Continuum shell model description of weakly bound and unbound nuclear systems

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Impressive progress has been achieved over last few years in the development of shell model for weakly bound or unbound nuclear states. The real-energy continuum shell model (the so-called Shell Model Embedded in the Continuum [1]) has been extended to treat the two-particle continuum and applied for the description of two-proton radioactivity [2][3]. The shell model in the complex k-plane (the so-called Gamow Shell Model (GSM)) [4] has been formulated using a complex Berggren ensemble and applied for binding energies and energy spectra of bound and unbound neutron-rich helium and lithium isotopes [5], spin-orbit splittings [6] and spectroscopic factors [7].

In this framework, we shall discuss recent results involving spectra, p-capture reaction cross-sections, binding systematics, nuclear radii, spectroscopic factors and one-neutron overlap integrals for neutron-rich drip-line nuclei. In this discussion we shall concentrate mainly on near-threshold continuum coupling phenomena. Moreover, salient features of level degeneracies in both integrable and non-integrable open quantum systems will be discussed [8].

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