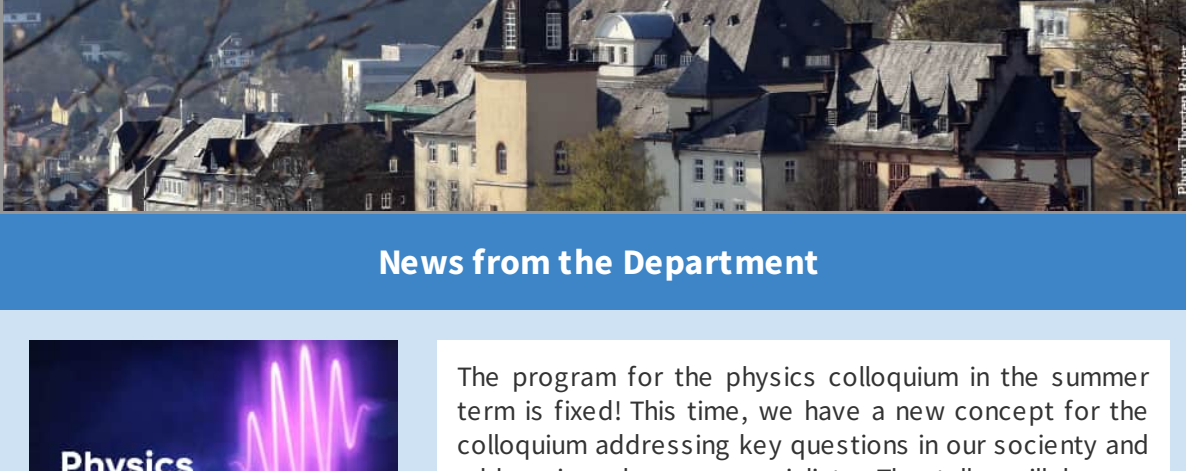
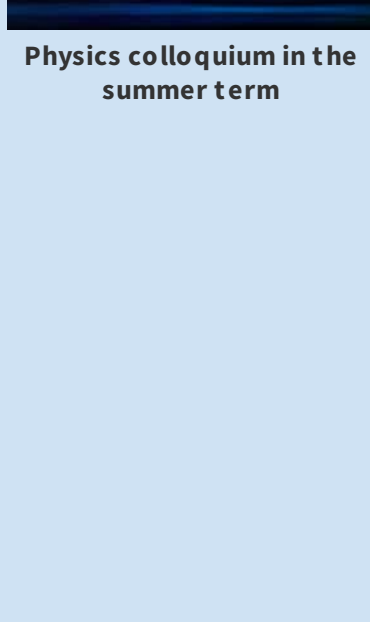


Newsletter Physics 04/23

Department News Research Highlights Events New colleagues



News from the Department



Physics colloquium in the summer term

The program for the physics colloquium in the summer term is fixed! This time, we have a new concept for the colloquium addressing key questions in our society and addressing also non-specialists. The talks will have a general character and will be given by leading representatives in research and industry. We will have talks about energy supply, photovoltaic production in Germany, machine learning, battery research, flexible electronics, etc. We would like to welcome everybody, but in particular students and non-scientific employees of the department. The colloquium will take place on Wednesdays 3.30-4.30 pm in the big lecture hall. After the colloquium, we will offer coffee and delicious Klingelhöfer cake giving you the opportunity to meet our speakers.

Das Programm für das Physik-Kolloquium im Sommersemester steht fest! Diesmal haben wir ein neues Konzept für das Kolloquium, das zentrale Fragen unserer Gesellschaft aufgreift und auch Nicht-Fachleute anspricht. Die Vorträge haben einen allgemeinen Charakter und werden von führenden Vertretern aus Forschung und Industrie gehalten. Es wird Vorträge zur Energieversorgung, zur Photovoltaikproduktion in Deutschland, zum maschinellen Lernen, zur Batterieforschung, zur flexible Elektronik geben. Alle sind herzlich willkommen, insbesondere aber Studierenden und auch nicht-wissenschaftliche Mitarbeiter des Fachbereichs. Das Kolloquium findet mittwochs von 15.30-16.30 Uhr im großen Hörsaal statt. Im Anschluss an das Kolloquium wird es bei Kaffee und leckerem Klingelhöfer Kuchen die Möglichkeit geben, unsere Sprecher auch persönlich kennenzulernen.

[poster](#)

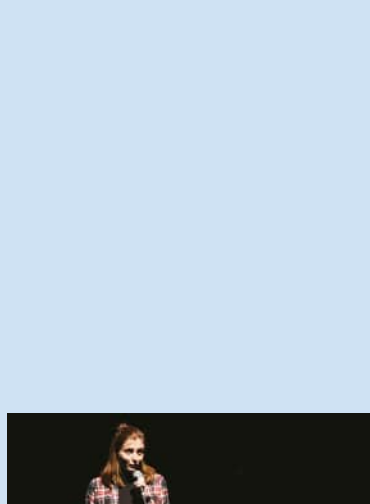


Interview with Andreas Oppermann

In our series of interviews with key people in our department, Sarah Zajusch and Josefine Neuhaus from the PR team interviewed Andreas Oppermann and found out that he was barbecue world champion and has a very special hobby that has absolutely nothing to do with computers. Find out and read the entire interview.

In unserer Interview-Serie mit Schlüsselpersonen in unserem Fachbereich, Sarah Zajusch und Josefine Neuhaus von der Werbegruppe haben Andreas Oppermann befragt und herausgefunden, dass er Grillweltmeister war und ein ganz spezielles Hobby hat, das so rein gar nichts mit Computern zu tun hat. Finden Sie es heraus und lesen das ganze Interview.

[Interview](#)

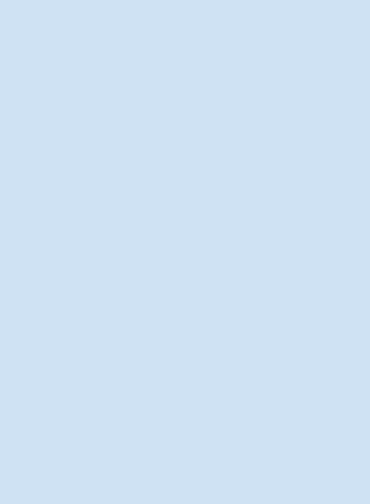


Science Slam 6th of May

Science brought to the point with humour. Science Slam combines science and entertainment, with speakers giving insights into their research in presentations lasting no more than 10 minutes. On Physics Day on 6 May, we offer you and your research, your project, your lecture discovery a stage. Would you like to inspire the audience with language, visualisation, music and charm for what you yourself enjoy? Then register your contribution no later than April 15th! The best presentation will be awarded a 50€ Marburg voucher. We look forward to your contribution!

Wissenschaft mit Humor auf den Punkt gebracht. Science Slam verknüpft Wissenschaft und Unterhaltung, in maximal 10-minütigen Darbietungen geben die Vortragenden Einblicke in ihre Forschung. Am Tag der Physik bieten wir dir und deiner Forschung, deinem Projekt, deiner Vorlesungsentdeckung eine Bühne. Hast du Lust mit Sprache, Bild, Musik und Charme das Publikum für das zu begeistern, woran du selber Freude hast? Dann melde deinen Beitrag bis spätestens zum 15. April! Der beste Beitrag wird mit einem 50€ Marburg-Gutschein prämiert. Wir freuen uns auf deinen Beitrag!

[sign in](#)



Sarah Zajusch wins a Science Slam

"Clear the stage for science!" is the motto of the Science Slam network from Hamburg, which has been bringing scientists from all over Germany on stage for over 10 years. This motto became reality for the PhD student Sarah Zajusch from the surface science group. In the sold-out "Gebäude 9" in Cologne, she and four other "slammys" had to inspire the audience within 10 minutes in a vivid and entertaining way about their own research. Under the title "Zwei Lichter und ein paar Elektronen in der (Halb-)Isolation" Sarah gave a short insight into Two-Photon Photoemission at 2D semiconductors and was chosen as the winner of the evening.

„Bühne frei für die Wissenschaft!“, so lautet das Motto vom Science Slam Netzwerk aus Hamburg, das seit über 10 Jahren Wissenschaftlerinnen und Wissenschaftler aus ganz Deutschland auf die Bühne bringt. Dieses Motto wurde für die Doktorandin Sarah Zajusch aus der AG Oberflächenphysik zur Realität. Im ausverkauften „Gebäude 9“ in Köln galt es für sie und vier weitere „Slammys“, das bunt gemischte Publikum innerhalb von 10 min auf anschauliche und unterhaltsame Weise vom Fachgebiet und der eigenen Forschung zu begeistern. Unter dem Titel „Zwei Lichter und ein paar Elektronen in der (Halb-)Isolation“ gab Sarah einen kurzen Einblick in die Zwei-Photonen-Photoemission an 2D Halbleitern und wurde dafür zur Siegerin des Abends gekürt.

[read more](#)



MINT Summer School for Girls, 3-7 July 2023

The MINT Summer School is an offer for schoolgirls in the E-Phase that provides insights into the different MINT study programmes. In one week, the schoolgirls visit different departments to experience with experiments and in exchange with lecturers and students, what these subjects imply. In this context, the students spend an afternoon at the physics department. More information about the project you can find under "read more" or contact Josefine Neuhaus (josefine.neuhaus@physik.uni-marburg.de).

Die MINT Summer School ist ein Angebot für Schülerinnen der E-Phase, das Einblicke in die unterschiedlichen MINT-Studiengänge gibt. In einer Woche besuchen die Schülerinnen unterschiedliche Fachbereiche, um dort mit Experimenten und im Austausch mit Dozentinnen und Studentinnen zu erfahren, wie in den Fächern gedacht und gearbeitet wird. In diesem Rahmen verbringen die Schülerinnen einen Nachmittag am Fachbereich Physik. Mehr Informationen zu dem Projekt unter dem Button "read more" oder wenden Sie sich an Josefine Neuhaus (josefine.neuhaus@physik.uni-marburg.de)

[read more](#)



Visit of the Gerling Observatory

Visit the Gerling Observatory at "Tag der Physik" on 6 May, "Nacht der Kunst" on 30 June or "Tag des offenen Denkmals" on September 10, 2023!

On October 12, 1841, Christian Ludwig Gerling looked up at the night sky with a telescope for the first time in his newly built observatory. The observatory was in operation for astronomical research until the 1930s. Immerse yourself in the astronomical history of the 19th century at a historic site!

Besuchen Sie die Gerling-Sternwarte am "Tag der Physik" am 6. Mai, "Nacht der Kunst" am 30. Juni oder "Tag des offenen Denkmals" am 10. September 2023! Am 12. Oktober 1841 blickte Christian Ludwig Gerling in seiner neu erbauten Sternwarte zum ersten Mal mit einem Fernrohr in den Nachthimmel. Die Sternwarte war bis in die 1930er Jahre für die astronomische Forschung in Betrieb. Tauchen Sie ein in die astronomische Geschichte des 19. Jahrhunderts an einem historischen Ort!

[read more](#)

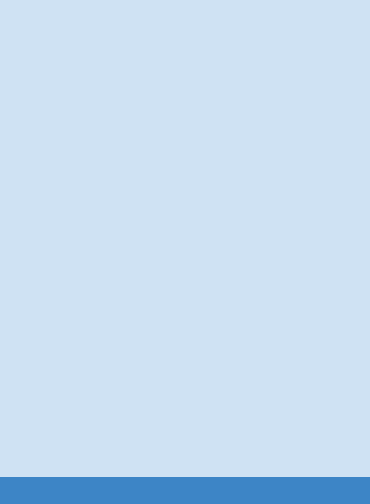


36th Physics University Days - Energy Supply

On February 13-14, the advanced training of physics teachers and many other interested people took place at the Department, for the 36th time. The topic of energy supply was well received, so that 130 visitors on the first day and 90 on the second day were present in the large lecture hall. The department was represented with the introductory lecture (Lukas Wagner) and Efficient Solar Cells (Jan Goldschmidt), and an alumnus (Stefan Gehler) covered the pitfalls of utility grids. The topics of hydrogen, geothermal energy, batteries, regional energy strategies and 1.5 degree compatible living were competently presented by experts.

Am 13.-14. Februar fand die Fortbildung von Physik-Lehrkräften und vielen weiteren Interessierten am Fachbereich statt, zum 36. mal. Das Thema Energieversorgung fand regen Zuspruch, so dass sich 130 am ersten und 90 Besucherinnen und Besucher am zweiten Tag im Großen Hörsaal einfanden. Der Fachbereich war mit dem Einführungsvortrag (Lukas Wagner) und den Effizienten Solarzellen (Jan Goldschmidt) vertreten, ein Ehemaliger (Stefan Gehler) hat die Tücken der Versorgungsnetze behandelt. Die Themen Wasserstoff, Geothermie, Batterien, regionale Energiestrategien und 1,5 Grad compatible Lebensführung wurden von Fachleuten kompetent referiert.

[read more](#)



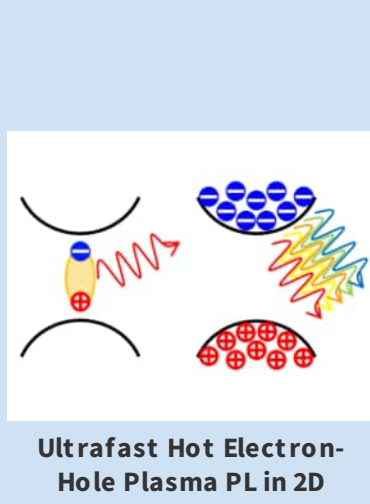
SFB Winterschool in Austria

The SFB 1083's Winter School 2023 took place from 27 February to 3 March at Marburger Haus in Kleinwalsertal, Austria. The 40 participants came from the four collaborating institutions, Marburg, Gießen, Jülich and Leipzig. The event was organized by the SFB student speaker including 29 PhD Students, seven Master students and four postdoctoral researchers. The program started with an official welcome and a first program overview. 17 talks distributed over six sessions at three days were chaired by postdocs and experienced PhD students. The idea was to give introductory talks, such that everyone regardless of the own discipline and scientific experience could follow the topic to broaden the own horizon. Highlights were talks by Carolin Kalff and Dominik Scharf, who presented a detailed lab day of an organic chemist or the talk by Willy Knorr, who gave insights into how to simulate transport characteristics of excitons.

Die Winter School 2023 des SFB 1083 fand vom 27. Februar bis 3. März im Marburger Haus im Kleinwalsertal, Österreich, statt. Die 40 Teilnehmer kamen aus den vier kooperierenden Einrichtungen Marburg, Gießen, Jülich und Leipzig. Die Veranstaltung wurde die Veranstaltung vom SFB-Studentensprecher, dem 29 Doktoranden, sieben Masterstudenten und vier Postdocs angehörten. Das Programm begann mit einer offiziellen Begrüßung und einem ersten Programmüberblick. 17 Vorträge, verteilt auf sechs Sitzungen an drei Tagen, wurden von Postdocs und erfahrenen Doktoranden geleitet. Die Idee war, Einführungsvorträge zu halten, so dass jeder, unabhängig von der eigenen Disziplin und wissenschaftlichen Erfahrung, dem Thema folgen konnte, um den eigenen Horizont zu erweitern. Höhepunkte waren die Vorträge von Carolin Kalff und Dominik Scharf, die einen detaillierten Laboralltag eines organischen Chemikers vorstellten oder der Vortrag von Willy Knorr, der Einblicke in die Simulation von Transporteigenschaften von Exzitonen gab.

[read more](#)

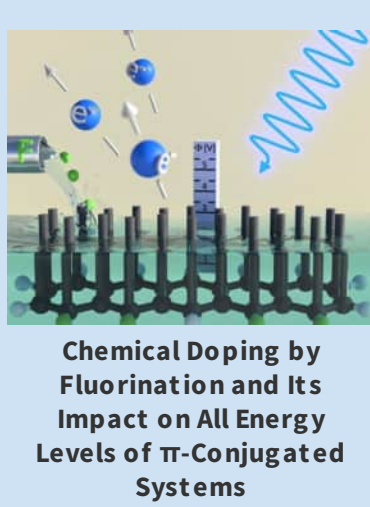
Research Highlights



Shape control in 2D molecular nanosheets (AG Witte)

The fabrication of molecular nanostructures typically relies on self-assembly processes since patterning techniques established for inorganic materials are not generally applicable to organic materials. These processes usually rely on covalent bonds due to their strength and directionality, at the price of complete structural rigidity. Using fluorinated acenes that interact exclusively via van der Waals forces, AG Witte demonstrated control over the shape of 2D molecular islands by variation of the kinetics of structure formation. Kinetic Monte Carlo simulations show that island formation is driven by strong local interactions, which allows to create energetically unfavorable island shapes by thermal treatment. This work is published in **Nature Communications**.

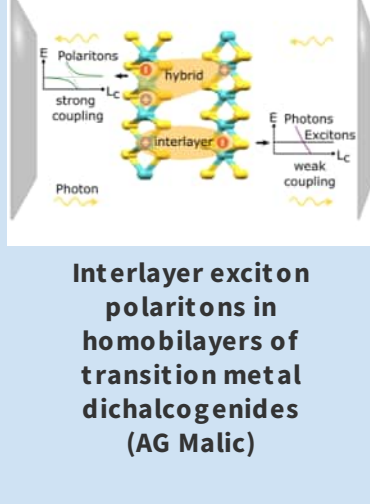
[read more](#)



Ultrafast Hot Electron-Plasma PL in 2D Materials (AG Malic)

2D materials present an ideal platform to study the exciton Mott transition into electron-hole plasma and liquid phases due to their strong Coulomb interactions. In this joint experiment theory work between A. Hartschuh (LMU Munich) and AG Malic, we show that pulsed laser excitation at high pump fluences can induce an exciton Mott transition to an electron-hole plasma in mono and few-layer transition metal dichalcogenides at room temperature. The formation of an electron-hole plasma leads to a broadband light emission spanning from the near infrared to the visible region. The photoluminescence emission at high energies displays an exponential decay that directly reflects the electronic temperature - a characteristic fingerprint of unbound electron-hole pairs recombination. This work is published in **Nanoscale**.

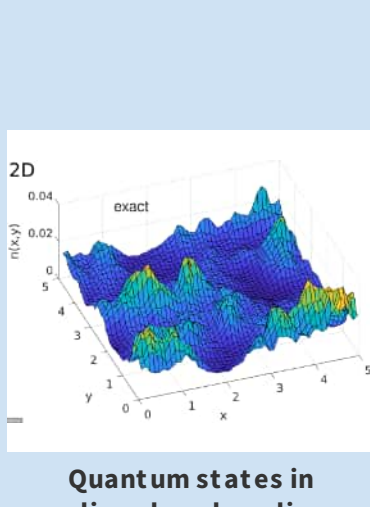
[read more](#)



Chemical Doping and its Impact on All Energy Levels of pi-Conjugated Systems (AG Witte)

Halogenation of organic molecules causes chemical shifts of C1s core level binding energies that are commonly used as fingerprint to identify chemical species. In this study, AG Witte used synchrotron-based X-ray photoelectron spectroscopy (XPS) and density functional theory (DFT) to unravel such chemical shifts by examining different partially fluorinated pentacene derivatives, which were synthesized in the groups of Ulrich Koert (Marburg) and Holger Bettinger (Tübingen). Interestingly, core level shifts occur even for carbon atoms distant from the fluorination positions, yielding a continuous shift of about 1.8 eV with increasing degree of fluorination for pentacenes. The results thus challenge the common picture of characteristic chemical core level energies as fingerprint signatures of fluorinated pi-conjugated molecules. This work was published in the **Journal of Physical Chemistry Letters**.

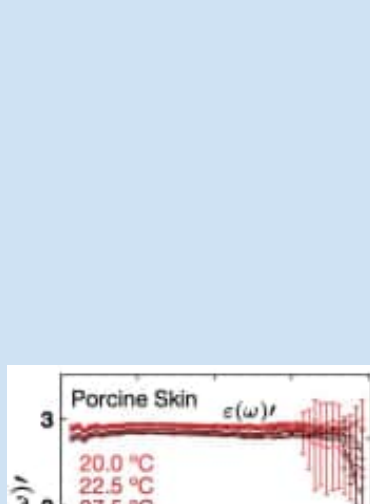
[read more](#)



Interlayer exciton polaritons in homobilayers of transition metal dichalcogenides (AG Malic)

Transition metal dichalcogenides integrated within a high-quality microcavity support well-defined exciton polaritons. While the role of intralayer excitons in 2D polaritonics is well studied, interlayer excitons have been largely ignored due to their weak oscillator strength. Using a microscopic and material-realistic Wannier-Hopfield model, AG Malic demonstrated that MoS2 homobilayers in a cavity support polaritons that exhibit a large interlayer exciton contribution, while remaining visible in linear optical spectra. Interestingly, with suitable tuning of the cavity length, the hybridization between intra- and interlayer excitons can be unmixd due to the interaction with photons. We predict formation of polaritons where more than 90% of the total excitonic contribution is stemming from the interlayer exciton. These findings have a wide relevance for fields ranging from nonlinear optoelectronic devices to Bose-Einstein condensation. This work was published in **2D Materials**.

[read more](#)



Quantum states in disordered media (AG Gebhard)

Short-range disorder potentials govern opto-electronic properties of a wide variety of amorphous materials, perovskites, and semiconductor alloys that are designed for applications in modern electronics. Since the full solution of the Schrödinger equation is too time consuming, new powerful theoretical tools must be designed that reveal the features of electronic states in random potentials. The local, temperature-dependent electron density distribution $n(r,T)$ is of particular interest for determining the charge transport and the optical absorption and emission spectra. AG Gebhard and the guest professor Alexey Anashev developed two powerful techniques to access $n(r,T)$ in a weak disorder potential at low densities. One technique is based on the recursive application of the Hamiltonian to random wave functions. The other technique reduces the full quantum-mechanical problem to a quasi-classical description of $n(r,T)$ using a universal low-pass filter. Both approaches prove to be far superior to currently used techniques. The results are published in two consecutive papers in **Physical Review B**.

[read more](#)



Dielectric function of dehydrated biological samples in the THz band (AG Camus / AG Koch)

Terahertz technology shows a steadily growing potential for the investigation of biological systems and medical diagnoses due to its sensitivity to the presence of water, which can be used as a valuable study parameter. One standard methodology for determining hydration values from terahertz measurements uses the approximation of the tissue through an effective medium theory, forming a volumetric combination of its compound materials. While the optical parameters of parts like air and water are already well studied, an individual analysis of the dry material is needed. Previous performed studies in that field have been carried out under laboratory conditions assuming a temperature independent behavior of these parameters. In this study, AG Koch/Camus show that there actually is a temperature dependent change in the dielectric behavior of the dry material, which has been investigated for a temperature range of 20 to 36.5°C and that concludes in general a necessary consideration for future studies. This work was published in **Biomedical Optics Express**.

[read more](#)

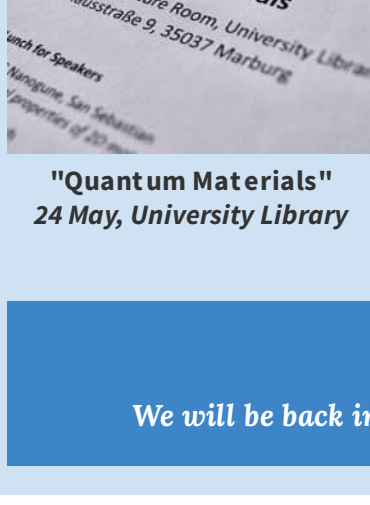
Events



Starry Sky Tour 22 April, 8.30pm Botanical Garden

Join the starry sky tour on 22 April at the Botanical Garden of the University. The planet Venus and the crescent moon waxing dominate the first part of the night. In the Virgo cluster - located between the constellations Leo and Virgo - you find the galaxy M87 with its famous black hole.

[read more](#)



Day of Physics 6 May, 11am - 6.30pm Renthof

On May 6, the Day of Physics will take place in Renthof. The goal is to offer an exciting day for all physics interested people in Marburg and the surroundings. The day is meant to be an advertisement for our department, but it is also an event for all employees and students within the department. We will offer an exciting program for the whole family - from a **physics show** full of fascinating effects to an **interactive experiment street** and a **science slam** in the afternoon. There will also be food from the grill and drinks, so you can spend the whole afternoon with your family at the department.

[read more](#)



"Quantum Materials" 24 May, University Library

On 24 May, there will be a SFB workshop on "Quantum Materials". Nine scientists from different universities will give us insights into their research on 2D materials, perovskites, polymers and other materials. The venue is the lecture room in the University Library, Deutshhausstraße 9. The program will start at 12.50 and end at 5.15 pm.

[read more](#)

— Easter break —

We will be back in June and wish everyone great Easter holidays.

Share your good news

Your newsletter team: Carina Hlawaty and Ermin Malic

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

