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Discovery of the proton emitter ^{116}La

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The discovery of the new proton emitter ^{116}La , 23 neutrons away from stable ^{139}La , will be reported. ^{116}La nuclei were synthesised in the fusion-evaporation reactions at the University of Jyväskylä Accelerator Center and identified via their proton radioactivity using the MARA recoil mass spectrometer. Comparisons of the measured proton energy ($E = 718 \text{ keV}$) and half-life ($T_{1/2} = 50 \pm 22 \text{ ms}$) with values calculated using microscopic nuclear barrier penetration theory indicate that the proton is emitted with an orbital angular momentum $l=2$ and that its emission probability is enhanced relative to its closest, less exotic, odd-even lanthanum isotope (^{117}La) while the proton-emission Q -value is lower. We propose this unusual feature to be a signature for the presence of strong isovector neutron-proton pair correlations in this exotic, neutron deficient system. The observations of gamma decays from isomeric states in ^{116}La and ^{117}La will also be discussed.

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