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Identification of deformed intruder states in semi-magic 70,72Ni

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The structures of semi-magic 70Ni42 and 72Ni44 were investigated following complementary multinucleon-transfer and secondary fragmentation reactions. Changes to the higher-spin, presumed negative-parity states based on observed γ-ray coincidence relationships improve the agreement with shell-model calculations using effective interactions in the neutron f5/2•p•g9/2 model space. The second 2+ and (4+) states in 70Ni42 can only be successfully described when proton excitations across the Z = 28 shell gap are included. Monte-Carlo shell-model calculations suggest that the latter two states are part of a prolate-deformed intruder sequence, establishing an instance of shape coexistence at excitation energies lower than those observed recently in neighboring 68Ni40.

Including U. of Maryland ANL - MSU - U. of Tokyo - U. of Padua - LBNL - U. of Edinburgh - U. of Aizu Orsay – JAEA - Central Michigan U collaboration
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