

HK 62: Invited Talks III

Time: Friday 11:00–12:30

Location: Kurt-Alder HS Chemie

Invited Talk HK 62.1 Fri 11:00 Kurt-Alder HS Chemie
New insights into the QCD phase diagram — ●FABIAN RENNENCKE — Institut für Theoretische Physik, Justus-Liebig-Universität Giessen

The phase diagram of quantum chromodynamics (QCD) is of paramount importance for nuclear and particle physics. It tells us how nuclear matter emerged from the quark-gluon plasma of the hot early universe and how the dense interior of neutron stars looks like. Through collisions of heavy ions at relativistic energies and multi-messenger signals from neutron stars and their mergers, we can get a glimpse of the QCD phase diagram and, hence, also a glimpse into the inner workings of strongly interacting matter. The region of the phase diagram relevant for the description of the cores of neutron stars and upcoming heavy-ion collision experiments, such as the Compressed Baryonic Matter experiment at FAIR, is largely unknown. However, a lot of progress has been made in recent years in understanding this region. I will discuss some of the latest developments, with a focus on the ongoing search for the critical endpoint of the chiral phase transition, the possibility for crystalline phases in hot and dense QCD matter, and their experimental signatures.

Invited Talk HK 62.2 Fri 11:30 Kurt-Alder HS Chemie
Overview of the BGOOD experiment at ELSA, Bonn — ●RACHELE DI SALVO for the BGOOD-Collaboration — I.N.F.N., Sezione di Roma Tor Vergata

The BGOOD experiment at the ELSA facility combines a forward spectrometer and a large solid angle central calorimeter, thus providing a hermetic coverage and a unique tool for the detection of both charged and neutral particles. The experiment, complementary to other setups working in the same physics sector, allows a systematic investigation of the nucleon excitation spectrum and the search for the so-called missing resonances, via strange and non-strange meson photoproduction. In the last years focus has been put also on the investigation of uncon-

ventional multi-quark states in the (hidden-)strange sector, in analogy to what happens in the (hidden-)charm one, where states interpreted as penta- and tetraquarks have been found. For the investigation of such loosely bound meson-baryon molecular systems, the opportunity (provided by the BGOOD apparatus) to access the low momentum transfer region, where the meson is detected at very forward angles, is crucial. I will give a short overview of the main results obtained at this experiment in the recent years.

Invited Talk HK 62.3 Fri 12:00 Kurt-Alder HS Chemie
Precision experiments with undressed radioactive atoms — ●YURY LITVINOV — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

Storage of freshly produced secondary particles in a storage ring is a straightforward way to achieve the most efficient use of the rare species as it allows for using the same precious secondary ion multiple times. Employing storage rings for precision physics experiments with highly-charged ions (HCI) at the intersection of atomic, nuclear, plasma and astrophysics is a rapidly developing field of research. The number of physics cases is enormous. In the focus of this presentation will be the most recent results obtained at the heavy-ion rings at GSI in Germany, at IMP in China, and at RIKEN in Japan.

Apart from routinely conducted precision mass measurements of short-lived rare nuclei, storage rings are utilized for investigations of radioactive decays of mass-resolved HCIs. Decay properties of HCIs can be very different from the ones known in neutral atoms: Specific decay channels can be blocked or new ones can become open. Furthermore, in-ring nuclear reaction studies profit from the beam cooling combined with internal ultra-thin ultra-pure windowless gas targets, thereby achieving high angular and energy resolution.

The experiments performed at the operating storage rings will be put in the context of the research programs in a worldwide context, where, thanks to fascinating results obtained, a number of new projects is planned.