TECHNISCHE UNIVERSITÄT DRESDEN

DRESDEN concept

EXCELLENCE NEWSLETTER

5TH OCTOBER 2020

TUD 2028 – SYNERGY AND BEYOND

EXCELLENCE AND RESEARCH CLUSTER

Dear Readers,

The DRESDEN-concept research alliance will celebrate its 10th anniversary in October. Membership has more than doubled since its inception, demonstrating once again the importance of this unique network of Dresden's research and cultural institutions. This special alliance also contributed significantly to TU Dresden winning the University of Excellence status. We send our congratulations to the DRESDEN-concept team and wish them the best of success for the future.

Besides the latest updates from DRESDEN-concept, the newsletter again features reports on impressive research findings and fascinating events, as well as on extraordinary competitions.

The editorial team of the Excellence Newsletter can be contacted by email: exzellenz@tu-dresden.de. We look forward to your questions, suggestions and comments. You are also welcome to recommend the newsletter, which can be subscribed to with just a few clicks.

TUD 2028 – SYNERGY AND BEYOND

10 years of DRESDEN-concept – a reason to celebrate!

When 15 Dresden research and cultural institutions founded the DRESDEN-concept association in August 2010, the success of today's exemplary alliance was not yet foreseeable: over time, though, collaboration between the partner institutions intensified, infrastructures were shared and increasing numbers of joint research projects were brought to a successful conclusion. This unique form of networking across institutional boundaries received special commendation when TU Dresden applied to join the Excellence Initiative/Excellence Strategy and made a significant contribution to it winning the University of Excellence status.

The association now has 32 partners, virtually all of the research institutions and research museums in Dresden. Invited guests will gather in the Deutsches Hygiene Museum on 10th October 2020 to hail their shared success during the 10th anniversary celebrations of the DRESDEN-concept alliance.

Opening of the DRESDEN-concept Science Exhibition

Climate change, demographic transition, pandemics and megacities are just a few of the major challenges facing our society. The "How will we live in the future?" exhibition by DRESDEN-concept showcases current collaborative research projects and innovations by Dresden scientists in the research fields of digitisation, living, climate & water, mobility, material and cultural heritage.

The exhibition opens in front of the Kulturpalast Dresden at 1:30 pm on 10th October 2020. Online registration is possible. ↗ More

New edition: Guide for newly appointed professors

The guide for newly appointed professors was first published in early 2018. It is now available in a completely revised, new edition. Not only does it provide new appointees with a compact introduction to important issues and relevant contacts, it is also a practical reference work for dean's offices and directorates. Professors appointed since 1st January 2020 will soon be issued with a printed copy. The guide is currently available as a PDF document (English coming soon) under "Starting Work" on the web pages of the Appointment Team. ↗ More

Event series "Diversity in Dialogue"

TU Dresden has introduced innovative dialogue and participation formats to foster exchange with civil society and to highlight current interdisciplinary topics. The "TU Dresden in Dialogue" seeks to implement this concern as part of the Excellence Strategy. It creates space and interaction to share knowledge based on open communication, both inside and outside the university. As an interface between science, society, business, and politics, "TU Dresden in Dialogue" provides an easily accessible platform to share views among equals. ↗ More

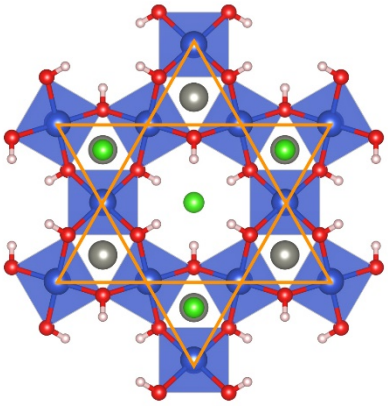
"Diversity in Dialogue" is the new event series at TU Dresden. Together with a variety of collaboration partners from civil society, it will engage with a broad audience from Saxony to discuss migration issues in autumn/winter 2020. Featuring a range of different formats, including an art workshop, digital readings and panel discussions, the individual events will seek to develop and discuss fresh perspectives on relevant topics for a culturally diverse society based on current research findings and practical experience.

The event series is organised by the School of Humanities and Social Sciences (including the Centre for Integration Studies) and the School of Science at TU Dresden, as well as by two extramural parties: anDemos – Institut für angewandte Demokratie- und Sozialforschung e.V. and Kulturbüro Sachsen e.V. ↗ More

EXCELLENCE AND RESEARCH CLUSTER

Quantum honey from black holes

Researchers from the Cluster of Excellence Complexity and Topology in Quantum Matter (ct.qmat) have proposed a new quantum material in which electrons move like a viscous fluid – a kind of quantum honey. These particles behave that way because they have much stronger bonds than previously known. The effect will be three times stronger than the "miracle material" graphene, provided it can be produced in sufficient purity. Due to its low resistance, this electron fluid might open up new perspectives for microelectronics and storage media. In addition, magnetic fields can be activated and deactivated precisely due to vortex formation in this fluid. These results were published in the scientific journal Nature Communications.

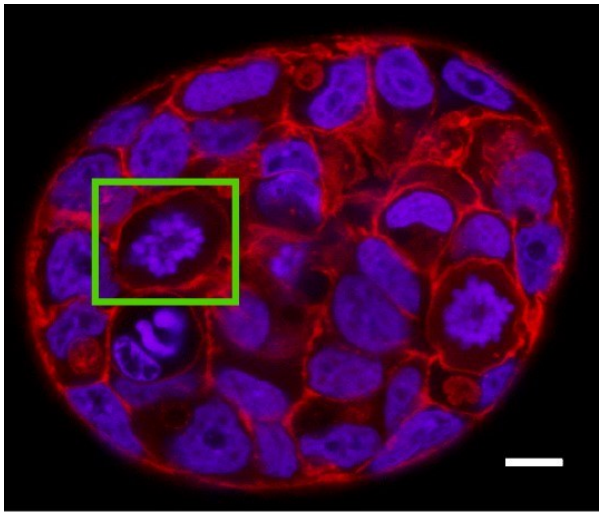


This insight had not been possible until the scientists combined the previously separate theories of quantum gravity and solid state physics. To do this, the physicists equated the temperature of black holes (Hawking temperature) with the temperature of electrons in the quantum material. This enabled a specific prediction of a quantum material in which these effects may be amplified: "Scandium-Herbertsmithite" (Sc-Hb) with trivalent scandium atoms instead of bivalent zinc.

How do cancer cells divide in a crowd?

Scientists under Dr Elisabeth Fischer-Friedrich, group leader at the Excellence Cluster Physics of Life (PoL) and the Biotechnology Center TU Dresden (BIOTEC), studied how cancer cells are able to divide in crowded tumour tissue and connected it to the hallmark of cancer progression and metastasis, the epithelial-mesenchymal transition (EMT).

The authors identified changes in rounding and growth of the tumour. EMT influenced the cancer cells in two contrasting ways. The dividing tumour cells became stiffer while the surrounding non-dividing cells became softer. Furthermore, the researchers discovered clues that the observed mechanical changes might be linked to the increased activity of a protein called Rac1, a known regulator of the cytoskeleton.



"Our findings will not only provide important results to the field of cell biology but may also identify new targets for cancer therapeutics," says Dr. Elisabeth Fischer-Friedrich. ↗ More

20 years biotechnology initiative in Saxony

15,500 employees, an annual turnover of almost two billion euros, numerous companies and research institutes located mainly in Dresden and Leipzig, international degree programmes and two Clusters of Excellence. The results of Saxony's biotechnology offensive launched in 2000 are impressive. Equipped with 200 million euros, the Free State of Saxony launched the life science locations Dresden and Leipzig. This is how the Biotechnology Center TU Dresden (BIOTEC) came into being, which has its home in the Bioinnovation Center Dresden. With its originally six professorships and junior research groups it became the nucleus of biotechnological research at TU Dresden.

BIOTEC, which was opened in 2001 as a central scientific institution at TU Dresden, has developed over the past 20 years into today's Campus Johannstadt with the Center for Regenerative Therapies Dresden (CRTD), founded in 2006, the Center for Molecular Bioengineering (B CUBE), founded in 2008, and the Center for Molecular and Cellular Bioengineering (CMCB), established in 2016 as the umbrella organisation for all three institutes.

Overall, the institutes of the Johannstadt Campus have had a lasting impact on the Research Priority Area "Health Sciences, Biomedicine and Bioengineering" of TU Dresden and, with their two Clusters of Excellence CRTD (funded from 2006 to 2019) and currently Physics of Life (PoL), have made a decisive contribution to the success of the university in the federal and state Excellence Initiative since 2012. ↗ More

DCN wins Protochips' AXON tool

Cause for celebration at the Dresden Center for Nanoanalysis (DCN): The analytics user facility to TU Dresden entered a competition organised by Protochips, Inc. (USA) – and won! Not only is DCN delighted by the international recognition and reputation this prestigious success will bring, it is also looking forward to becoming the proud owner of a unique and state-of-the-art AXON synchronisation tool for no more than the cost of transport. This will once again significantly increase DCN's already outstanding facilities for in-situ investigations under the electron microscope. The hard and software components for the AXON system will be delivered in the coming weeks and then installed on the JEOL F200 high-resolution transmission electron microscope. This will enable observation of dynamic and kinetic processes such as structural or chemical changes of materials during exposure to high temperatures or in a gaseous atmosphere with up to atomic resolution. ↗ More

As a technology platform of the Center for Advancing Electronics Dresden (cfaed), DCN makes its equipment and expertise available to the whole user community at TU Dresden and its partner institutions. As an integral part of a sustainable concept, this central access to premium-quality, high-end equipment, particularly in the field of electron, ion and X-ray micros-

copy, as well as the provision of state-of-the-art infrastructure, including magnetically shielded, low-noise special laboratories, creates synergies and initiates collaboration beyond the boundaries of scientific disciplines. ↗ More

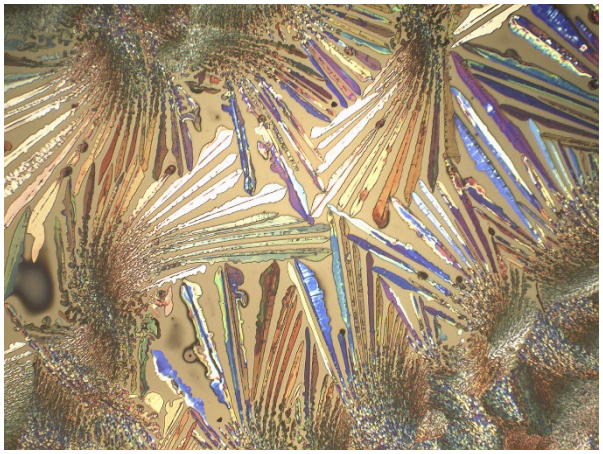
Prize winners selected in the cfaed Scientific Images Contest

The prize winners for this year's Scientific Images Contest by the Center for Advancing Electronics Dresden (cfaed) have been announced. The four winning researchers and their successful entries were presented during the meeting of the cfaed Council on 2nd September 2020. The winners received a copy of the photo they submitted in poster format. Here is the list of winners:

1st Prize: "Dis/Order II" by Dr Felix Talnack (cfaed, Chair of Organic Devices and Systems)

2nd Prize: "HeLa-Cells Distribution" by Dr Anna Eichler-Volf (HZDR)

3rd Prize, tied: "Hellish Glow" by Markus Löffler (DCN) and "Pop-Art Diatomes" by Darius Pohl (DCN)



Each year, the cfaed Scientific Images Contest nominates the most inspiring and unique images from research conducted by cfaed and its associate members. The images are published on the cfaed Instagram profile and elsewhere. Many of the submitted motifs now grace the cfaed corridors in the south wing of the Barkhausen building as large posters, where visitors can enjoy their unique imagery at any time.

Half-Time: German Research Laboratories for Microelectronics (ForLab)

The establishment of twelve "Research Laboratories for Microelectronics" (ForLab) at 14 locations throughout Germany has been ongoing since 2019.

In total, the Federal Ministry of Education and Research (BMBF) is providing 50 million euros for investment in university microelectronics research.

Researchers have since presented initial results during the programme's Half-Time Workshop, which was held in mid-September. The joint project website by the twelve research laboratories for microelectronics is now live as well.

Prof. Thomas Mikolajick, Director of the Institute of Semiconductors and Microsystems at TU Dresden, is the general coordinator of the research laboratories. The research cluster Center for Advancing Electronics Dresden (cfaed) helps to coordinate Forlab's work. ↗ More

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Fig. 3: A mini-tumour of human breast epithelial-cells (MCF-7), a dividing cell indicated in green
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Fig. 4: 1st Prize "Dis/Order II" © Dr Felix Talnack
Fig. 5: ForLab focuses on achieving greater computing power with less energy input. © TU Ilmenau / Christoph Gorke

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