

Physics Cases and Instrumentation for the EURISOL-DF, next step towards Eurisol



Contribution ID: 9

Radioactive Ion Beams

Type: **Going to the limits of mass, temperature, spin and isospin with heavy**

Dynamical aspects of nuclear structure under extreme conditions

Nucleus-nucleus collisions at low and intermediate energies allow one to produce nuclear systems under extreme conditions of excitation energy, density, spin and isospin asymmetry. During the dynamical evolution of these systems nuclear structure manifests itself with correlations between two and more particles that can be studied experimentally by good characterization of the collision event, provided by large solid angle detector setups, and by exploring invariant mass spectroscopy techniques and intensity interferometry. In this context the limits of nuclear existence as a function of a number of parameters can be studied and insights on the equation of state and the symmetry energy can be revealed.

In this field, nuclear structure and dynamics are strongly interconnected. Indeed, in the dilute and hot medium produced during the collisions structure properties of unbound and, often, exotic states can be studied. Some of these structure properties include decay energies, branching ratios and the spin of particle unbound states. Such in-medium properties probe a quantum N-body system composed by nucleons clusters dynamically evolving in a dilute and hot medium. They are thus sensitive also to the equation of state for asymmetric nuclear matter. Example of such studies that point to both dynamics and structure on nuclear systems under extreme conditions are presented with results from high resolution and high solid angle arrays, such as Indra@GANIL, Fazia@LNS, Lassa@MSU. Perspectives with radioactive beams at low and intermediate energies relevant for the Eurisol DF project will be discussed.

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