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Neutron Skin Effects in Mirror Energy Differences: The Case of 23Mg-23Na

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Energy differences between analogue states in the T=1/2 ^{23}Mg-^{23}Na mirror nuclei have been measured along the rotational yrast bands with the EXOGAM + Neutron Wall + DIAMANT setup at GANIL. The nuclei of interest have been populated via the ^{12}C+^{16}O fusion evaporation reaction.
This allows us to search for effects arising from isospin-symmetry breaking interactions (ISB) and/or shape changes. Data are interpreted in the shell model framework following the method successfully applied to nuclei in the $f_{7/2}$ shell.
It is shown that the introduction of a schematic ISB interaction of the same type of that used in the $f_{7/2}$ shell is needed to reproduce the data.
An alternative novel description, applied here for the first time, relies on the use of an effective interaction deduced from a realistic charge-dependent chiral nucleon-nucleon potential.
This analysis provides two important results: (i) The mirror energy differences give direct insight into the nuclear skin; (ii) the skin changes along the rotational bands are strongly correlated with the difference between the neutron and proton occupations of the $s_{1/2}$ "halo"orbit.

Primary authors: RECCHIA, Francesco (University and INFN Padova); BOSO, Alberto (National Physical Laboratory); LENZI, Silvia Monica (PD)

Presenter: RECCHIA, Francesco (University and INFN Padova)

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