

A mini-Wigner effect in p-n interactions in heavy nuclei and the 0[110] transformation in the Nilsson scheme

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Following the discovery of a valence mini-Wigner energy in heavy nuclei [1], the origins of this effect have been studied, leading to the recognition that orbits linked by changes in Nilsson quantum numbers of 0[110] have enhanced p-n interactions. Here, we will review these ideas and then present new results [2] on the spatial overlaps of Nilsson orbits, showing the large values for proton and neutron orbits differing solely by the addition of a single quantum in the z-direction (the ZQT or z-quantum transformation). We will discuss the possibility that these ideas may lead to an alternate way of correlating proton and neutron Nilsson orbits in different shells, and how this may give a new way to understand the locus of the evolution of structure in deformed nuclei with N and Z

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[1]R.B. Cakirli, K. Blaum and R.F. Casten, PRC 82, 061304 (2010)

[2]D. Bonatsos, S. Karampagia, R. B.Cakirli, R. F. Casten, K.Blaum, to be published