

Newsletter

RESEARCH

Biology

Interaction of different yeast species allows bio-economic detection of pharmaceutical residues

the In cooperative project "Implementation of a yeast pheromone-based signal amplifier system for environmental monitoring of pharmaceutical residues in water" (acronym: ISAr), the scientists of the Biological Sensor-Actor Systems group headed by Dr Kai Ostermann work together with the Kurt Schwabe Institut für Mess- und Sensortechnik Meinsberg e.V. (KSI Meinsberg e.V.) in order to develop a sustainable and low budget yeast cell-based sensor for the detection of diclofenac in environmentally relevant concentrations in soil and wastewater. The detector is based on immobilized yeast cells in a suitable technical readout device and is intended to be used as a rapid, on-site alternative to the existing rather expensive laboratory diagnostic methods. The project is funded by the Free State of Saxony and the European funding project EFRE. Read more on the project ISAr

Chemistry & Food Chemistry Cyanobacteria: Small Candidates as Great Hopes for Medicine and Biotechnology

At the Chair of Technical Biochemistry, the researchers will focus on some of the oldest of such little superheroes: cyanobacteria. There are about 2000 species of cyanobacteria and many of these species have been poorly researched. Dr Paul D'Agostino, Professor Tobias Gulder and their team – including cooperation partners Dr. Michelle Gehringer (TU Kaiserslautern), Dr. Michael Lakatos and Dr. Patrick Jung (both Hochschule Kaiserslautern) – hope that unusual cyanobacteria will yield promising Issue 1 - 2021

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results and make an innovative contribution to bioeconomy. In order to unlock the genetic potential of unusual cyanobacteria for the production of new active agents and to explore the potential for applications in biotechnology, the team has been awarded a competitive whole-genome sequencing grant from the Joint Genome Institute (JGI) in the USA. <u>Learn more</u> <u>on the cynobacteria project</u>

Blue phosphorus: How a semiconductor becomes a metal



Blue phosphorus, an atomically thin synthetic semiconductor, becomes metallic as soon as it is converted into a double layer. This has been discovered by an interdisciplinary team led by Prof Thomas Heine from TU Dresden and Prof Gabriel Merino from the Mexican research institute Cinvestav Merida. The scientists are first to describe the possibility of constructing nanoscale, highly efficient transistors consisting of only one element. The results of these investigations were published as highlight article in the journal "Physical Review Letters". Read more on the project "Blue phosphorus"

Microswimmers move like moths to the light

The Freigeist group led by chemist Dr Juliane Simmchen has studied an impressive behavior of synthetic microswimmers: as soon as the photocatalytic particles leave an illuminated zone, they flip independently and swim back into the light. This promising observation and its analysis was recently published in the scientific journal "Soft Matter" as an "Emerging Investigator" article. First author Lukas Niese and Dr Simmchen were able to show that as long as the particles are active in the light, their swimming direction is stabilized by a combination of physicochemical effects. As soon as the particles are no longer exposed to light, there is no energy conversion and the direction of movement is no longer stable. "In this case," explains Lukas Niese, "the natural thermal movement (Brownian Motion) sets in. This causes the particles to virtually flip, and then

they swim back into the exposed area." <u>Read more on the move-</u> <u>ment of microswimmers</u>

ERC-PoC Grant for Prof Stefan Kaskel

Chemist Prof Stefan Kaskel has been awarded an ERC Proof of Concept (PoC) grant to explore the design and understanding of dynamic porous materials, which can adapt their pore size depending on the environment. In particular, the responsiveness towards gases is potentially essential for gas storage, separation and sensors. The PoC DynaDIFF will develop an innovative analysis tool for the discovery of responsive porous materials.

Physics Understanding the power of our Sun

he Borexino collaboration, in which also scientists from TU Dresden are involved, has succeeded after more than 80 years in experimentally confirming the Bethe-Weizsäcker cycle. For the first time, the international team was able to directly observe neutrinos from this cycle (CNO neutrinos) with the Borexino detector in the Laboratori Nazionali in the Gran Sasso Massif (Italy). This milestone represents the fulfilment of a long-cherished scientific dream for the Dresden neutrino researcher Prof Kai Zuber and his team at the Institute of Nuclear and Particle Physics: "Actually, I have now achieved everything I had imagined and hoped for. I (almost) no longer believe in great new discoveries in solar neutrino research for the rest of my lifetime. However, I would like to continue working on the optimization of the experiments, in which the Felsenkeller accelerator here in Dresden plays an extremely important role. For sure, we will be able to have even more precise measurements of the Sun in the future." Read more on the CNO neutrino detection

<u>Black holes made from semi-</u> metals

Dr. Tobias Meng, an early career research team leader in the Cluster of Excellence ct.qmat - Complexity and Topology in Quantum Matter, launches the three-year research project TOPREL connecting the physics of semimetals to the theory of black holes. One of the central goals is to control the flow of electrons in these materials so precisely that new types of quantum sensors can be developed. The project is an international collaboration of researcher from TU Dresden and the University of Luxembourg, and has just received funding of roughly one million Euros. Read more on the **TOPREL** project

<u>Reducing traps increases per-</u> <u>formance of organic photode-</u> <u>tectors</u>



Organic photodetectors (OPDs) have a huge potential for applications in low-cost imaging, health monitoring and near infrared sensing. Yet, before industrially realizing these applications, the performance of these devices still needs to be improved. Physicists at the Dresden Integrated Center for Applied Physics and Photonic Materials (IAPP) discovered that trap states rule the performance of organic photodetectors, ultimately limiting their detectivity. "The newly discovered relation does only clarify the operation of OPDs but gives guidance for further research in the field," states first author Jonas Kublitski. Read more on the research of OPDs

Psychology We hear what we expect to hear



Humans depend on their senses to perceive the world, themselves and each other. Despite senses being the only window to the outside world, people do rarely question how faithfully they represent the external physical reality. During the last 20 years, neuroscience research has revealed that the cerebral cortex constantly generates predictions on what will happen next, and that neurons in charge of sensory processing only encode the difference between our predictions and the actual reality.

A team of neuroscientists of TU Dresden headed by Prof Katharina von Kriegstein presents new findings that show that not only the cerebral cortex, but the entire auditory pathway, represents sounds according to prior expectations. Their findings have now been published in the renowned scientific journal eLife. Read more on the neuroscientific study of the auditory pathway

<u>Strengthening mental health</u> <u>via app</u>

As part of the TUDo! project, researchers from the Chair of Clinical Psychology and E-Mental-Health have developed an online training program based on empirical findings dealing with the topics of stress management and relaxation, sleep, nutrition, alcohol consumption, exercise, self-esteem, perfectionism, social competence, emotion regulation and problem-solving skills. Each module consists of several small chapters and is designed with information texts, examples, videos and exercises. The time required for each module depends on your own interests and needs. <u>Read</u> <u>more on the TUDo! online training</u>

PRIZES AND AWARDS Dresden Promotionspreis Physik awarded for the second time

Dresdner Promotionspreis Physik



On 5 January 2021, the Dresden Promotionspreis (Doctoral Prize) Physik was awarded for the second time. Therewith, the two laureates, Dr Urban Seifert and Dr Ruben Verresen, are honored for their outstanding research work in the context of their doctoral theses in physics at TU Dresden. The prize, which is endowed with a total of 4,000 euros, is funded by the Wilhelm and Else Heraeus Foundation. <u>Read more on the 2. Dresden Promotionspreis Physik</u>

<u>New plant species from Amazonia region named after botanist</u> <u>Stefan Wanke</u>

Researchers at the Chair of Botany at TU Dresden have intensively studied the plant family of pipevines (Aristolochiaceae) for over 20 years. The Dresden scientists are among the few specialists for these plants worldwide and have published significant papers on the evolution and biology of this group. By investigating the plant family, the botanists want to help develop protective measures for particularly endangered species. Aristolochia wankeana is the name of a recently discovered new pipevine species from French Guyana,

named after the Dresden botanist Prof. Dr. Stefan Wanke.

Together with *Aristolochia neinhuisii*, the new species is now already the second one, which honors a Dresden researcher with its name. <u>Read more on the new</u> <u>pipevine species</u>

Commerzbank prizes for Dr Magdalena Wekenborg and Dr Simon Krause

On 6 November 2020, the Commerzbank Dissertation prizes2019 and the Dr.-Walter-Seipp Prize of the Commerzbank Foundation were awarded by the Rector. The winner of the Dr. Walter Seipp Prize, which is endowed with 4,000 euros, is Dr Magdalena Wekenborg. In her thesis entitled "When the heart burns out: the predictive power of repeated heart rate variability measurements for the development and pathogenesis of burn-out", the psychologist investigated the psychophysiological basis of burnout symptoms. The work was supervised by Prof Clemens Kirschbaum.



One of the Commerzbank dissertation prizes, endowed with 1,000 euros, was awarded to chemist Dr. Simon Krause for his work on "Negative Gas Adsorption of Flexible Metal-Organic Frameworks", under the supervision of Prof Stefan Kaskel.

Awarding of the OSIP Open Science Award 2020

The Open Science Initiative of the Faculty of Psychology (OSIP) at TU Dresden, which has been in existence since August 2018, is dedicated to promoting the exchange of open research methods among scientists and the implementation of these methods in everyday research.

On 21 October, the OSIP, with the support of the Faculty of Psychology, presented the OSIP Open Science Award for the first time. The award was given to three research papers that demonstrate an exemplary implementation of open science methods in their work.

The award is endowed with 500 Euro each, which can be used for future research purposes at the TU Dresden. The award winners are Dr. Anne Gärtner, Dr. Denise Dörfel and M.Sc. Christoph Scheffel for their work "Resting state cortico-limbic functional connectivity and dispositional use of emotion regulation strategies: A replication and extension study"; B. Sc. Anne Wiedenroth for her work on "Primacy Effects in Interpersonal Perception"; and M.Sc. Nicolas Ramer for his work on "The role of task similarity for ego depletion.

SERVICE

Terminal server offers "virtual computer pool" for online teaching

Due to the Corona-related changeover to online teaching, the IT Competence and Service Center of the School of Science has set up a comfortable IT infrastructure for all teachers and students.

The Linux terminal server allows access to frequently used, licensed, but also free software for all members of TU Dresden - easily, quickly and from anywhere.

More information and access to the terminal server

RETROSPECT

Online info event "Studying abroad in times of Corona"

On 27 January 27 2021, the School of Science organized an information event on the topic of inter-

national student exchange programmes for the fourth time in a row. The current Corona crisis poses particular challenges for all those involved in this undertaking. About 90 students attended the presentations of the International Office and the Leonardo Büro Sachsen to inform themselves about the current possibilities. The Erasmus coordinators of the faculties and the ZLSB then offered the opportunity to clarify individual questions in breakout rooms. The event was presented by Maria Richter-Babekoff, the International Affairs Advisor. On the website of the event you can find several experience reports of Erasmus students.

A heartfelt thank you to everyone involved.

RECOMMENDED READING

At this point, we would like to present selected contributions by our scientists that go beyond research publications and appeal to a broad readership.

[German only]: "Unterricht Physik" by Friedrich-Verlag, Band 180: Teilchenphysik

Elementary particles - a topic that fascinates many people. Questions about the whence and whither of the universe and about the elementary building blocks and interactions of matter are the driving force behind elaborate experiments that require the international collaboration of thousands of scientists.

This booklet gives you an insight into the world of elementary particles and their principles, the Standard Model, and aims to provide suggestions for presenting this in the classroom. Among other things, a model accelerator for reconstruction is described, the handling of digital data of astroparticle physics is shown, a game for the Standard Model is presented and last, but not least, an insight into the Feynmand diagrams is given.

The basic articles are written by Prof Gesche Pospiech and Prof Michael Kobel, the other authors are many current or former active members of the Netzwerk Teilchenwelt. <u>Link to the Friedrich-Verlag</u>

[German only]: What connects Harry Potter with bed bugs

In the January issue of *Das Magazin*, Prof Klaus Reinhardt publishes a guest article about his former British colleague Richard Naylor, for whom he traveled to England, where he finds himself in the traces of Harry Potter. Richard Naylor owns a worldwide unique company - CimexStore - with which he ships up to 100,000 bed bugs a year around the world.

"If there's ever a blood shortage, I'll offer myself" by Klaus Reinhardt, published in *Das Magazin*, January 2021, print only.

PODCAST

[German only] OFP Podcast -Hör rein in die Praxis!



In the podcast of the Orientation Platform Research & Practice (OFP), Christina Schulz, OFP coordinator of the School of Science, talks to experts from various scientific disciplines, but also from service institutions of TU Dresden. The podcast is primarily aimed at students giving them an insight into professional practice. A new episode is released on the 15th of each month during the lecture period.

All podcasts on the OFP-website

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Contact: Nicole.Gierig@tu-dresden.de, Tel. 0351 463 39504