Analysis of high-spin isomers in A=128 hole nuclei near ^{132}Sn

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Many exotic and intriguing phenomena have been reported in neutron-rich nuclei near the doubly magic ^{132}Sn. The second abundance peak at $A \approx 130$ appears through the astrophysical rapid neutron capture process, and the doubly magic nature of ^{132}Sn was explored in experiment and also theory[1-3]. We make up a suitable interaction that works well in hole nuclei region near ^{132}Sn(Fig.1). The nuclear structure properties of both low-lying levels and high ones are well described by a uniform model space[4-6].

Recently, A regular correlation driven by the monopole interaction between the neutron orbits $h_{11/2}$ and $d_{3/2}$ has been found in this nuclear region for different isotonic chains with N = 79, 80, 81[6]. The ground-state inversions from ^{130}In (^{129}Cd) to ^{128}In (^{127}Cd) seen experimentally are well described for the first time by this regular correlation(Fig.2). This regular correlation in different isotonic chains should provide useful guidance for further experiments in this region of nuclei(Fig.3).

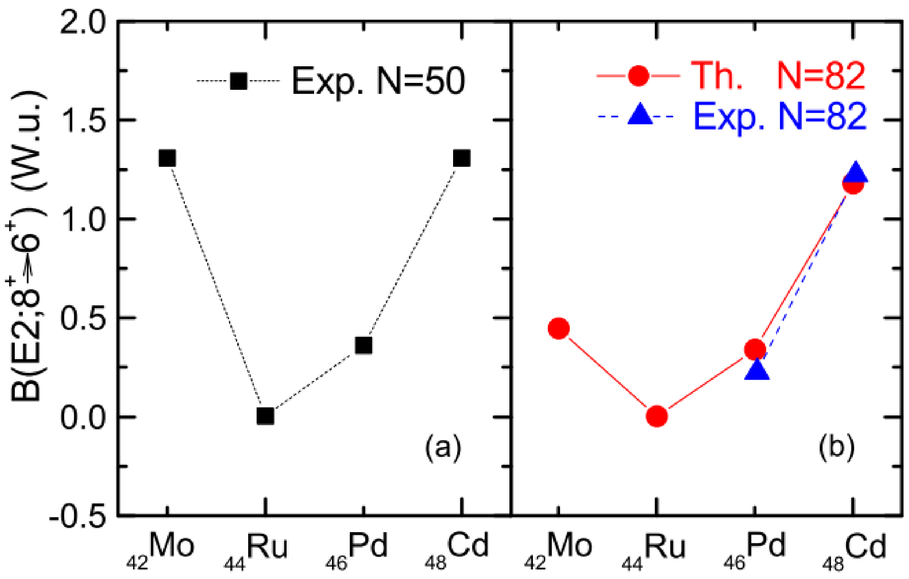

Fig.1 Isomerism and persistence of the N=82 shell closure in the neutron-rich ^{132}Sn region[5].

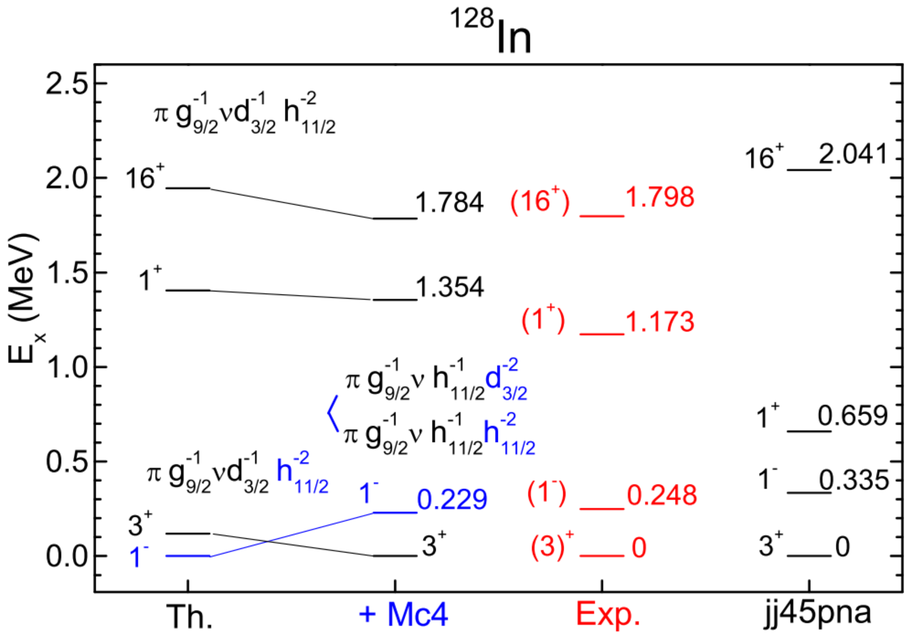

Fig.2 The theoretical low-lying levels of 128In in comparison with experimental data[6].

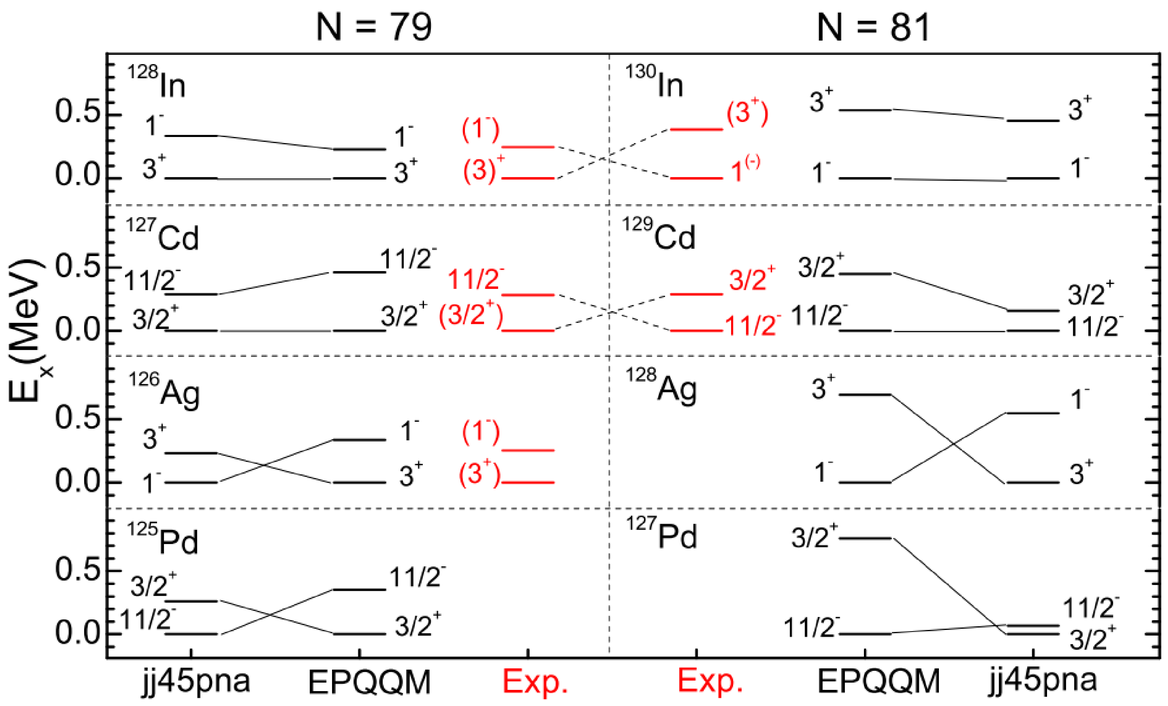

Fig.3 The EPQQM calculations on ground-state inversions in comparison with experiment and jj45pna results[6].

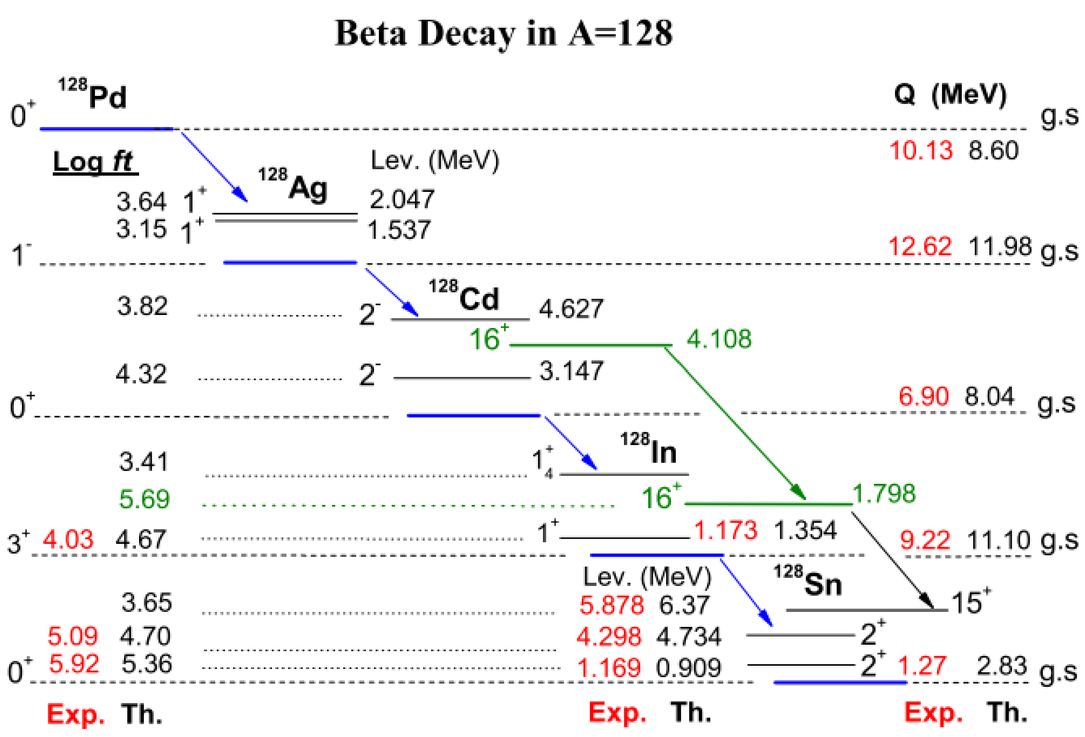

Fig.4 Beta decay in hole nuclei of A=128 with Q value and *logft*. A high-spin level 16^+ is predicted at 4.108 MeV in ^{128}Cd that feeds the existed 16^+ level in ^{128}In by beta decay[7] .

The neutron-rich isotopes of indium have been studied in both experiment and shell model theory. A new high-spin isomer 16^+ has been discovered in ^{128}In at 1.797 MeV that feeds the 15^- isomer in ^{128}Sn by beta decay process(Fig.4) [6]. We pridict a high-spin level 16^+ at 4.108 MeV in ^{128}Cd with a main configuration of $\pi g_{9/2}\ \nu h_{11/2}$[7] . Its energy is lower than levels of 14^+, and 15^+ nearby that limits its electro magnetic transitions to the low-spin states around, which is similar with the 16+ spin-trap isomer in ^{128}In. This 16^+ level will be a predicted isomer of ^{128}Cd feeding the existed 16^+ level in ^{128}In by beta decay with *logft* 5.69 in theory(Fig.4).

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