

HK 16: Hauptvorträge I

Zeit: Dienstag 11:00–13:00

Raum: HZ 1+2

Hauptvortrag HK 16.1 Di 11:00 HZ 1+2
Laser Spectroscopic Determination of Nuclear Ground-State Properties — ●WILFRIED NÖRTERSCHÄUSER — Technische Universität Darmstadt, Institut für Kernphysik

Ground-state properties of nuclei can be extracted from the optical spectrum of an isotope or isomer with high accuracy and independent of a specific nuclear model. Particularly for short-lived isotopes, this is the method of choice to determine spins, magnetic dipole and electric quadrupole moments, and changes in nuclear charge radii along a chain of isotopes. Spectroscopy of stable isotopes is often used to calibrate the atomic parameters required to extract the nuclear property or to determine reference values. Moreover, laser spectroscopic techniques can also be used to prepare ion beams in a specific energy level, charge state, or polarized beams. This can facilitate the determination of nuclear ground-state properties as well as other atomic physics and nuclear physics experiments. Recent progress in these fields is presented.

Hauptvortrag HK 16.2 Di 11:40 HZ 1+2
The origin of heavy elements — ●ALMUDENA ARCONES — TU Darmstadt

Where in the universe are heavy elements, like gold and uranium, synthesized? How are these elements produced? These are two exciting and interdisciplinary questions in nuclear astrophysics today. The favored candidates are core-collapse supernovae and neutron star mergers where extreme conditions enable the rapid neutron capture process (r-process). Recent advance in hydrodynamic simulations with improved microphysics can be combined with observations of the old-

est stars to bring new insights about the astrophysical sites of the r-process. On the experimental side of nuclear physics research, a new era for nuclear astrophysics will start with the new-generation facilities, like FAIR, which will advance the experimental frontier towards the heaviest neutron-rich isotopes. In this talk, new results on nucleosynthesis in core-collapse supernova and neutron-star mergers will be discussed together with the impact that nuclear physics has on the origin of heavy elements.

Hauptvortrag HK 16.3 Di 12:20 HZ 1+2
Thermalization Dynamics in Ultra-Relativistic Nuclear Collisions — ●JUERGEN BERGES — ITP Heidelberg

In recent years, significant progress in a first principles understanding of non-Abelian plasmas out-of-equilibrium has been achieved in two limiting cases. One of these is the study of the strong-coupling limit using gauge-string dualities in supersymmetric Yang-Mills theories. The other case that is amenable to ab initio calculations is Quantum Chromodynamics in the weak-coupling limit. The colliding nuclei in this limit are described in the Color Glass Condensate framework. The dynamics of the non-equilibrium Glasma created in such a collision is that of highly occupied gluon fields with given typical momentum. Since the characteristic occupancies are large, the gauge fields are strongly correlated even for small gauge coupling. The dynamics of highly occupied gauge fields is classical in nature and can be studied from first principles using real-time lattice gauge theory techniques. I'll report on the largest real-time simulations to date and how they provide unprecedented quantitative understanding of the thermalization process.