

Newsletter Physics 06/21

Department News Research Highlights Events New colleagues



From now on, we will inform you every month about the latest news from the department. This includes research highlights, important project grants, upcoming events and much more. We will also use this platform to welcome our new colleagues and say goodbye to the ones leaving the department. This newsletter will exclusively contain positive news!

If you have difficulties reading the newsletter, you can download it by clicking the "download pdf" button or on the department homepage (under events).

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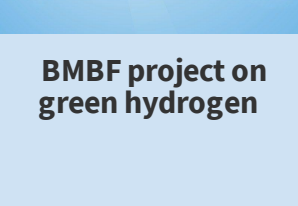
News from the Department



Third funding period of the CRC 1083 granted!

The German Research Foundation (DFG) has granted our Collaborative Research Center SFB 1083 „Structure and Dynamics of Internal Interfaces“ 12.3 Million Euros for a third funding period from July 2021 to June 2025. The SFB 1083 consists of 19 scientific and three service projects. The projects will be led by 21 professors, senior scientists or junior group leaders. They will involve a total of about 80 scientists working in physics, chemistry and materials sciences. We thank Kerstin Volz and Ulrich Höfer for their hard work!

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BMBF project on green hydrogen

The Federal Ministry of Education and Research supports the collaborative project „H2Demo“ with 14 Million Euros over a period of 5 years. Kerstin Volz participates in this project focusing on sustainable and environment-friendly production of hydrogen through direct solar water splitting. The project is led by the Fraunhofer Institute for Solar Energy Systems ISE and includes 11 partners.

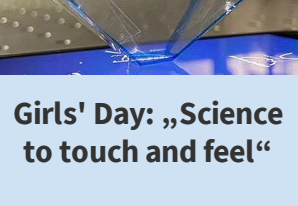
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University of Marburg: Member of Graphene Flagship

The executive board of the Graphene Flagship has approved Philipps-University of Marburg as a new full member. The Ultrafast Quantum Dynamics Group led by Ermin Malic is part of the work package Sensors. Funded by the European Commission, the Graphene Flagship aims to bring graphene innovation out of the lab into commercial applications. With a budget of €1 billion it represents Europe's biggest research initiative.

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Girls' Day: „Science to touch and feel“

This year's Girls' Day has been organized by the Semiconductor Photonics Group on Instagram: Supervised experiments could be imitated in front of the screen at home. The girls were introduced to the world of microplastic research, explored exciting properties of liquids and made their own hologram. Have a look @semiconductorphotonics.



Ulrich Höfer (deputy chair of the DPG Surface Science Division)

Ulrich Höfer is the deputy chair and from March 2022 chair of the surface science division of the German Physical Society (DPG).

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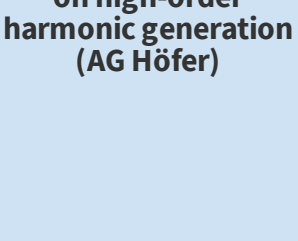


Martin Koch: New Head of Department

I am very pleased about the initiative of our new colleague Ermin Malic to publish a regular department newsletter. It will represent an important information channel and hopefully strengthen our sense of togetherness. Follow the link below to read what tasks lie ahead of us and what will be important to me as the new head of department.

[read more](#)

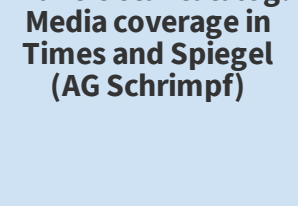
Research Highlights



Nature publication on high-order harmonic generation (AG Höfer)

In a joint Nature publication with Rupert Huber in Regensburg, Suguru Ito, Jens Güdde and Ulrich Höfer from the surface physics group report a novel mechanism for high-order harmonic generation. In the conducting surface states of topological insulators, electrons behave like massless particles, characterized by a linear dispersion (Dirac cone). Driven by the electric field of an intense multi THz pulse, the electrons rapidly switch their direction of motion when their k-space trajectories come close to the minimum of the cone, the Dirac point. This results in the emission of an ultrafast flash of light.

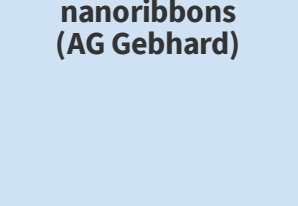
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Better than Tycho Brahe's star catalog: Media coverage in Times and Spiegel (AG Schrimpf)

Near the end of the 16th century Wilhelm IV, son of the founder of our university, Philipp, Landgraf von Hessen, initiated and organized new measurements of stellar positions and compiled a star catalog. Unfortunately, this catalog appeared in print not before 1666, long after the dissemination of Brahe's catalog. Frank Verbunt (Radboud University Nijmegen) and Andreas Schrimpf analyzed the accuracy of measurements, computations and of the final catalog by comparing it with modern data. The result: the Hessian catalog surpassed Brahe's catalog by a factor of two in accuracy.

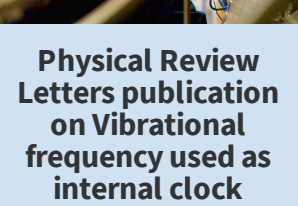
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Nature Commun. publication on charge transport in graphene nanoribbons (AG Gebhard)

Atomically precise graphene nanoribbons (GNRs) hold promise for applications as transistors in nanotechnology. However, the mechanism of the electrical conductivity of GNRs has not yet been undoubtedly revealed. An international group of researchers from Germany, Russia, Japan, Canada, and the USA succeeded in elucidating the mechanism of charge transport in a monolayer of aligned multiple heterojunctions consisting of quasi-metallic and wide-bandgap GNRs. Florian Gebhard and his colleagues of the group Many-Particle Theory devised a model for charge transport in these GNR monolayers and derived the electrical conductivity.

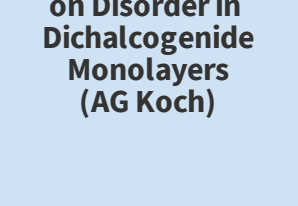
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Physical Review Letters publication on Vibrational frequency used as internal clock (AG Jakob)

Dynamical charge-transfer processes at molecule-metal interfaces proceed in the few fs timescale that renders them highly relevant to electronic excitations in optoelectronic devices. This is particularly true when electronic ground state situations are considered that implicate charge transfer directly at the Fermi energy. In their study, Peter Jakob and Sebastian Thüssing show that such processes can be accessed by means of vibrational excitations, with nonadiabatic electron-vibron coupling leading to distinct asymmetric line shapes. Thereby the characteristic timescale of this interfacial dynamical charge transfer can be derived by using the vibrational oscillation period as an internal clock reference.

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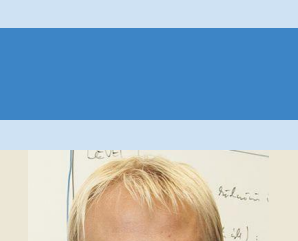


Advanced Electronic Materials publication on Disorder in Dichalcogenide Monolayers (AG Koch)

Semiconductor alloys are usually associated with spatial compositional fluctuations which affect a material's in-plane transport properties. This alloy disorder should also be present in a ternary $\text{Mo}_{0.3}\text{W}_{0.7}\text{Se}_2$ monolayer. For the first time, Dr. Masenda from the Semiconductor Photonics Group has observed the impact of this disorder on luminescence experiments. The data show a non-monotonous temperature dependence of the luminescence Stokes shift, the so-called S-shape; a feature not evident in its binary counterparts. Moreover, an estimation of the energy scale of the disorder potential confirms experimental results and suggests compositional variations as the main source of the observed disorder-induced effects.

[read more](#)

Upcoming Events



AG Seminar Ultrafast Quantum Dynamics Group

4 June 2-3 pm
Tobias Korn (Rostock University)
Optical spectroscopy of 2D materials

11 June 2-3 pm
Timur Shegai (Chalmers University of Technology)
TMD nanophotonics for strong light-matter coupling

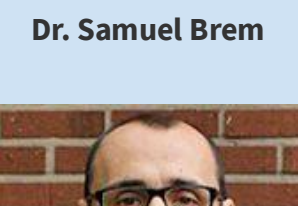
[zoom link](#)

New Colleagues



Prof. Örs Legeza

Prof. Örs Legeza from the Wigner Research Centre for Physics in Hungary will be guest professor at our department from April to September 2021. He studied at the Ohio State University and the Eötvös Loránd University and did his PhD in 1998 at the Budapest University of Technology. He will do research together with Florian Gebhard and Reinhard Noack and will co-organize a summer school on „Density matrix renormalization group: Methods, Developments, and Applications“.



Carina Hlawaty

I started on the 15th of March as secretary of Prof. Dr. Ermin Malic at the Ultrafast Quantum Dynamics Group. Me and my family live in a small village near Marburg. I previously worked in tourism and designed, sold and supervised journeys for groups.



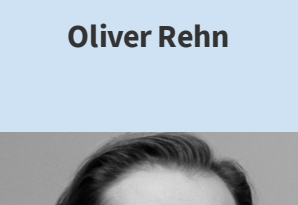
Dr. Samuel Brem

I am a postdoc in the new research group Ultrafast Quantum Dynamics. I am 30 years old and come from Berlin. I love to go out with friends, watch movies and to play board games.



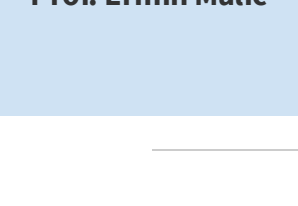
Dr. Roberto Rosati

I am a postdoc in the new research group Ultrafast Quantum Dynamics. Originally from Italy and with also other past experiences in Germany and Sweden, I have worked predominantly on spatio-temporal dynamics and transport, in particular of excitons in semiconducting monolayers. I love running, reading and travelling and I am really much enjoying my stay here in Marburg!



Willy Knorr

I am a PhD student in the Ultrafast Quantum Dynamics group of Prof. Ermin Malic. I studied at the Technische Universität Berlin, where I finished my master thesis on the topic of "Heisenberg spin chains with long-range interaction". In my free time I am a huge sports enthusiast with a penchant for traveling.



Giuseppe Meneghini

I am a PhD student in the Ultrafast Quantum Dynamics Group under the supervision of Prof. Dr. Ermin Malic. I obtained my Master degree in Physics at Università degli studi di Padova with a thesis on electronics properties of Twisted Bilayer Graphene. My interest in two-dimensional materials is what led me to my current project. In my free time I love hiking in nature, reading and play videogames.



Oliver Rehn

In May 2021 I have started as technical support on Linux computing at the physics department. Before that, I worked for over ten years in managed hosting in a small company in Marburg. Beside mathematics, physics was my school subject, later I studied electrical engineering and computer science. My main task is IT support for team-members of the Ultrafast Quantum Dynamics group and other theoretical research groups.

Prof. Ermin Malic

I started the new research group Ultrafast Quantum Dynamics in January 2021. I studied at the TU Berlin and after research stays in Cambridge (MIT), Barcelona, and San Sebastian, I became professor at the Chalmers University of Technology in Gothenburg, Sweden, in 2015. My research focuses on microscopic modeling of ultrafast phenomena in atomically thin semiconductors. The goal is to explain experimental findings, predict new yet undiscovered phenomena and propose novel technological concepts.

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Share your good news.

Your newsletter team: Maya Strobel, Carina Hlawaty, and Ermin Malic

Send us an e-mail with a short text and a nice foto.

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