One of the most important questions that nuclear physics is trying to address is the origin and abundance of the elements in the universe. Proton-gamma capture reactions, $X(p, \gamma)Y$, play an important role in the creation of elements in processes like X-ray bursts or novae explosions [1-3]. The main focus of this work is the reaction $^{34}_{\text{g,m}}\text{Cl}(p, \gamma)^{35}\text{Ar}$. In novae, production of $^{34}\text{S}$ depends on the amount of $^{34}\text{Cl}$ which $\beta$-decays into $^{34}\text{S}$ with a half-life $T_{1/2}=1.5266$ s. Sulfur isotopic ratios can be used for classification of presolar grains which can be found in the meteorites. One way to destroy $^{34}\text{Cl}$ is the reaction $^{34}_{\text{g,m}}\text{Cl}(p, \gamma)^{35}\text{Ar}$. The rate of this reaction will eventually determine how much $^{34}\text{Cl}$ will be left for the creation of $^{34}\text{S}$. To be able to accurately predict the reaction rate of $^{34}_{\text{g,m}}\text{Cl}(p, \gamma)^{35}\text{Ar}$, one needs to know the resonances in $^{35}\text{Ar}$, including their energy, spin-parity, and proton width. We chose to study this reaction

**FIG. 1.** A proton spectrum obtained in the AstroBoxII following $\beta$-decay of $^{35}\text{K}$. 

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by means of an indirect method where we populate states in $^{35}$Ar just above proton threshold $S_p$ and observe them decaying into the ground level of $^{34}$Cl + proton. Therefore detection of low energy protons becomes a challenge. The AstroBoxII was built to address this problem [4] [6]. To test our system, an experiment was conducted in March 2017. A beam of $^{36}$Ar at 36 MeV/u was obtained from the K500 cyclotron. In the target chamber of MARS [5] an H$_2$ gas target was used. Through the reaction $^1$H($^{36}$Ar, $^{35}$K)2n we created a secondary beam of $^{35}$K was made and then implanted into the AstroBoxII. After doing gain matching for the AstroBoxII anode pads, two HPGe detectors were calibrated with $^{137}$Cs and $^{152}$Eu sources. The estimated production rate for $^{35}$K was 2.77 event/nC. An Al degrader (13 mil) on a rotary mechanism was used to control the position for the implantation of $^{35}$K in the AstroBoxII. Due to a number of technical issues the beam time was very limited with only about 6 hours of data available. Nonetheless a proton spectrum was obtained (Fig 1.) and it is in good agreement with a similar spectrum that was obtained in 2014, but with the silicon detectors instead of the AstroBoxII.