THE STRUCTURE OF THE ^{146}Tm AND ^{145}Er EXOTIC NUCLEI DEDUCED FROM PROTON EMISSION PROPERTIES

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There are over forty proton radioactive ground- and isomeric-states identified up to date. Among these proton-unbound nuclei there is only one (odd-Z,odd-N) emitter, ^{146}Tm [1], known to populate ground **and** excited neutron states. The structure of the ^{146gs,m}Tm and ^{145}Er states was reinvestigated using an intense (over 20 pnA) 297 MeV ^{58}Ni beam bombarding a ^{92}Mo target at the Recoil Mass Separator (HRIBF, Oak Ridge) [2]. The RMS focal plane detector system consisted of a Microchannel Plate Detector, a Double-sided Silicon Strip Detector (DSSD), a four-fold Si-box and a SiLi veto detector around the DSSD. All the detector signals were recorded using digital pulse processing modules [3]. The counting statistics was improved by a factor of about five with respect to the previous study [1], with over 20 thousand counts collected for the main proton transition at 1.12 MeV.

The previously unassigned proton line at 1.01 MeV [1] appeared to have a short half-life, of about 80 ms. It was therefore interpreted as the transition originating from the low-spin (5^-) ground-state. The structure of ^{146gs}Tm wave function can now be explained as having at least three important proton-emitting π-ν components, all coupled to the $I^\pi=(5^-)$. These are : the dominating $\pi h_{11/2}\nu s_{1/2}$ part causing the l=5, 1.19 MeV transition to the $\nu s_{1/2}$ ground-state of ^{145}Er, the $2^+\otimes\,\pi f_{7/2}\nu s_{1/2}$ part decaying via l=3, 1.01 MeV line to the $(3/2^-)$, 0.18 MeV excited state in ^{145}Er and the "mirror" $\pi s_{1/2}\nu h_{11/2}$ part responsible for the l=0, 0.94 MeV line populating the $\nu h_{11/2}$, 0.25 MeV isomeric level in ^{145}Er.
As found in our previous study, the (8^+) ^{146m}Tm is dominated by the the $\pi h_{11/2}\nu h_{11/2}$ part emitting the l=5, 1.12 MeV proton to the $\nu h_{11/2}$ isomer in ^{145}Er. The small admixture of the $2^+\otimes\pi f_{7/2}\nu h_{11/2}$ configuration is responsible for the l=3, 0.89 MeV transition to the excited state at 0.48 MeV in ^{145}Er. The wave function composition will be analyzed using the reference spherical picture as well as the advanced particle - core vibration coupling model of Hagino [4,5].

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