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Persistence of the Z = 28 shell gap in A = 75 isobars

The evolution of shell structure around doubly-magic exotic nuclei is of great interest in nuclear physics and astrophysics. In the 'south-west' region of ^{78}Ni, the development of deformation might trigger a major shift in our understanding of explosive nucleosynthesis. To this end, new spectroscopic information on key close-lying nuclei is very valuable.

The isomeric and β decay of ^{75}Co, with one proton- and two neutron-holes relative to ^{78}Ni, were studied at the Radioactive Ion Beam Factory (RIBF) in the RIKEN Nishina Center. This very exotic nucleus was produced in in-flight fission reactions of ^{238}U (@ 345 MeV/nucleon) and subsequently studied exploiting the state-of-the-art BigRIPS [1] and EURICA [2] setups.

In this contribution I will discuss the partial β-decay spectra for ^{75}Ni and ^{74}Ni obtained from these data, and report a new isomeric transition in ^{75}Co [3]. The coexistence of spherical and deformed shapes in the region immediately below ^{78}Ni will be discussed in terms of PFSDG-U shell-model calculations, which reproduce well the states observed in ^{75}Ni, but predict the first $1/2^-$ level, the prolate K = 1/2 bandhead, 1 MeV below the observed $(1/2^-)$ state in ^{75}Co.

References:
[1] N. Fukuda *et al.*, Nucl. Instrum. Methods 317, 323 (2013)
[2] P.-A. Söderström *et al.*, Nucl. Instrum. Methods 317, 649 (2013)
[3] S. Escrig *et al.*, arXiv:2101.06246, nucl-ex (2021)

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