Abstract Submitted
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Nuclear shell evolution in the "Island of Inversion"[1] D. MUECHER, Department of Physics, University of Guelph, E. E. PETERS, Department of Chemistry, University of Kentucky, B. A. BROWN, Department of Physics and Astronomy, Michigan State University, N. PIETRALLA, Institute for Nuclear Physics, TU Darmstadt, B. TOKIWA, Department of Physics, University of Guelph, S. W. YATES, Department of Chemistry, University of Kentucky — Recent publications suggest a re-interpretation for the "Island of Inversion" (IOI) around Mg-32 at N=20. In contrast to earlier beliefs, significant amounts of intruder configurations might be present in the ground states of Mg-28 and Mg-30, already [N. Tsunoda et al. PRC 95, 021304(R)]. Also, the excited 0+ state in Mg-32 seems to be dominated by 2p2h and 4p4h contributions [A. O. Macchiavelli et al., PRC 94, 051303(R)]. We here confirm this picture for the region of the IOI around Ni-68, based on large-scale shell model calculations in the fpg shell using the new JJ44C effective interaction. We show that the nature of shell evolution in the IOI is not unique to neutron-rich, exotic nuclei. Instead, the tensor force is essential understanding the transition into the IOI, also affecting the interpretation of R4/2 values. We show that the mixing of np-nh configurations results in characteristic low-lying strong M1 transitions, which we confirm based on new lifetime measurements in 70Zn at N=40. The M1 strength systematics around N=20 and N=40 is found to be correlated with the behaviour of the presumed shape-coexisting 0+ states, offering a re-interpreation of low-lying M1 transitions in medium-light nuclei.

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