Probing structure and reactions of two-neutron halos in the N=28 isotones: ^{40}Mg and ^{39}Na

Jagjit Singh[1], J. Casal[2], W. Horiuchi[3], N. R. Walet[1], and W. Satuła[4]

[1]*Department of Physics and Astronomy, The University of Manchester, Manchester M13 9PL, UK*

[2]*Departamento de Física Atómica, Molecular y Nuclear, Facultad de Física, Universidad de Sevilla, Apartado 1065, E-41080 Sevilla, Spain*

[3]*Department of Physics, Osaka Metropolitan University, Osaka 558-8585, Japan*

[4]*Institute of Theoretical Physics, Faculty of Physics, University of Warsaw, ul. Pasteura 5, PL-02-093 Warsaw, Poland*

The advent of cutting-edge Rare Isotope Beam (RIB) facilities has revolutionized our exploration of the nuclear landscape, providing us access to the neutron-rich shores of the nuclear chart. This exciting era has triggered intense theoretical and experimental investigations into exotic nuclear structures, particularly two-neutron halos at the low-Z coast of the Island of Inversion with and around the neutron magic numbers N=20 and N=28 [1-9].

In this talk, I will discuss few-body insights into the structure and reactions of two-neutron halos with *N=28* in Na and Mg isotones [9]. I will explore key structure observables of two-neutron halos within a three-body (core+*n*+*n*) framework based on the hyperspherical-harmonics formalism by using an analytical-transformed harmonic-oscillator basis. This includes configuration mixing, matter radius, and neutron-neutron correlations. For the reaction aspect, I will discuss the total reaction cross-section estimates within the conventional Glauber reaction theory. The discussion will cover results for the heaviest observed 2n-halo nucleus, ^{29}F [2-4], as well as potential two-neutron halo candidates in sodium (^{39}Na) [9], and magnesium (^{40}Mg) [9] isotopes. I will also discuss our preliminary results of the electric dipole (E1) response of ^{40}Mg.

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