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Séminaire de Physique Nucléaire Théorique

Bubble nuclei and finite-size instabilities in mean-field calculations.

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Finite-size instabilities are unphysical phase transitions that plague several parameterizations of effective interactions used in self-constistent mean-field calculations. They take the form of large-amplitude oscillations of the isovector density, or the vector (spin) density if time reversal symmetry in not enforced. I will briefly review a study we made concerning the isovector instabilities and discuss a quantitative tool that we have developed in order to detect and avoid them during the fit of the parameters of an interaction. Since the so called bubble (or semi-bubble) nuclei show significant oscillations in proton and neutron densities often quantified by a depletion factor, it is interesting to see how the proximity of an isovector instability may be correlated with this depletion factor. Finally, I will revisit some results for several nuclei considered as having a possible bubble structure and question the predictive power of the zero or finite-range interactions used for these predictions.

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