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Astrobox - a novel detector for nuclear astrophysics studies with low-energy protons[1] B.T. ROEDER, E. SIMMONS, M. MCCLESKEY, A. SPIRIDON, L. TRACHE, R.E. TRIBBLE, Texas A&M University, E. POLLACCO, DSM/Irfu/SPhN, CEA-Saclay, G. PASCOVICI, IKP, University of Cologne — In many radiative proton capture reactions on sd-shell nuclei or heavier, resonances dominate. One way these resonances can be studied is by measuring very-low energy protons from β-delayed proton decays. In the past, we produced and separated chosen exotic nuclei with MARS, implanted them in thin silicon strip detectors and observed the β-delayed protons while pulsing the beam. With this technique, we measured protons with low background for E_p = 400-1500 keV. However, to measure lower-energy protons, careful subtraction of a substantial background from the positrons was needed. To reduce this background, we have developed Astrobox, a gas detector using micromegas electron amplifiers. In the first in-beam test of this gas detector at Texas A&M University, it was found to be more transparent to positrons than the thin silicon detectors, and we were able to measure low-energy protons down to 200 keV with no positron background. The design of Astrobox and the results of the first test measurement of the device, which observed low-energy protons from the β-delayed proton decay of ^{23}Al with very-low positron background for the first time, will be presented.

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