

Weakly bound systems, continuum effects, and reactions

mardi 9 octobre 2012 09:00 (40 minutes)

We will review recent progress in the Shell Model description of nuclear open quantum systems by introducing the Gamow Shell Model and the real-energy Continuum Shell Model. The interplay between Hermitian and anti-Hermitian (through the decay channels) configuration mixing in open quantum systems creates complicated collective phenomena such as the resonance trapping and the super-radiance, the cluster states in the vicinity of cluster-decay threshold, the multichannel coupling effects in reaction cross-sections and shell occupancies, the modification of spectral fluctuations, etc. Applications of these two models in studies of nuclear spectra and binding energies, exotic particle decays and nuclear reactions of astrophysical interest will illustrate some of those generic open quantum system phenomena in the context of nuclear physics.

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Classification de Session: Weakly bound quantum systems and reactions

Classification de thématique: Weakly-bound quantum systems and reactions