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New developments in the nuclear binary cluster-Core in the Super-Heavy Nuclear region

The atomic nucleus is a complex many-body interacting system, which exhibits a underlying correlated set of nucleon states. The clustering model is one of the most reliable models that predicts the strongly correlated subsystem of nucleons closed to the threshold decay of nuclei. The binary-cluster model describes the structure and decay properties of super-heavy nuclei.

The phenomenological Cubic Woods-Saxon potential, developed by Buck, Merchant and Perez, has successfully predicted a number of experimental observables associated with clustering phenomenon. The recently developed microscopic double folded M3Y potential results in the inverted spectra for the positive parity excited cluster states, but successfully predicts the decay half-life for alpha-Pb system. These shortcomings of the M3Y based microscopic binary cluster model lead to the newly developed hybrid code-cluster potential, obtained by fitting the Phenomenological Woods-Saxon Cube and the M3Y double folding at the surface region where the two potential coalesce.

The project presented will give an overview of the nuclear cluster models available. Furthermore the recently developed self-consistent relativistic mean-field cluster-core description will be presented.

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