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Quest for α-cluster states to constrain the (α,p) reactions in type-I X-ray bursts using active-targets JASPREET SINGH RANDHAWA, TAN AHN, University of Notre Dame, WOLFGANG MITTIG, YASSID AYYAD, DANIEL BAZIN, Facility for Rare Isotope Beams, Michigan State University, SAUL BECEIRO-NOVO, Michigan State University , JIE CHEN, Facility for Rare Isotope Beams, Michigan State University, NATHAN WATWOOD, Michigan State University , SAMUEL HENDERSON, D. BARDAYAN, PATRICK O'MALLEY, SEBASTIAN AGUILAR, MAXIME RENAUD, JAMES KOLATA, University of Notre Dame — Type-I X-ray bursts are powered by the nuclear burning, e.g. hot CNO cycles, αp-process, rp-process. To constrain the αp-process, direct measurements of reaction cross sections in the Gamow window is required. However, for any direct measurement of such reactions restricted to only higher energies, extrapolations to the Gamow window need detailed information on nuclear structure especially the near-threshold α-cluster states. Time projection chambers used in active target mode provides an ample detector system for performing the resonant elastic scattering in inverse kinematics to explore cluster states. Use of pure He and H_2 gases as target aided by the thick GEMs, offers nearly background-free measurement. We will present the initial observation from simultaneous measurement of ^{17}F(α,p) and ^{17}F(α,α) with pAT-TPC with pure helium gas. The new active target being developed at the University of Notre Dame and plans to use this detector for resonant α-scattering to explore the alpha-cluster states in the astrophysics will be discussed.

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