

Vorträge im Physikalischen Kolloquium

Wintersemester 2019/20

Mittwochs 16 Uhr c.t., Hörsaal _111 (EG), Max-von-Laue-Str. 1

20.11.2019 **Apl. Prof. Dr. Olga N. Rosmej** GSI Helmholtzzentrum für Schwerionenforschung
Darmstadt, Goethe-Universität Frankfurt am Main

Antrittsvorlesung

Physics with intense lasers

The PHELIX-laser system at GSI-Darmstadt provides a great opportunity for a variety of experiments in the field of High Energy Density physics, particle acceleration, generation of MeV gamma-sources and laser driven nuclear reactions. During the last decade twelve experimental projects using intense laser beam or a combination of laser and ion beams have been carried out at GSI with participation of students from the Plasma Physics group of the Goethe University.

In the talk I will highlight two experimental campaigns: one on measurements of the increased energy loss of heavy ions in laser produced plasmas, where a worldwide unique combination of the ion beam from the UNILAC and the synchronized high energy ns PHELIX laser pulse was used. Another one deals with the interaction of sub-ps laser pulse of relativistic intensity with structured polymer targets that leads to the production of very directed, highly charged electron beams with a cut-off energy up to 100 MeV. Interaction of such energetic electrons with high Z materials gives rise to high yield of gamma-driven nuclear reactions with threshold energies beyond 20 MeV. This opens a new path to nuclear photonics at rather moderate relativistic laser intensities.

04.12.2019 **Prof. Dr. Dominik Schwarz**, Universität Bielefeld

Tension, crisis, or hot air --- The status of cosmology

Increasingly precise measurements in observational cosmology challenge our current understanding of the evolution and composition of the Universe. Local and cosmic inference of the Hubble-Lemaître expansion rate disagree by a statistically significant amount. The strength of large-scale clustering as measured by means of weak gravitational lensing is in tension with its inferred strength from the study of the cosmic microwave background fluctuations.

Other tensions include anomalies of the cosmic microwave sky at the largest angular scales and the cosmic radio dipole. In this colloquium I will review the status of modern cosmology in view of these observational puzzles.

11.12.2019 Prof. Dr. Achim Wixforth, Universität Augsburg

The perfect wave

Many materials provide quite remarkable features in terms of their mechanical, electronic, magnetic or optical properties. Semiconductor structures and layered systems thereof for example have revolutionized our daily life over the last few decades. Moreover, if reduced to the nanometer scale, a wealth of novel properties and physical effects emerged that are partially already exploited technologically. However, some other materials have their own particular specialities that cannot be accomplished by semiconductors alone. By the deliberate realization of hybrid nanostructures consisting of semiconductors and piezoelectric oxides, or soft matter materials like supported membranes and elastomers we are able to create functional nanosystems that aim towards 'the best of both worlds' in such hybrids.

In my talk, I will present a few examples for functional hybrid nanosystems for photonic, electronic and even medical/biological applications. By letting Surface Acoustic Waves interact with these hybrids, novel tunable functionalities can be created that are only possible by combining very different material classes.

18.12.2019 Dr. Frank Nerling, Goethe-Universität Frankfurt am Main, GSI Helmholtzzentrum für Schwerionenforschung Darmstadt

Antrittsvorlesung

Tetraquarks -- Do they matter

The recently discovered XYZ states in the charmonium region are discussed to be exotic states. The subject of hadron spectroscopy and QCD bound states is introduced. A selection of relevant results obtained by the BESIII experiment are presented. Moreover, unique possibilities of the upcoming PANDA experiment to contribute to solve the XYZ puzzle are discussed.

05.02.2020 Prof. Dr. Aleks Kurkela, CERN Theoretical Physics Department

QCD in the cores of neutron stars

Neutron stars are the densest astrophysical objects in the universe. The cores of neutron stars reach densities that are as high as those realized in ultrarelativistic heavy-ion collisions where ordinary nuclear matter melts into a new phase of matter: quark matter. This naturally raises the question: does quark matter also exist inside neutron stars? In my talk, I describe how recent advancements in the theory of superdense matter and in observations of neutron stars - such as the LIGO/Virgo detection of gravitational waves arising from merger of two neutron stars - can inform us about what lies in the centers of neutron stars.

12.02.2020 Dr. Thorsten Vehoff, Heraeus Noblelight GmbH

Als promovierter Physiker in der Industrie

Im Vortrag werde ich über eine Industriekarriere als Alternative zu einem Werdegang an der Universität sprechen. Dabei geht es zum einen um die Bewerbung und die eigene Positionierung für den weiteren Aufstieg. Zum anderen um eine Reihe an möglichen Arbeitsfeldern von der Computersimulation (Molekulardynamik, Finite

Elemente, etc.) über Technologieberatung, OLED Design, Fehlersuche bis hin zu UV LED Strahlern und letztlich Projekt- und Teamleitung.
