# THE NEW SHORT-LIVED PROTON EMITTER $^{144}$Tm

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Proton emitter studies enable precise probing of the composition of the wave function of nuclei beyond the proton dripline. In a decay of proton radioactive odd-odd nuclei excited levels in the (even-Z,odd-N) daughters can be populated allowing us to deduce the properties of single particle neutron states. So far, fine structure in proton emission was observed for only one odd-odd emitter, the $^{146}$Tm [1]. The neighbouring odd-odd isotope $^{144}$Tm is an obvious candidate to exhibit similar decay pattern . Its decay should be dominated by a large $\pi h_{11/2}$ component present in the ground and isomeric state wavefunction, as it was observed for $^{146}$Tm[1] and $^{145}$Tm[2]. The admixture of the $2^+ \otimes \pi f_{7/2}$ component or of the mirror $[\nu h_{11/2}\ \pi s_{1/2}]$ proton-neutron configuration can cause the fine structure in proton emission.

The evidence for the proton decay of $^{144}$Tm has been found in an experiment at the Recoil Mass Spectrometer [3] at Oak Ridge National Laboratory. The $^{144}$Tm events were found in a weak ($\sigma \approx 10$ nb) p5n channel of the fusion reaction of $^{58}$Ni beam at 340 MeV on a $^{92}$Mo target.

The observed decay energy of about 1.8 MeV and the halflife of the order of $\approx 1$ $\mu$s suggest proton emission from the dominant $\pi h_{11/2}$ part of the wave function. The detection of this very short proton emitter was made possible by use of a double-sided silicon strip detector connected to a fast Digital-Signal-Processing-based acquisition system [4].

[1] T.N. Ginter et al. Phys. Rev. **C68**, 034330 (2003).
[2] M. Karny et al. *Phys. Rev. Lett.* **90**, 012502 (2003).
[3] C. J. Gross et al. *Nucl.Instrum.Methods* **A450**, 12 (2000).
[4] R. Grzywacz *Nucl. Instrum. Methods* **B204**, 649 (2003).