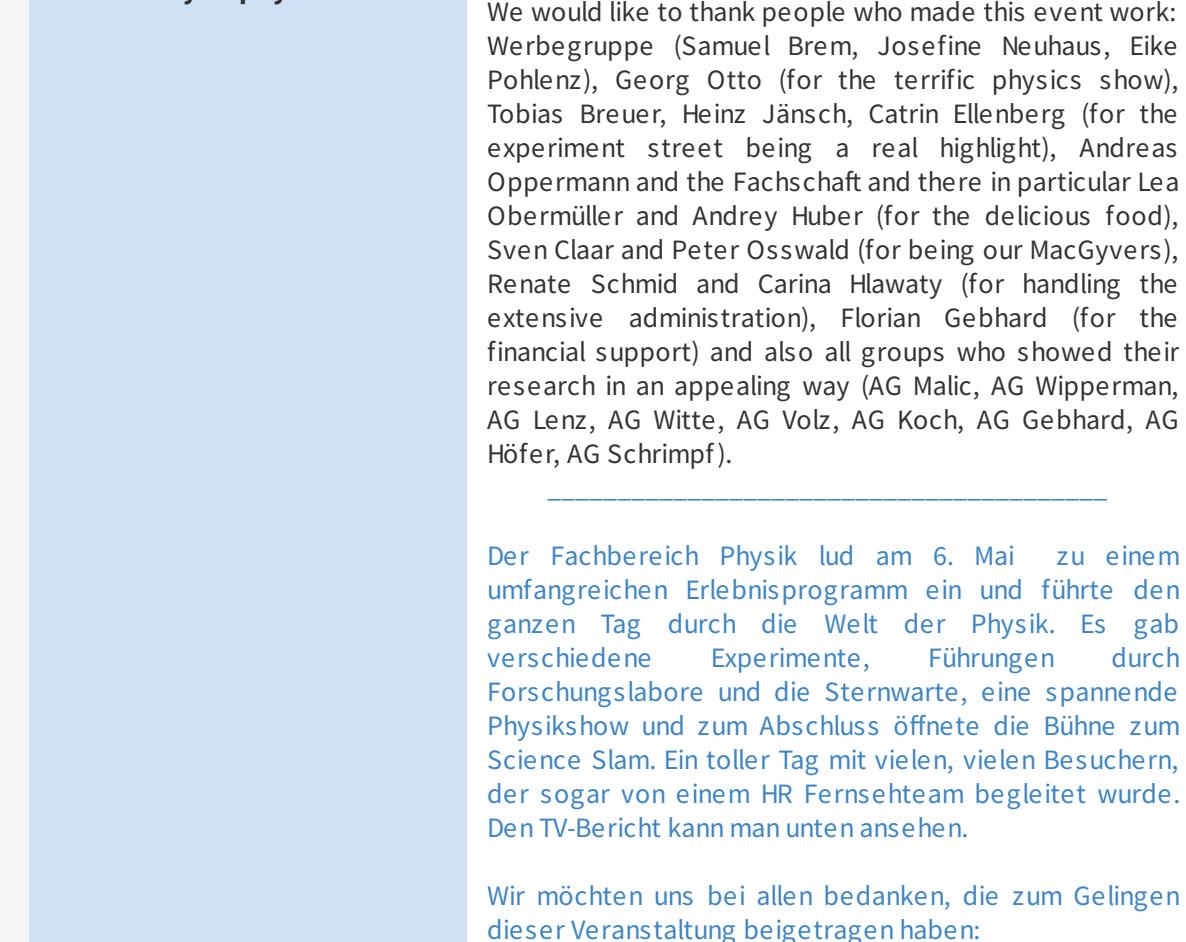


Newsletter Physics 06/23

Department News Research Highlights Events New colleagues



News from the Department



Day of physics

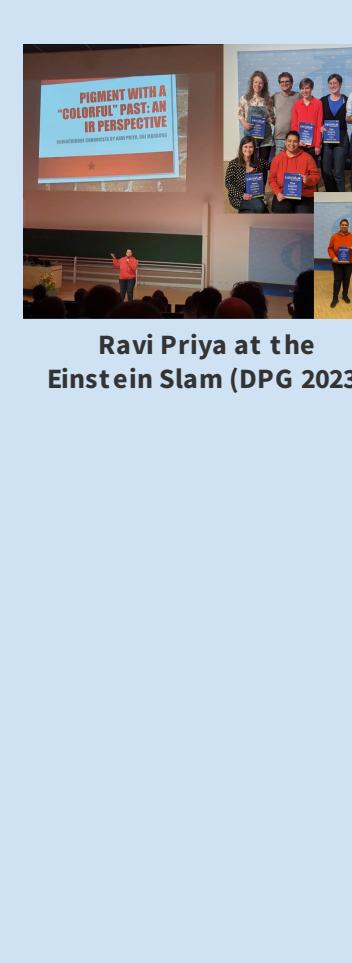
The physics department invited to a day of physics on May 6 and guided the visitors through the fascinating world of physics. There were various interactive experiments, guided tours through research labs and the observatory, an exciting physics show and finally the stage opened for the science show. This was a great and successful day with many visitors. You can watch the TV report below.

We would like to thank people who made this event work: Werbegruppe (Samuel Brem, Josefin Neuhäus, Elke Pohlenz), Georg Otto (für die terific physics show), Tobias Breuer, Hein Jänsch, Catrin Ellenberg (für die experiment street being a real highlight), Andreas Oppermann und die Fachschaft und there in particular Lea Obermüller and Andrej Huber (for the delicious food), Sven Claar and Peter Osswald (for being our MacGyvers), Renate Schmid and Carina Hlawaty (for handling the extensive administration), Florian Gebhard (for the financial support) and also all groups who showed their AG Lenzach (AG Witte, AG Malic, AG Wippermann, AG Höfer, AG Schrimpf).

Der Fachbereich Physik lud am 6. Mai zu einem umfangreichen Erlebnisprogramm ein und führte den ganzen Tag durch die Welt der Physik. Es gab verschiedene Experimente, Führungen durch Forschungslabore und die Sternwarte, eine spannende Physikshow und zum Abschluss öffnete die Bühne zum Science Slam. Zum Abschluss mit vielen Besuchern, die sogar von einem HR Fernsehteam begleitet wurde. Der TV-Bericht kann man unten ansehen.

Wir möchten uns bei allen bedanken, die zum Gelingen dieser Veranstaltung beigetragen haben: team (Samuel Brem, Josefin Neuhäus, Elke Pohlenz, Georg Otto (für die herausragende Physikshow), Tobias Breuer, Hein Jänsch und Catrin Ellenberg (für die interaktive Experimentierstraße, die ein absolutes Highlight war), Andreas Oppermann und die Fachschaft und dort insbesondere Lea Obermüller und Andrej Huber (für das leckere Essen vom Grill), Sven Claar und Peter Osswald (unsre MacGyvers), Renate Schmid und Carina Hlawaty (für die extensive Administration im Hintergrund), Florian Gebhard (für die Unterstützung durch das Dekanat) und schließlich alle Gruppen, die ihre Forschung auf eine spannende Art und Weise vorgestellt haben (AG Malic, AG Wippermann, AG Lenz, AG Witte, AG Volz, AG Koch, AG Gebhard, AG Höfer, AG Schrimpf).

TV report



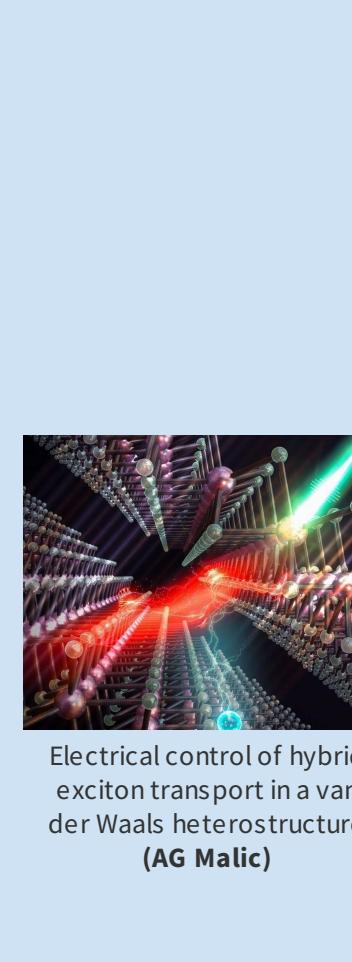
Physics Summer Party

Dear members, friends and family of the physics department, the student council is pleased to invite you to the summer party again this year! There will be music, drinks and barbecue. The party starts at 3pm on 14 June. We are looking forward to seeing you!

We need your support, so please contact the Fachschaft.

Liebe Mitglieder, Freunde und Familie des Fachbereichs, die Fachschaft freut sich, Sie dieses Jahr wieder zum Sommerfest einzuladen zu können! Es wird Musik, Getränke und Grillgut geben. Das Fest beginnt um 15 Uhr am 14. Juni. Wir freuen uns auf Sie!

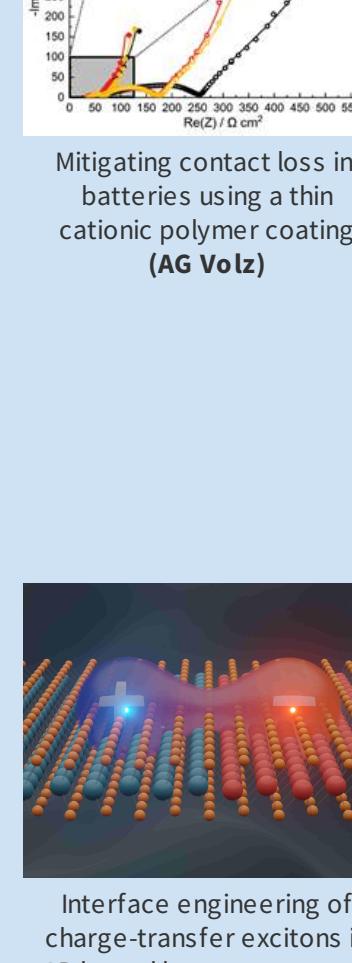
Support



Winner of the Alfred-Wegener-Price 2022 (AG Volz)

Dr. Shamal Ahmed, who finished his PhD in the research group of Prof. Dr. Kerstin Volz, received the Alfred-Wegener-Dissertation Preis 2022 for his outstanding dissertation "Characterization of Ni-Rich Lithium-Ion Battery Layered Cathode Materials Using Scanning Transmission Electron Microscopy". Using TEM, it was able to identify two effects that are partly responsible for material-related problems in energy storage and thus provided insights into why the materials used in such batteries degrade so quickly. His work is of particular scientific and socio-political relevance as the sustainable generation and storage of energy are among the most pressing issues of our time.

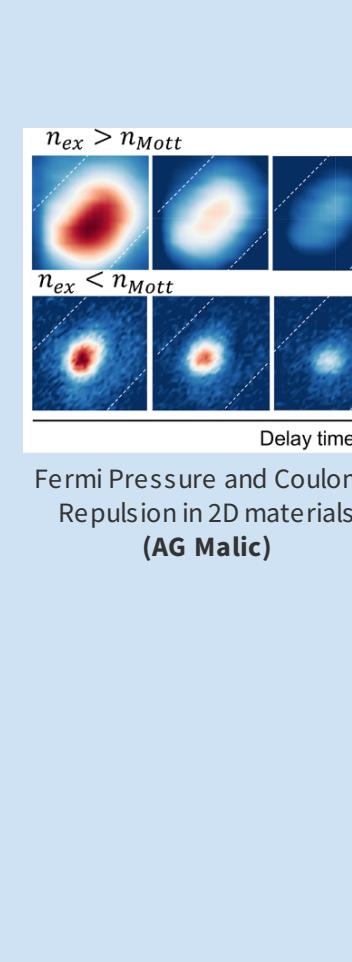
read more



Ravi Priya at the Einstein Slam (DPG 2023)

Transport of charge carriers is crucial for nanoelectronics. In 2D materials, transport of neutral excitons cannot be controlled by electrical fields, but rather strain engineering has been introduced to manipulate exciton propagation. A joint theory-experiment proposal "Low-temperature exciton transport in strained atomically thin semiconductors" between AG Malic and R. Bratschitsch (University of Münster) has been approved by the DFG. The grant runs over 3 years and will be carried out by a theoretical and an experimental PhD student.

read more



DFG grant on exciton dynamics in perovskites (AG Malic)

Perovskites have emerged as highly promising materials for energy harvesting application. Solar cell applications rely mostly on the bulk, however 2D perovskites are known to have a high quantum emission efficiency. Its microscopic origin is still not well understood. A joint theory-experiment proposal "Microscopic understanding of the phonon bottleneck in 2D perovskites" between AG Malic and P. Plochocka and M. Baranowski (Wroclaw University, Poland) has been approved by the DFG and the Polish NCN. The grant runs over 3 years and will be carried out by a theoretical and an experimental PhD student.

read more



Bosonic Delocalization of Dipolar Moiré Excitons (AG Malic)

Perovskites are vielseitige Materialien für die Energiegewinnung. Solarkellenanwendungen beruhen meist auf dicken Schichten von Perovskiten, allerdings haben atomdichte 2D-Perovskite Vorteile im Sinne einer hohen Quanteneffizienz. Der mikroskopische Ursprung dieses Phänomens ist noch immer nicht gut verstanden. Ein gemeinsamer Antrag ("Mikroskopisches Verständnis vom Phonon-Bottleneck in 2D-Perovskiten") von der AG Malic und P. Plochocka und M. Baranowski (Universität Breslau, Polen) wurde von der DFG und der polnischen NCN genehmigt. Die Förderung läuft über 3 Jahre und wird von einem theoretischen und einem experimentellen Doktoranden durchgeführt.

read more



Fermi Pressure and Coulomb Repulsion in 2D materials (AG Malic)

Transition metal dichalcogenide heterostructures provide a versatile platform to explore electronic and excitonic phases. As the excitation density exceeds the critical Mott density, interlayer excitons are ionized into an electron-hole plasma phase. The transport of the highly non-equilibrium charge carriers is relevant for high-power optoelectronic devices but has not been carefully investigated previously. In this experiment-theory collaboration between Elaine Li (University of Tsinghua, China) and AG Malic, we employ spatially resolved pump-probe microscopy to investigate the spatial-temporal dynamics of interlayer excitons and hot-plasma phase in a MoSe₂/WSe₂ twisted bilayer. At the excitation density of ~10¹⁴ cm⁻², well exceeding the Mott density, we find a surprisingly rapid initial expansion of hot plasma to a few microns away from the excitation source within ~0.2 ps. Microscopic theory reveals that this rapid expansion is mainly driven by Fermi pressure and coulomb repulsion. This work is published in *Nano Letters*.

read more



Ballistic photocurrents in a van der Waals heterostructure (AG Malic)

Surface states of 3D topological insulators are characterized by a Dirac-like, quasi-relativistic energy dispersion and a helical spin texture in momentum space with the spin of the electrons locked to its parallel momentum. By mapping the full two-dimensional momentum distribution of photoexcited electrons in the Dirac cone with time- and angle-resolved photoemission, AG Höfer in collaboration with Akio Kimura (Hirosima University, Japan), showed that linearly polarized mid-infrared light can induce strong spin currents at the surface of an appropriately oriented topological insulator Sb₂Te₃. Electron-electron scattering was found to be strongly suppressed by spin-momentum locking. The result are ballistic currents with scattering times in the picosecond regime. The paper was published in *Scientific Reports*.

read more

Events



Physics Colloquium 21 June, 3.30pm Big lecture hall, Renthof

Prof. Dr. Jürgen Janek, Justus Liebig Universität Gießen
"Energy in the Box" - The Physical Chemistry of High-Performance Batteries

Electrochemical energy storage is a key technology in our "mobile society", and is also expected to contribute to the future energy grid. Lithium ion batteries have evolved during the last 30 years as leading battery cell concept, and their further development drives worldwide research activities. In parallel and in view of the ever-increasing demand for total storage capacity that amounts to hundreds of thousands of GWh, alternative electrochemical storage concepts based on compounds with virtually unlimited resources are also increasingly investigated. This lecture will therefore first focus on the (electro)chemical ingredients of state-of-the-art lithium ion batteries and their further evolution as reference for any alternative approach. Secondly, the lecture will try to consider electrochemical energy storage through the eyes of a physicochemist who knows well the different views of physicists and chemists.

read more

Physics Colloquium 21 June, 3.30pm Big lecture hall, Renthof

Prof. Dr. Witlef Wieczorek, Chalmers University of Technology
Towards Quantum Experiments with Micrometer-Sized Particles

Quantum states of massive objects have fascinated since the inception of quantum mechanics. Nowadays molecules of thousands of atoms can be brought into quantum states. This capability enables testes of the validity of quantum technologies. To explore even more massive quantum systems requires exceptional isolation of the system from the environment and precise control over its quantum state. I will present first steps in the development of a new experimental platform that may allow quantum control over the motion of objects with masses larger than 10¹³ atomic mass units. This platform is based on magnetically levitating a superconducting microparticle in a cryogenic vacuum

read more

Vitalii Lider - PhD student (AG Volz)

I recently completed my master's degree in the group of Prof. Volz. Right after that I started my PhD in the same group. As part of my work, I want to study different materials using 4D-TEM while in-situ applying bias inside the TEM. I hope to gain new insights for the development of methods for measuring the electric fields and for the materials investigated. I am fascinated by the wide range of possible uses of semiconductor materials, which is why I would like to delve deeper into the subject. Besides the physics, I enjoy growing plants indoors.

read more

Share your good news

Your newsletter team: Carina Hlawaty and Ermin Malic

write e-mail

