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Perspectives of NUCLEAR DYNAMICS AND THERMODYNAMICS with Radioactive Ion Beams

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Modern nuclear dynamics and thermodynamics studies are related to the description of the properties of the nuclear matter under extreme conditions. Among them the dependence of nuclear matter symmetry energy on nuclear density and temperature is one of the most interesting problems. However, the symmetry energy is not a directly measurable quantity and has to be extracted indirectly from observables which are related to it through model predictions.
Other microscopic properties, related to the transport theory, like the viscosity parameter and the in medium n-n cross sections can be addressed through dynamical studies. The thermodynamics, especially through the study of the de-excitation of hot nuclear systems, gives access to macroscopic properties like the level density parameter or the limiting Temperature and the maximum Excitation Energy which a nuclear system can sustain. The studies performed with stable beams are the first step in an effort to constrain these properties of the nuclear matter, moving in a region up to extreme values in terms of excitation energy and angular momentum. With the advent of facilities like SPES, SPIRAL2 and ISOLDE new measurements will be carried out with accelerated radioactive beams as a function of extreme values of isospin, in order to gain new insight for nuclear models in the region far from the stability.

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