

# Allgemeines Physikalisches Kolloquium

Donnerstag, 11.02.2021 um 16 Uhr c.t.  
Online-Kolloquium

Prof. Dr. Tetyana Galatyuk  
Institut für Kernphysik, TU Darmstadt

## SHINE A LIGHT! WHEN MATTER SHATTERS

What happens when gold nuclei, accelerated to about 90% of the speed of light, strike gold nuclei at rest? For an extremely short time,  $t \sim 10^{-23}$  seconds, states of matter at extreme temperatures ( $10^{12}$  K) and densities ( $> 280$  Mt/cm<sup>3</sup>) are produced. The possibility to form and explore in the laboratory strongly interacting matter under conditions similar to those realized a few microseconds after the "Big Bang", or still existing today in the interior of compact stellar objects is truly fascinating.

Virtual photons, the generalized form of electromagnetic radiation, materialize after short time by formation of a pair of charged leptons, e.g. an electron and a positron. Throughout the course of a heavy-ion collision such photons offer the unique opportunity to directly monitor "Roentgen-images" (in-medium electromagnetic spectral functions) and to measure "Planck-like-spectra" (temperature of the emitting source) of strongly interacting matter. This talk will discuss important experimental results on emissivity of matter obtained by the High Acceptance DiElectron Spectrometer at heavy-ion synchrotron SIS18, GSI-Darmstadt. A deeper understanding of the microscopic origin of the excess radiation requires systematic investigation of di-electron radiation emitted from baryonic resonances produced off protons in pion-induced reactions. These are studied in HADES at GSI making use of pion beams.

