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La matière nucléaire : contraintes expérimentales avec le couplage INDRA-FAZIA au GANIL

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The study of fragmentation reactions produced in heavy-ion collisions has permitted major advances in the understanding of the dynamics and thermodynamics of nuclear matter and is still one of the most promising tools to constrain its equation of state. This fundamental property in nuclear physics is also a crucial ingredient in the understanding of various astrophysical objects or phenomenon: dynamics of supernovae explosion and structure of the remanent neutron star, or interpretation of signals coming from neutron star mergers such as gravitational waves.

Up to now, a crucial ingredient was missing in most laboratory experiments: the isotopic composition of reaction products was only accessible for the lightest fragments with existing multi-detectors such as INDRA at GANIL (Caen, France). In this context, the FAZIA collaboration has developed a new generation detector able to measure the charge and mass of fragments up to Z=25 with a spectrometer-like resolution over a broad angular range. Since 2019, twelve FAZIA blocks are mounted in GANIL to replace the forward part of INDRA. The INDRA-FAZIA coupling is one of the most powerful detector to constrain the nuclear equation of state asymmetry term. The identification quality also allows to investigate nuclear collision dynamics, clusterization processes at low density, and light nuclei structure and decay modes.

In this presentation I will briefly present the unique features of the INDRA-FAZIA coupling and review the results obtained at GANIL in recent years.

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