Horia Hulubei National Institute for R&D
in Physics and Nuclear Engineering

IFIN-HH

Seminar general

Probing cosmic forms of matter in the laboratory

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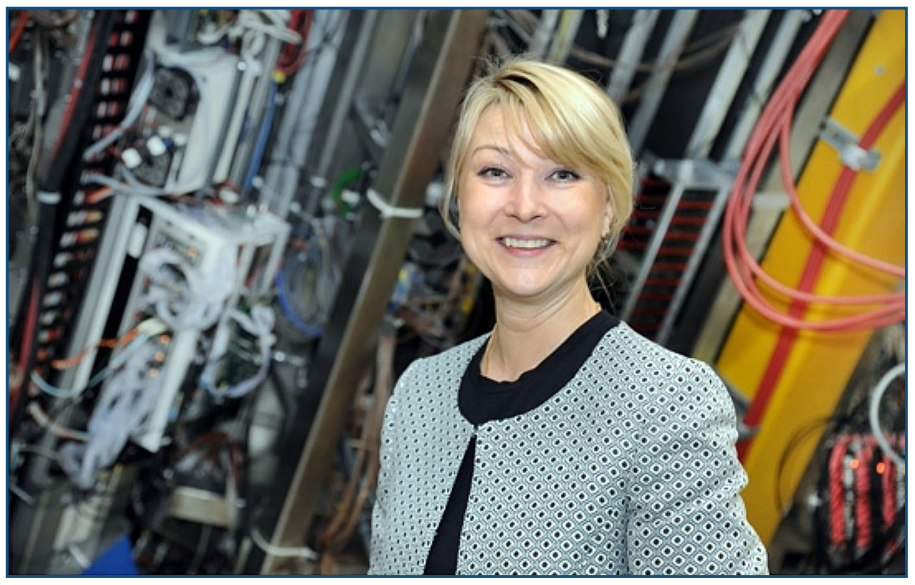

What happens when gold nuclei, accelerated to about 90% of the speed of light, strike gold nuclei at rest? For an extremely short time, $t \sim 10^{-23}$ seconds, states of matter at extreme temperatures (10^{12} K) and densities (>280 Mt/cm^3) are produced. The microscopic properties of the strong-interaction matter under extreme conditions of temperature and density is a topic of great current interest. Despite 18 orders of magnitude difference in system size and time, the conditions present in heavy-ion collisions share great overlap with the conditions of the strong-interaction matter in neutron-star mergers. The possibility to form and explore in the laboratory strong-interaction matter under extreme conditions is truly fascinating.

The relativistic heavy-ion physics program at GSI/FAIR has the potential to discover the most prominent landmarks of the QCD phase diagram expected to exist at high net baryon densities. The measurement of comprehensive set of diagnostic probes offers the possibility to find signatures of exotic phases, and to discover the conjectured first order deconfinement phase transition and its critical endpoint. In this talk I will mention relevant observables to study criticality, emissivity, vorticity and equation-of-state of baryon rich matter. Particular emphasis is put on electromagnetic radiation.

Monday, December 8th, 2025, at 13:00
Hadron Physics Department Conference Hall