

Structure of heavy Fe nuclei at the point of transition at $N \sim 37$

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Nuclei above the proton shell closure at $Z=28$ show different structure than those below it. In particular, for the nuclei in the Cu-Ge region there seems to be a shell effect at $N=40$ evident from the systematics of the energies of the first excited $2+$ states and the related $B(E2)$ values. On the other hand the nuclei below Ni, like heavy Fe, follow the structure of the heavier isotones but only until $N \sim 37$ where strong differences start to appear. However, very little experimental information exists for the heavy Mn-Co nuclei, and thus the exact mechanism responsible for the structure differences is not well understood. The situation will change with a series of measurements to be performed in this region at the ISOLDE facility at CERN.

During the test measurements at ISOLDE we have obtained surprisingly high quality results on the heavy Fe and Co nuclei populated from the beta decays of $^{59-66}\text{Mn}$. In particular using the gamma-gamma coincidences, level lifetimes in the sub-ns range and absolute gamma-ray intensities we have constructed the level scheme of ^{63}Fe and deduced spins of the low-lying states. The data for ^{63}Fe (a nucleus located exactly at the point of transition at $N \sim 37$) show an inversion of level sequence in comparison to those for the close isotones ^{65}Ni and ^{67}Zn . New results for the heavy Fe and Co nuclei obtained from this measurement will be presented.