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Constraints on the nuclear Equation of State from heavy ion reaction dynamics

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Recent results connected to nuclear collision dynamics, from low up to intermediate energies, will be reviewed. Direct reactions can carry important information on yet unknown aspects of the nuclear effective interaction, relating to the excitation of isospin and spin-isospin modes.
Dissipative heavy ion reactions offer the unique opportunity to probe the complex nuclear many-body dynamics and to explore, in laboratory experiments, transient states of nuclear matter under several conditions of density, temperature and charge asymmetry. Transport models are an essential tool to undertake the latter investigations and make a connection between the nuclear effective interaction and sensitive observables of experimental interest.
In this talks, I mainly focus on the description of a selection of reaction mechanisms, also considering comparisons of predictions of different approaches. This analysis can help understanding the impact of the interplay between mean-field and correlation effects, as well as of in-medium effects, on reaction observables, which is an essential point also for extracting information on the features of the nuclear effective interaction and on the nuclear Equation of State.

Author: Dr COLONNA, Maria

Presenter: Dr COLONNA, Maria

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