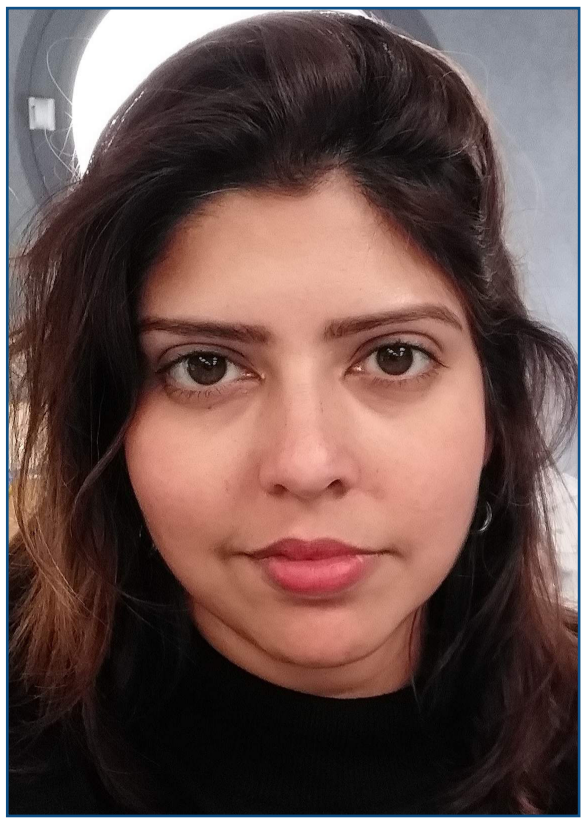
Horia Hulubei National Institute for R&D
in Physics and Nuclear Engineering

IFIN-HH

Seminar general

Hints from Multi-disciplinary Physics to probe dense matter in Neutron Stars



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Ultradense matter in the interior of neutron stars may exceed several times normal nuclear densities. Under such extreme conditions, strangeness may appear in the form of hyperons, which may then affect its global structure and properties. While terrestrial experiments, such as nuclear or heavy-ion collision experiments, provide clues about the behaviour of dense matter, one must resort to theoretical models to extrapolate to unknown regimes at higher density and finite neutron/proton asymmetry relevant for neutron stars. In our recent investigations, we explored the parameter space within the framework of the Relativistic Mean Field model allowed by present uncertainties from state-of-the-art nuclear and hypernuclear experimental data. To restrict the parameter space, we imposed constraints from multidisciplinary physics at different density regimes: Chiral effective field theory, heavy-ion collision data as well as multi-messenger astrophysical observations of neutron stars. We investigated possible correlations between empirical nuclear and hypernuclear parameters with observable properties of neutron stars, which revealed a wealth of information about their interior.

Thursday, October 27, 2022, 11:00

The Training and Research Centre of IFIN-HH