
ALPHA CLUSTERING IN THE MODERN SHELL MODEL APPROACH

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In this presentation we summarize our progress in the study of α -clustering. We use the modern configuration interaction approach with advanced realistic shell-model Hamiltonians, both effective and ab-initio, in order to study clustering phenomena; the study is facilitated by the algebraic properties of many-nucleon configurations in the harmonic oscillator basis. Using a translationally invariant formalism we built cluster channels that satisfy the Pauli exclusion principle as well as orthogonality and normalization conditions. We discuss the alpha spectroscopic factors of low-lying states, study the distribution of clustering strength, and address the structure of effective 4-body operators that are relevant for in-medium alpha dynamics in multi-shell configuration spaces. We address interplay of clustering, pairing, collective particle-hole excitations, and decay processes, exploring both model and realistic examples.

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REFERENCES

[1] A. Volya and Y. M. Tchuvil'sky, Phys. Rev. C **91**, 044319 (2015).