

Isospin Transport in Heavy Ion Collisions

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Abstract

Heavy Ion Collisions represent the only way to study the nuclear interaction in regions away from normal conditions and therefore to "explore" the nuclear Equation of State (EOS).

This is particularly important for the isovector part of the in-medium interaction. We remind the interest in a better knowledge of the symmetry energy at subsaturation densities (see neutron skin, Giant Dipole Response, Neutron Star Crust...) as well as at high baryon densities (see Neutron Star Bulk and Cooling, Deconfinement Transition...). The momentum dependence of the Symmetry Potential, i.e. the splitting of the neutron/proton effective masses in asymmetric matter, is also a still open problem with several fundamental implications.

Transport models, based on semiclassical kinetic equations suggested in the pioneering work of David Brink, have now reached a great degree of accuracy. The talk will be focussed on the reaction observables which appear most sensitive to the isospin dynamics in collisions of charge asymmetric ions in a wide range of beam energies, from 20 MeV to few GeV per nucleon.

Fermi energies:

- Competition of Dissipative Reaction Mechanisms
- Isospin Distillation in Spinodal Instabilities
- Isospin Migration in Neck Fragmentation
- Fast Particle Emission

Relativistic Energies:

- High density cluster formation
- Collective Flows
- Pion/Kaon production
- Isospin Transparency
- Deconfinement Precursors.

Several suggestions are emerging for a physics of "violent" collisions with Radioactive Beams.