Decay studies of proton-radioactive nuclei at the HRIBF *

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The investigations of proton radioactivity at the Holifield Radioactive Ion Beam Facility will be presented. The highlights include the identification of five new proton emitters, ^{140}Ho, ^{141}mHo [1], ^{145}Tm [2], ^{150m}Lu [3] and ^{151m}Lu [4], as well as the recent observation of fine structure in proton emission from ^{146}Tm [5] and ^{145}Tm [6]. The latter emitter was studied using a novel technique based on the digital processing of the detector signals at the Recoil Mass Separator.

The observed properties of proton emission are interpreted within a spherical approach [7,8] as well as within advanced models accounting for deformation [9,10]. These results contribute to the understanding of the structure of nuclei beyond the proton-drip line including the evolution of proton single-particle levels, nuclear shapes and energy surfaces. Recently, the $s_{1/2}$ and $h_{11/2}$ neutron levels in exotic N=77 isotone ^{145}Er were identified in the study of proton-radioactive odd-odd ^{146}Tm [5]. The transitional properties ($\beta_2 \approx 0.18$) of ^{144}Er were deduced from the 0.33 MeV excitation energy of the 2^+ level populated ($I_p \approx 9\%$) in the proton emission from the 3 μs activity of ^{145}Tm [6].

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