

## HK 41: Invited Talks III

Time: Thursday 11:00–12:30

Location: H-HS X

**Invited Talk** HK 41.1 Thu 11:00 H-HS X  
**Highlights from the COMPASS Experiment and the COMPASS++/AMBER Proposal** — ●BORIS GRUBE for the COMPASS-Collaboration — Physik-Department E18, Technische Universität München

With COMPASS, the largest multi-purpose fixed-target spectrometer setup at the CERN Super Proton Synchrotron, the structure and spectrum of hadrons is investigated by scattering high-energetic hadrons and polarized muons off various targets. The broad physics program aims at a better understanding of the strong interaction, which is theoretically described by quantum chromodynamics (QCD). The studied processes include soft reactions of hadrons to test the breaking of the chiral symmetry of QCD, production and decay of meson resonances to perform detailed studies of the excitation spectrum of light-quark mesons, and scattering of high-energy muons and pions off nucleons to unravel the role of spin and internal dynamics of the quark-gluon structure in the nucleon. We will present highlights from recent analyses.

Based on the very successful running of COMPASS, the new COMPASS++/AMBER experiment was proposed recently. The physics program entails a wide variety of measurements addressing fundamental questions of QCD. We will discuss the first part of the proposed program, which is intended to start 2021 and aims, among other things, at a measurement of the proton radius via elastic scattering of high-energetic muons in order to shed more light on the proton-radius puzzle.

**Invited Talk** HK 41.2 Thu 11:30 H-HS X  
**The charm of exotic bound states of the strong interaction** — ●FRANK NERLING — Goethe-Universität Frankfurt & GSI Darmstadt  
 Exotic hadrons beyond the simple quark model are allowed for and predicted within quantum chromodynamics. They offer laboratories

to study the strong interaction. Experimental searches are performed since decades, however, most of them were not conclusive yet. Since the beginning of the millenium, a new era has begun with the discovery of the so-called charmonium-like (exotic) XYZ states. With the observation of tetraquark candidates, the BESIII experiment has discovered manifestly exotic states in the meson sector. Other facilities such as the upcoming PANDA experiment at FAIR offer unique possibilities to finally clarify the nature of *e.g.* one of the first and most famous XYZ states that still 15 years after the observation is not yet understood.

**Invited Talk** HK 41.3 Thu 12:00 H-HS X  
**Characterizing baryon dominated matter with HADES measurements** — ●SZYMON HARABASZ for the HADES-Collaboration — TU Darmstadt / GSI

In heavy-ion reactions at beam energies of a few GeV per nucleon on stationary targets, QCD matter is substantially compressed (2-3 times nuclear saturation density) while temperatures are expected not to exceed  $T = 70$  MeV. Matter under such conditions is being studied with HADES at SIS18.

This contribution discusses new experimental results on the mechanisms of strangeness production, the emissivity of matter and the role of baryonic resonances herein. The multi-differential representations of hadron and dilepton spectra, collective effects and particle correlations will be confronted with results of other experiments as well as with hitherto model calculations.

To provide a deeper understanding of the temperature and density dependence of the intriguing results obtained in the Au+Au and Ar+KCl runs, HADES has recently completed a run studying Ag+Ag collisions at  $\sqrt{s_{NN}} = 2.55$  GeV, optimized to reach a high enough beam energy for abundant strangeness and vector meson production while yet realizing a large interaction volume. The results obtained for heavy-ion collisions are confronted to studies of elementary reactions serving as a reference for medium effects.