Contribution ID: **28** Type: **Poster**

Deformation in one-neutron halo nuclei using halo effective field theory

Tuesday 23 September 2025 20:12 (1 minute)

Halo nuclei are exotic nuclear structures found far from stability near the dripline. Unlike stable nuclei, halo nuclei exhibit a large matter radius. This peculiar feature is the result of their strongly clusterised structure. They can be seen as a compact core to which one or two valence neutrons are loosely bound. Due to the quantum tunnel effect, they exhibit a high presence probability at a large distance from the other nucleons. Being located far from stability halo nuclei are mostly studied through reactions. To describe these reactions, it is essential to have reliable few body models of halo nuclei. This can be achieved by resorting to the halo effective field theory (Halo-EFT).

In this talk, I propose a simple structure model to account for deformation in one-neutron halo nuclei. I develop the Halo-EFT particle-rotor model to describe one-neutron halo nuclei, which takes core excitation into account. I solve the resulting coupled-channel equations, using the R-matrix method on a Lagrange mesh. Last, I study the impact of core excitation on the wave functions and scattering phaseshifts for bound and resonant states. Depending on the studied nucleus, a comparison between my results and some high-precision ab initio or microscopic calculations is also provided. Structure and reaction calculations for 11Be, 17C and 19C will be presented.

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Session Classification: Poster session

Track Classification: Nuclear Structure, Spectroscopy and Dynamics