upper body to it.

"This enables him to interact more with his environment", says Ott. Driven by a computer-controlled signal, TORO starts walking. Sensors in its feet measure the forces of each tread, sensors in the joints allow it to get a feeling for its environment. "He can balance impacts whilst standing. In future, he is to be capable of doing this also when walking", says Ott. "He is to be capable also of navigating stairs and opening doors." The actual further development of TORO takes place on the computer: using simulations, the researchers refine algorithms and develop methods for rendering TORO's gait more robust and flexible. In the long term, the DLR researchers intend to further adapt their walking apparatuses to emulate humans even more, for instance, by imitating sinews. This is to enable future generations of robots to walk faster whilst requiring less energy.

## In Brief

### Higgs Increasingly Likely

It turns out to be increasingly probable that the elementary particle discovered in the past year is indeed the predicted Higgs boson. This is the result of new investigations conducted with the Large Hadron Collider particle accelerator at CERN under participation of the Deutsches Elektronen-Synchrotron DESY. However, further research is required to clarify whether the Higgs boson actually corresponds to the standard model of particle physics or to a different theory. The new particle can be created in high energy collisions, yet this happens only very rarely. This makes researching it particularly time-consuming and research is likely to continue for many years to come.

### Hydrogen Generation without CO<sub>2</sub> Emissions

The Karlsruhe Institute of Technology (KIT) is a partner in a seminal project aiming at CO<sub>2</sub>-free hydrogen generation out of methane. Hydrogen is excellent for storing and transporting energy, yet so far its generation entails the emission of the greenhouse gas CO<sub>2</sub>. A so-called liquid metal bubble column reactor is scheduled to be built in the coming months. It is a column containing liquid metal, which can be heated to up to 1,000 degrees Celsius. When methane is injected, the gas rises and the high temperature causes it to disaggregate into its components hydrogen and carbon.

### Smartphone App Allergy Study

The free "e-symptomes" app is an extension of the allergy study conducted in the context of the EU research project HIALINE, headed by Prof. Jeroen Buters from the Helmholtz Zentrum München. People suffering from allergies and asthma can daily enter their symptoms in an electronic diary. It generates a statistical analysis and every patient receives a personal evaluation. The data is processed anonymised; a PIN function in the app protects the personal data. The broad scope of the study centres around the connection between the amount of pollen, the release of allergens and the symptoms caused. The study aims to significantly improve the prediction of symptoms.



The Goethe University in Frankfurt is the first stop of Helmholtz&Uni. Photo: Goethe University Frankfurt

## Helmholtz in Discussion with Universities

*With "Helmholtz&Uni", the Helmholtz Association establishes a country-wide series of events at and with universities. The main purpose is to listen to what the universities expect from their partners, says Jürgen Mlynek.*

### What do you want to achieve with this new series of events?

**Mlynek:** For me, working together with the universities on eye level is a particularly important goal of Helmholtz – in research projects, in strategic cooperation projects and in fostering the next generation of scientists. Yet we also have to acknowledge that our size and our plans to adopt more responsibility within the science system cause fears and criticism in some quarters. We intend to face and own up to this reality.

**You speak of fears and criticism. The "Helmholtz 2020" strategy paper, in which the Association in the past year has publicly reflected on its future role within the science system, was called "Hubris 2020"; the President of the German Association of University Professors and Lecturers, Bernhard Kempen, repeatedly issued warnings regarding a "Helmholtzification" of the universities. Justifiably so?**

**Mlynek:** Certainly not! However, the fact that others, a minority, by the way, admonish us in such a manner shows that we need to provide even more in the way of explanation. In particular, it shows that we need to listen to what the universities expect from their extramural partners. I believe: if we enter into an open dialogue with each other, many misunderstandings will resolve themselves automatically. In our everyday work we have already established this dialogue long since.

### So "Helmholtz 2020" is yesterday's news?

**Mlynek:** Quite the contrary: this is precisely what "Helmholtz 2020" is about. The often forgotten subtitle of our strategy paper reads "Shaping the Future Through Partnership". We intend to take this partnership on eye level very seriously. For example, by a discussion format such as Helmholtz&Uni.

### What will your main message be in this format?

**Mlynek:** First and foremost, of course, the signal that we want to openly discuss and listen. That by no means we know everything better. The universities have their specific key areas of research, we have ours. Helmholtz stands for safeguarding national research interests. Here, we are aware of our responsibility to assume the role of co-ordinator in fields that we feel are within our competence. To this end, we search for partners who want to launch joint projects with us. Conversely, we are also glad to accept the role as junior partner, if the universities or other research organisations take the initiative in their fields of expertise.

### And what happens after the debate? What do you do with the expectations you are presented with?

**Mlynek:** We take them seriously. After every event we will compile a report and place the core results at the disposal of our assembly of members, in which all 18 Helmholtz centres are represented.

### When and where does Helmholtz&Uni start?

**Mlynek:** We start on 6th May at the Frankfurt University, from where we will move on to the University of Cologne. We aim to have at least four events per year.

*The interview was conducted by J-M Wiarda.*



Retention reservoir of a water supply works. Photo: André Künzelmann/UFZ

## Medication Contaminates our Water

*Owing to medical progress and improved sustenance, humans live increasingly longer lives. One aspect that tends to be neglected in this context is the effect this social change has on the quality of our water. Older people tend to consume more medication. By excretion and improper disposal, the active agents end up in waste water as well as in surface and drinking water.*

Our body is unable to decompose many kinds of medication and sewage plants often fail to filter out these substances. Rolf Altenburger, ecotoxicologist at the Helmholtz Centre for Environmental Research – UFZ, identifies the problem: "We are in the process of producing a new category of environmentally stable chemicals." In the case of many of these active agents, the researchers as yet do not know whether these may cause damage to the environment. The painkiller diclofenac, however, has already revealed a negative impact: in Pakistan, it was released into the environment, causing large numbers of vultures to die of kidney failure. It can also cause damage to the kidneys of fish. The EU therefore now put diclofenac on the list of pollutants that are to be controlled in EU water bodies. Yet diclofenac is only one of thousands of chemicals used in large amounts.

Rolf Altenburger employs a combination of biological and chemical procedures: with his working group, he first examines potential damaging effects of samples from the environment by using biological reactions in fish eggs and green algae. The researchers then identify the pollutants by way of chemical analysis techniques. However, the complex chemical structures of pharmaceuticals render classical instruments of environmental

analysis inapplicable. For example, in the case of certain drugs, the effects can be determined only after sustained periods of effectiveness. This includes hormones from contraceptives, which influenced the sexual maturity of fish in European water bodies and led to feminisation of fish populations. Although the scientists focus in particular on the effects on the environment and less on the effects on humans, there are methods combining both human toxicology and ecotoxicology: for instance, the researchers investigate whether the receptors a drug is designed to react to exist also in fish. By observing the fish, they can assess whether active agents in the water cause undesired or unexpected effects.

New technologies are required also in the field of waste water treatment. Polymer researchers from the Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research now have developed dual switchable membranes that, depending on the size of their pores, filter out of the water different biomolecules, such as hormones, proteins and genetic material.

By contrast, a project at the UFZ envisions the use of catalytically active nanoparticles absorbing the active agents in the water. The nanoparticles first are magnetised so that after the filtering process they can be fished out of the water again with the help of a magnet. Additional cleansing processes could be applied also directly where active agents enter into the water, for example, at hospitals. "Of course, the most cost-efficient method would be to find structures that are biocompatible in themselves", adds Altenburger, "but especially in the case of pharmaceuticals this is as yet not even remotely a criterion."

### Bundestag Relies on Helmholtz

As of August 2013, the Helmholtz Association will be represented at the Office of Technology Assessment at the German Bundestag (TAB) with two of its centres. This is the result of a vote amongst members of the Bundestag. The vote confirmed the Institute for Technology Assessment and Systems Analysis (ITAS) at the Karlsruhe Institute of Technology as the main protagonist; the Helmholtz Centre for Environmental Research was added as a new partner. The TAB analyses the consequences of new scientific-technical developments, the opportunities they may offer and what framework conditions are available or need to be created for successful implementation.

### Against Scientific Misdemeanour

For the first time, in March, all "Ombudsmen for Safeguarding Good Scientific Practice" from the 18 Helmholtz centres have met to exchange experiences and to further develop the standards of their work. They are contact persons in the event of scientific misdemeanour, for example, in the event of suspicion of data falsification, theft of ideas and the ignoring of authorship. At the meeting, Prof. Wolfgang Löwer, Spokesman of the "Ombudsman für die Wissenschaft" (Ombudsman for Science), provided valuable tips. This independent body was instituted by the German Research Foundation (DFG) and is there for all scientists in Germany for all questions pertaining to good scientific practice.

### Germany Collects Time for Little Scientists

Children need time to make discoveries, so they can develop their curiosity, interests and talents from the very start. Therefore, in the context of the "Little Scientists' Day" 2013, the foundation "Haus der kleinen Forscher" ("Little Scientists' House") calls upon Germany to give children as much time for research as possible and thus to support improved opportunities for education. Everyone can join by taking children on a joint journey of exploration. Tips for expeditions are available on the website. Please make sure to also enter into the time meter the time you have "given": [www.haus-der-kleinen-forscher.de/zeit-schenken](http://www.haus-der-kleinen-forscher.de/zeit-schenken). Every single moment counts!

## Awards

Prof. **Stefan Pfister**, molecular biologist at the German Cancer Research Center and pediatrician at the University Hospital Heidelberg, has been honoured with the translational part of the German Cancer Award. He has discovered changes in the genome of malign brain tumours in children. This discovery may provide approaches for developing new forms of medication. The award is endowed with 7,500 Euro.

Prof. **Gabriele Multhoff** from the Helmholtz Zentrum München and Dr Daniela Schilling from the Clinic for Radiation Therapy at the TU Munich are the joint recipients of funding from the Wilhelm Sander Foundation totalling 190,000 Euro. The scientists intend to use new approaches to treatment for improving the success rate of curing tumour diseases with radiation therapy.

Dr **James Poulet**, neuroscientist at the Max Delbrück Center for Molecular Medicine (MDC) was awarded the Paul Ehrlich and Ludwig Darmstaedter Young Academics Prize. The award endowed with 60,000 Euro is given in recognition of Poulet's research regarding the brain's influence on behaviour. Moreover, his work on the activity of certain brain regions is of fundamental significance for the development of artificial joints and prostheses.

The Institute of Coastal Research at the Helmholtz-Zentrum Geesthacht has produced two excellent doctoral theses: The Gesellschaft Deutscher Chemiker (Association of German Chemists) awarded Dr **Mechthild Grebe** the A.M.S.El. prize, endowed with 1,500 Euro, for her analysis of a protein in the blood of seals. Dr **Oliver Krüger** was awarded the sponsorship award by the Reinhard Süring Foundation for his research on evaluating the past storm climate. The award is endowed with 1,000 Euro.

## Withdrawal from Oil Sand Research?

*In the course of the past weeks, the Helmholtz Alberta Initiative (HAI) has repeatedly made headlines in the media. There was talk about a complete withdrawal of the Helmholtz Association from the German-Canadian co-operation project. What is the truth behind the headlines? We provide answers.*

### Is the Helmholtz Alberta Initiative at an end?

No. The partnership with the well-respected University of Alberta in Edmonton will continue. Only the industrial oil sand research in the HAI context will be suspended. As it were, this was only a small part of the German contribution to the co-operation. At the same time, however, co-operation in other fields will be extended. The aim is to ensure that HAI has a long term perspective.

### Why does the Helmholtz Association pull out of oil sand research?

Our oil sand research aimed at bundling the scientific expertise of both partners for the benefit of sustainable and environmentally friendly energy generation. Energy generation comprised both renewable and conventional energy sources. The reclamation of land, research on new methods for waste water treatment and environmentally friendly refinement processes for this raw material – these were all goals of oil sand-related research.

The progress in doing so was remarkable. But in Europe and in particular in Germany the debate regarding climate change and energy transition has further intensified, causing a distorted image of the German-Canadian research activities: HAI has never intended to mine and process oil sand.

### What are the key research areas HAI will concentrate on after its withdrawal from oil sand-related research?

The scientific co-operation with the University of Alberta can be continued in all research fields, since research in the HAI range of topics is wide-ranging and thus can be continued also without any reference to oil sand. Topics such as geothermics, membrane technologies, geological storage of carbon dioxide and research on initial ecosystem development have formed the core of HAI activities ever since the initiative was established. They all are now being further extended.

Additional expansion plans exist in the field of remote sensing and environmental monitoring. It is intended to include also research on mineral resources. Last but not least, health will also become an important aspect of our co-operation. Here, joint projects in the fields of infection research and neurodegenerative diseases are in the process of being prepared.

*Janine Tychsen*

The managing director of the KIT Institute of Nanotechnology, Prof. **Horst Hahn**, was awarded the Robert Franklin Mehl Award. The award honours outstanding insights in the field of materials science, which are considered milestones in the individual sub-disciplines. Since

its first bestowal in 1922, Hahn is only the sixth German recipient of the award. He is internationally regarded as a pioneer in the study of so-called nano-crystalline materials, which enabled the production of materials with entirely new, consciously created characteristics.

## Imprint

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