# THEORETICAL ANALYSIS OF PROTON EMISSION FOLLOWING BETA-DECAY OF $^{56}$ZN.

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We present a shell-model analysis of the beta decay of $^{56}$Zn, leading to proton emission from $^{56}$Cu. The calculations are performed using isospin-nonconserving Hamiltonians constructed on the basis of the GXPF1A and KB3G interactions. First experimental spectroscopic data were provided by Dossat et al (NPA 2007) and a more comprehensive study has been reported recently by Orrigo (PRL 2014). The spectroscopic factor for proton emission from the IAS (Isobaric Analogue State) can be expressed as $S(IAS) = \alpha^2 S(T=1)$, where $S(T=1)$ is the allowed spectroscopic factor of the admixed state, and $\alpha$ is the amplitude of the T=1 state, assuming two-level mixing. It has been found experimentally (Orrigo, PRL 2014) that the IAS of the $^{56}$Zn ground state in $^{56}$Cu is strongly mixed with another $0^+$ (mainly T=1) state lying about 85 keV below, resulting in $\alpha^2$=33(10) % of isospin mixing in the IAS. In spite of this high isospin impurity of the IAS and a large probability for proton emission with an energy of $E_p$=2948(10) keV, its proton decay does not represent the dominant decay, but is observed in competition with gamma-ray emission with similar intensities, $I_p$=18.8(10) % and $I\gamma$=19.2(50) %. The main conclusion of our analysis is that the hindrance of the proton decay from the IAS is due to a very small overlap between the admixed $0^+$, T=1 state of $^{56}$Cu and the ground state of $^{55}$Ni plus an $f_{7/2}$ proton. Proton emission from the admixed $0^+$, T=1 state is allowed by the isospin quantum number selection rule, however, it is hindered by nuclear structure effects.