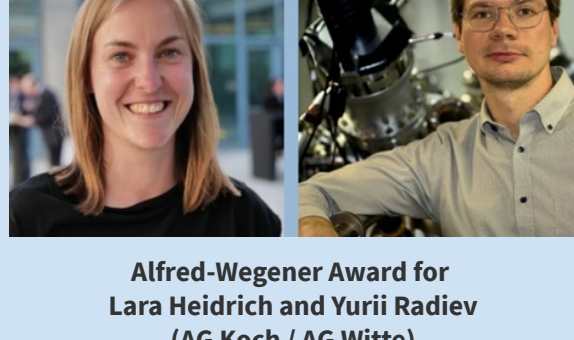




Photo: Theresia Fischer

News from the Department



Alfred-Wegener Award for Lara Heidrich and Yuri Radiev (AG Koch / AG Witte)

Since 2019, the Department of Physics has awarded the Alfred-Wegener-Prize to honor the scientific progress achieved by outstanding early-career researchers. This year, the award, which is endowed with 2,000 euros, is split and goes in equal parts to Dr. Lara Heidrich, Semiconductor Photonics Group, for her dissertation *Tracing the Crystallization of Poorly Soluble Drugs by Terahertz Time-Domain Spectroscopy* and to Dr. Yuri Radiev, Molecular Solid-State Physics Group, for his dissertation *Reducing the Contact Resistance in p- and n-Channel Thin-Film Organic Field-Effect Transistors*. Both researchers completed their PhD in 2025 with distinction. The academic ceremony will take place as part of this year's graduation ceremony for the Department of Physics on July 3 at 4:00 p.m.

Seit 2019 würdigt der Fachbereich Physik mit der Verleihung des Alfred-Wegener-Preises den wissenschaftlichen Fortschritt, den herausragende Nachwuchswissenschaftler*innen erzielt haben. Der Preis, der mit 2.000 Euro dotiert ist, geht in diesem Jahr zu gleichen Teilen an Dr. Lara Heidrich, AG Halbleiterphotonik, für ihre Dissertation *Tracing the Crystallization of Poorly Soluble Drugs by Terahertz Time-Domain Spectroscopy* und an Dr. Yuri Radiev, AG Molekulare Festkörperphysik, für seine Dissertation *Reducing the Contact Resistance in p- and n-Channel Thin-Film Organic Field-Effect Transistors*. Beide Wissenschaftler*innen haben ihre Promotion 2025 mit Auszeichnung abgeschlossen. Die akademische Feier anlässlich der Preisverleihung findet im Rahmen der diesjährigen Graduationsfeier des Fachbereichs Physik am 3. Juli 2026 um 16 Uhr statt.

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Frank Bremmer appointed as adjunct professor at Monash University, Melbourne

Professor Frank Bremmer from the Applied Physics and Neurophysics group, has been appointed Adjunct Professor (Research) in the Department of Physiology, School of Biomedical Sciences, Faculty of Medicine, Nursing and Health Sciences at Monash University, Melbourne, Australia. The appointment reflects a long-standing and highly successful scientific collaboration with colleagues at Monash University, particularly in the field of visual neuroscience and space- and self-motion perception. Over the past years, this partnership has been supported by two major European Union funded research projects: PLATYPUS (2017–2023) and the ongoing project PLACES (2023–2027). The collaboration combines expertise from neuroscience, physics, computational modeling, and behavioral research to better understand how the brain processes sensory information under natural conditions. The adjunct professorship further strengthens the international research links between Marburg University and Monash University and will foster future joint research initiatives, student exchange, and scientific cooperation.

Professor Frank Bremmer aus der Arbeitsgruppe Angewandte Physik und Neurophysik wurde zum Adjunct Professor (Research) im Department of Physiology der School of Biomedical Sciences, Faculty of Medicine, Nursing and Health Sciences der Monash University in Melbourne, Australien, ernannt. Die Ernennung spiegelt eine langjährige und äußerst erfolgreiche wissenschaftliche Zusammenarbeit mit Kolleginnen und Kollegen der Monash University wider, insbesondere auf dem Gebiet der visuellen Neurowissenschaften sowie der Wahrnehmung von Raum und Eigenbewegung. In den vergangenen Jahren wurde diese Kooperation durch zwei große Forschungsprojekte der Europäischen Union gefördert: PLATYPUS (2017–2023) sowie das laufende Projekt PLACES (2023–2027). Die Zusammenarbeit vereint Expertise aus den Neurowissenschaften, der Physik, der computergestützten Modellierung und der Verhaltensforschung, um besser zu verstehen, wie das Gehirn sensorische Informationen unter natürlichen Bedingungen verarbeitet. Die Adjunct Professorship stärkt darüber hinaus die internationalen Forschungsbeziehungen zwischen der Philipps-Universität Marburg und der Monash-Universität und wird zukünftige gemeinsame Forschungsinitiativen, den Austausch von Studierenden sowie die wissenschaftliche Kooperation weiter fördern.



Girls' Day 2026

“From Workshop to Lab – Your Day in the World of Physics,” was the motto of this year's Girls' Day event in which eleven enthusiastic girls aged 12 to 15 from Marburg and the wider surrounding area took part on April 23, 2026. The varied program involved the three technical departments—the electronic workshop, the precision engineering workshop, and the lecture hall team—as well as the research groups Gerhard, Lenz, and Reutzel. The girls were able to get hands-on experience with both practical and experimental activities. They also had the opportunity to get to know one another in a relaxed setting and gain first insights into studying physics and the world of science. As always, the event was organized and moderated by Dr. Catrin Ellenberger, head of the Physics Didactics Group.

Unter dem Motto „Von der Werkstatt ins Labor – Dein Tag in der Welt der Physik“ hat das diesjährige Angebot zum Girls' Day elf Schülerinnen der Klassen 7 bis 9 begeistert, die am 23. April 2026 aus einem großen Einzugsgebiet nach Marburg gekommen waren. Am Programm beteiligt waren die drei technischen Bereiche, E-Werkstatt, FM-Werkstatt und Hörsaalvorbereitung, sowie die Forschungsgruppen Gerhard, Lenz und Reutzel. In einem abwechslungsreichen Programm konnten die Mädchen selbst handwerklich und experimentell aktiv werden und erhielten darüber hinaus die Möglichkeit, sich in entspannter Runde kennenzulernen und auszutauschen sowie erste Einblicke in das Physikstudium und in die Welt der Wissenschaft zu gewinnen. Die Organisation und Moderation der Veranstaltung lag, wie immer, in der Hand von Dr. Catrin Ellenberger, der Leiterin der AG Didaktik der Physik.

[read more](#)

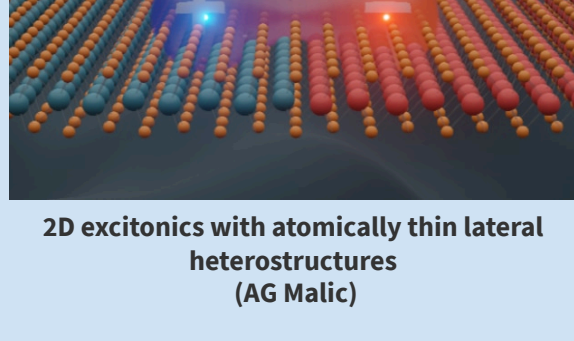


DBU fellow in the “Physics of Solar Energy Conversion” research group

Malwine Lühder started her doctoral studies in the Goldschmidt Research Group at the beginning of the year and now received a doctoral scholarship from the German Federal Environmental Foundation (DBU) for her interdisciplinary work on low-dimensional perovskites. With this, she is the third DBU fellow in the “Physics of Solar Energy Conversion” research group. Malwine is excited about this special honor and looks forward to the interdisciplinary exchange with the other fellows from all over Germany.

Malwine Lühder hat zum Jahresbeginn ihre Promotion in der AG Goldschmidt begonnen und hat kürzlich für ihre interdisziplinäre Arbeiten an niedrigdimensionalen Perowskiten ein Promotionsstipendium von der Deutschen Bundesstiftung Umwelt (DBU) erhalten. Damit ist sie bereits die dritte DBU-Stipendiantin in der Arbeitsgruppe “Physik der Solar-Energiekonversion”. Malwine freut sich über diese besondere Auszeichnung und auf den fachübergreifenden Austausch mit den anderen Stipendiaten aus ganz Deutschland.

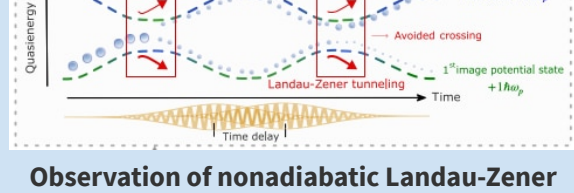
Research Highlights



2D excitonics with atomically thin lateral heterostructures (AG Malic)

Semiconducting transition metal dichalcogenides (TMDs), such as MoSe2 and WSe2, exhibit unique optical and electronic properties. Vertical stacking of layers of one or more TMDs, to create heterostructures, has expanded the fields of moiré physics and twistronics. Bottom-up fabrication techniques, such as chemical vapor deposition, have advanced the creation of heterostructures beyond what was possible with mechanical exfoliation and stacking. These techniques now enable the fabrication of lateral heterostructures (LHs), where two or more monolayers are covalently bonded in the plane of their atoms. At their atomically sharp interfaces, lateral heterostructures exhibit additional phenomena, such as the formation of charge-transfer excitons, in which the electron and hole reside on opposite sides of the interface. Due to the energy landscape created by differences in the band structures of the constituent materials, unique effects such as unidirectional exciton transport and excitonic lensing can be observed in LHs. This review outlines recent progress in exciton dynamics and spectroscopy of TMD-based LHs and offers an outlook on future developments in excitonics in this promising system. This work is published in **Reports on Progress in Physics**.

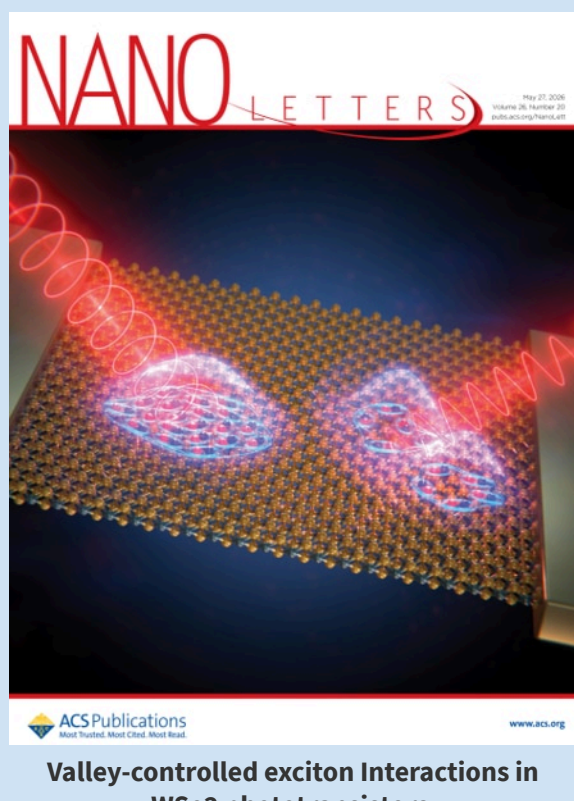
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Observation of nonadiabatic Landau-Zener tunneling among Floquet states (AG Reutzel)

Ultrashort light pulses can be used to coherently manipulate material properties with the help of the concept of “Floquet engineering.” In the future, this may enable new material phases that can be flexibly switched – and perhaps are even thermally inaccessible. But can we also learn something about the fundamental dynamics in Floquet states? Experimental data from Marcel Reutzel's postdoctoral work with Hrvoje Petek has been studied in direct comparison with the theoretical work of Michael Schüler. The authors demonstrate how Landau-Zener transitions occur between Floquet states. The experimental approach and the direct comparison with theory promise a wide range of opportunities for future studies in quantum materials such as graphene and other Dirac materials. This work was published in **Physical Review X**.

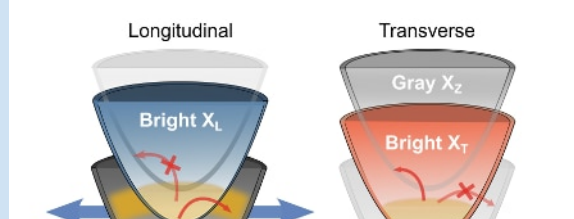
[read more](#)



Valley-controlled exciton Interactions in WSe2 phototransistors (AG Malic)

Many-body exciton interactions shape the optoelectronic response of atomically-thin transition metal dichalcogenides, yet optical control of these interactions remains largely unexplored. To date, modulation of exciton-exciton interactions has primarily relied on electrical gating or van der Waals engineering. In this joint experiment theory study including Marcos Guimarães (University of Groningen, Netherlands) and AG Malic, we demonstrate all-optical control of many-body exciton interactions in monolayer WSe2 via valley-selective excitation using polarization-resolved pulsed-laser photocurrent spectroscopy. Circular excitation selectively populates excitons in a single valley, whereas linear excitation populates both valleys, inducing a valley-dependent nonlinear photoresponse. We observe helicity-dependent exciton renormalization, alongside a two-fold enhancement of sublinear photocurrent scaling under circular excitation, reflecting single-valley population of interacting excitons. A microscopic model incorporating intervalley-exchange and exciton-exciton annihilation mediated by dark and bright exciton populations reproduces the nonlinear valley-selective response. These results establish the valley degree of freedom as an all-optical control parameter for tuning many-body excitonic effects and, exploring correlated exciton states and valleytronic applications in two-dimensional semiconductors. This work is published in **Nano Letters** and was selected for the **cover of the journal**.

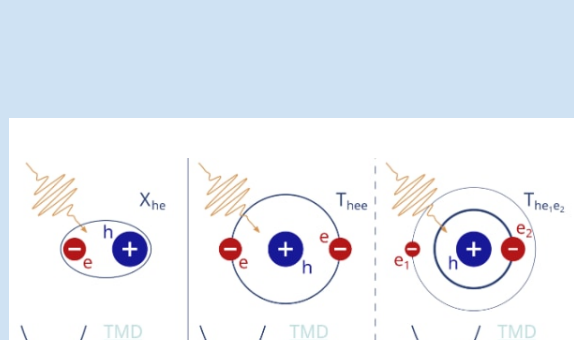
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Microscopic Insights into magneto-optics and magneto-transport in 2D perovskites (AG Malic)

Two-dimensional (2D) perovskites host tightly bound excitons with a fine structure shaped by spin-orbit coupling and exchange interaction. In the prototypical 2D perovskite, (PEA)2PbI4, the dark exciton lies below two bright excitons and a gray state. In-plane magnetic fields split the bright excitons, polarize them longitudinally (L) and transversely (T) to the field, and hybridize them with gray and dark states, respectively. The impact of magnetic fields on exciton emission and diffusion has remained largely unexplored. In this joint theory-experiment study involving the groups of Paulina Plochocka (CNRS Toulouse), Alexey Chernikov (TU Dresden) and AG Malic, we investigate time- and temperature-resolved magneto-optics and magneto-transport of excitons in (PEA)2PbI4. We demonstrate that magnetic fields enhance emission from XT excitons and accelerate the transport of XL states. We trace this back to suppressed scattering of XT states into dark excitons, while XL states offer guidance for experimental studies on magneto-optics and magneto-transport in layered perovskites. This work is published in **Nano Letters**.

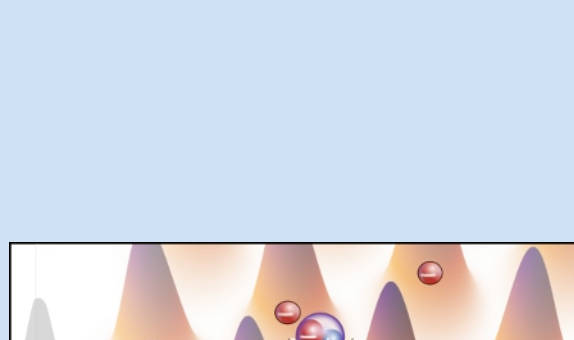
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ARPES signatures of trions in 2D materials (AG Malic / AG Reutzel)

Angle-resolved photoemission spectroscopy (ARPES) has recently emerged as a direct probe of excitonic correlations in two-dimensional semiconductors, resolving their dispersion and dynamics in energy-momentum space, including dark exciton states inaccessible to optical techniques. However, the ARPES fingerprint of charged excitons (trions), which plays a key role in all doped and gated two-dimensional (2D) material systems, has remained unknown so far. In this joint theory-experiment study involving the groups of Stefan Mathias (University of Göttingen), AG Reutzel, and AG Malic, we present a first analysis of trion signatures in monolayer transition-metal dichalcogenides, highlighting how the additional charge carrier modifies the spectral position and shape relative to neutral excitons in ARPES spectra. Interestingly, we further predict that mass-imbalanced trions yield a characteristic double-peak structure, clearly separated in energy and line shape from neutral excitons. The predicted temperature dependence of these features offers guidance for experimental investigations aimed at identifying trionic states, thereby establishing a framework for ARPES studies of many-body Coulomb complexes in doped 2D semiconductors. This work is published in **Nano Letters**.

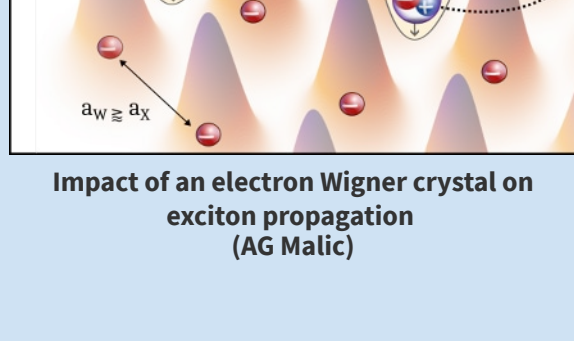
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Impact of an electron Wigner crystal on exciton propagation (AG Malic)

The strong Coulomb interaction in 2D materials facilitates the formation of tightly bound excitons and charge-ordered phases of matter. A prominent example is the formation of a crystalline phase from free charges due to Coulomb repulsion, known as the Wigner crystal. While exciton-electron interactions have been used as a sensor for Wigner crystallization, its impact on the exciton properties has so far been poorly understood. In this joint theory-experiment collaboration between Alexey Chernikov (TU Dresden) and AG Malic, we show that the weak potential induced by periodically ordered Wigner crystal electrons has a major impact on exciton propagation, albeit having only a minor influence on exciton energy. The effect is tunable with carrier density determining the Wigner crystal confinement and temperature via thermal occupation of the higher subbands. Our work provides microscopic insights into the interplay between excitons and charge-ordered states identifying key signatures in exciton transport and establishes a theoretical framework for understanding exciton propagation in the presence of strong electronic correlations. This work is published in **Nano Letters**.

[read more](#)



Role of nonequilibrium populations in dark-exciton formation (AG Reutzel / AG Malic)

The dispersion relation of bright and dark excitons $E(Q)$ relates the exciton's energy with its center-of-mass momentum Q . During the formation and thermalization of dark excitons, excitons with different energy and center-of-mass momenta Q contribute to the dynamics. Combining ultrafast momentum microscopy in the groups of Reutzel and Mathias (Göttingen) with microscopic modelling from the Malic group, we quantitatively evaluate the related dynamics. On the example of homobilayer 2H-MoS2, we show how dark excitons are formed on the 85 fs timescale and subsequently thermalize on the 150 fs timescale. Our results provide a previously inaccessible view of the complete exciton relaxation cascade, which is of importance for the future characterization of nonequilibrium excitonic phases and the efficient design of optoelectronic devices. The results are now published in **Physical Review Letters**.

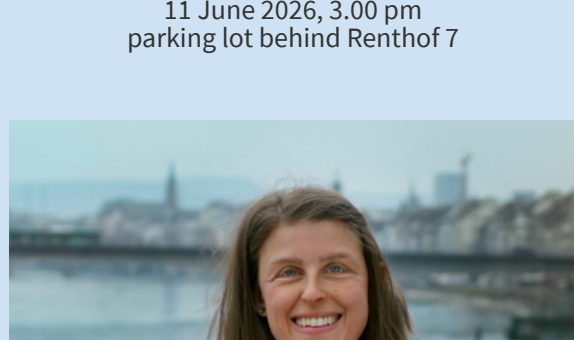
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Events



Summer party at the department
11 June 2026, 3.00 pm
parking lot behind Renthof 7

The days are getting longer again, the trees are turning greener, and with that, of course, our anticipation for our annual summer party is growing once more. The Physics Student Council would therefore like to cordially invite all members of the department, along with their friends and families, to the 2026 Summer Party!! The party will take place on Thursday, June 11, 2026, starting at 3:00 PM; as usual, in the parking lot behind Renthof 7. We're still finalizing the exact program, but you can already look forward to cold drinks, grilled food, some music, (hopefully!!) good weather, and plenty of socializing. As every year, we'll need plenty of helping hands for setting up and taking down, as well as at the food and drink stations. More details will follow, but feel free to save some space for your calendar for a shift or two.



Inaugural lecture Prof. Dr. Nadine Leisgang
17 June 2026, 2.30 pm
big lecture hall, Renthof 5

Inaugural Lecture by Prof. Dr. Nadine Leisgang

The lecture, titled “When Quantum Materials Glow – Physics in Two Dimensions,” will take place on June 17, 2026, at 2:30 p.m. in the Main Lecture Hall at Renthof 5.

Share your good news

Your newsletter team: Carina Hlawaty, Oliver Rehn and Ermin Malic

Send us a newsletter with a short text and a nice foto to newsfb13@physik.uni-marburg.de

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