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Weakly bound systems, continuum effects, and reactions

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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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