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Exploring N=28 isotones: A quest for two-neutron halos within three-body framework

Thursday, 27 June 2024 15:00 (20 minutes)

The latest generation of radioactive ion beam facilities provides unparalleled access to neutron-rich unstable isotopes. One of the areas of active investigation is the study of the shell evolution near the neutron magic numbers $N=20$ [1-4] and $N=28$ [5-6] for such unstable nuclei. The nuclei near these magic numbers display exotic structural features such as dampening of shell gaps, formation of halos, and deformed structures.

Recently, the ^{29}F system, a light neutron-rich $N=20$ isotone, was identified as the heaviest two-neutron Borromean-halo nucleus found till date [1-4]. Motivated by this observation, it is interesting to explore the “ $N=28$ ” shell closure for nuclei with a small proton number as well, to see whether we can find similar Borromean structure formation.

In this talk, I will compare and contrast the shell evolution across the neutron magic numbers $N=20$ and 28 within a three-body (core+N+N) framework based on the hyperspherical-harmonics formalism by using an analytical-transformed harmonic-oscillator basis. New three-body results will be presented for the ground state structural properties of putative two-neutron Borromean halos in Na and Mg isotopes with $N=28$ [7].

- [1] S. Bagchi, *et al.*, PRL **124**, 222504 (2020).
- [2] J. Singh, *et al.*, PRC **101**, 024310 (2020).
- [3] J. Casal, J. Singh, *et al.*, PRC **102**, 064627 (2020).
- [4] L. Fortunato, *et al.*, Commun. Phys. **3**, 132 (2020).
- [5] D. S. Ahn, *et al.*, PRL **129**, 212502 (2022).
- [6] K.Y. Zhang, *et al.*, PRC **107**, L041303 (2023).
- [7] Jagjit Singh *et al.*, arXiv:2401.05160 [nucl-th] (2024).

Collaboration

Primary author: SINGH, JAGJIT (University of Manchester, UK)

Co-authors: CASAL BERBEL, Jesús (Universidad de Sevilla, Spain); HORIUCHI, Wataru (Osaka Metropolitan University, Japan); WALET, Niels R. (University of Manchester, UK); SATULA, Wojciech (University of Warsaw, Poland)

Presenter: SINGH, JAGJIT (University of Manchester, UK)

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