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Séminaire de Physique Nucléaire Théorique

The nuclear symmetry energy and the breaking of the isospin symmetry : how do they reconcile with each other ?

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A deeper understanding of the density dependence of the symmetry energy would be highly needed, because the accurate characterization of the symmetry energy entails profound consequences for the study of the neutron distributions in nuclei along the whole nuclear chart, as well of other properties of neutron-rich nuclei. The symmetry energy is also of paramount importance for understanding the properties of compact objects like neutron stars.
The Isobaric Analog State (IAS) is one of the well established properties of nuclei that is measured accurately, and is dominantly sensitive to the isospin symmetry breaking (ISB) in the nuclear medium due to Coulomb interaction. In several microscopic calculations, it was found that there is an inconsistency between the properties of the symmetry energy and our knowledge of the Isobaric Analog State (IAS) and of the ISB forces. We will discuss how to solve this problem by the state-of-the-art fully self-consistent HF+RPA calculations of all possible contributions to the excitation energy of IAS with Skyrme-type EDF.

X. Roca-Maza and G. Colo and H. Sagawa, Phys. Rev. Lett. 120, 202501 (2018).

Jeudi 6 Septembre 2018
11 :30
IJCLab, Bât. 100, Salle Bâtiment 100, Salle A015