α-decay study of the new neutron-deficient isotope ^{210}Pa

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Synthesizing new isotopes far from the line of β-stability and studying their decay properties is one of the frontiers in present-day nuclear physics. However, mapping the boundaries of nuclear landscape is exceptionally challenging due to the tiny production cross sections and short half-lives of nuclei. In this work, the fusion-evaporation reaction ^{40}Ca+^{175}Lu aimed at synthesizing new neutron-deficient protactinium isotopes was investigated at the newly constructed China Accelerator Facility for Superheavy Elements. The cross sections for the xn and pxn evaporation channels were measured. At a beam energy of 212 MeV, a new isotope ^{210}Pa produced through the 5n evaporation channel was identified for the first time. The measured α-decay properties of ^{210}Pa allow us to extend the α-decay systematics and test the predictive power of selected theoretical models for the heavy nuclei near the proton drip line.