INSTITUTE OF NUCLEAR & PARTICLE PHYSICS INPP @OHIO UNIVERSITY

Exploration of the *N=8* island of inversion in the beryllium isotopes

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Neutron-rich beryllium isotopes have garnered significant interest due to the apparent breakdown of the *N = 8* shell closure evidenced by party inversion in ^{11}Be and the intruder ground state in ^{12}Be. The appearance of this island of inversion in beryllium isotopes is thought to be tied to the emergence of shape coexistence arising from the interplay of collectivity, e.g., formation of alpha clusters, which prefers a more deformed nuclear shape and the tendency of low lying states to revert to a more spherical shape at a shell closure. However, in these light nuclei, information on nuclear shape, particularly for excited states, is challenging to extract experimentally. But, with ab initio no-core shell model (NCSM) predictions for beryllium isotopes in reasonable agreement with known experimental values, we can take the ab initio calculated wave functions as reasonable approximations of the physical wave function. Observables associated with nuclear shape such as radii, quadrupole moments, and deformation can then be directly calculated. In this talk I present NCSM predictions for these shape observables for $^{10-13}$Be.

In trying to understand the evolution of the structure, it can be helpful to consider simple models which approximately describe the observed behavior. In particular, a simple rotational model which can be tied to both microscopic correlations as well as collective rotational dynamics and nuclear deformation is given by Elliott's SU(3) rotational model. I will also discuss how consistent this simple picture is with the ab initio results.

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4:00 pm

Lindley Hall room 321