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AstroBox2 - Detector for Low-energy Beta-delayed Proton Detection

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Over the past years we have done several studies of beta-delayed proton emitters of astrophysical interest by implanting the nuclei of interest into Si detectors of various segmentations [1-5]. In these studies it was realized that shrinking the physical detection volume of elements in Si detector did not reduce the beta-background enough to create a background free spectrum in the typical energy range of astrophysically interesting decays ($E_p \sim$ few hundred keV). To further reduce the beta-background a novel detector, AstroBox, based on Micro Pattern Gas Amplifier Detector (MPGAD) was developed [6].

We are now building an upgraded version of this detector, AstroBox2. The major change to the first version is the change of geometry of the MPGAD pad structure. The earlier cylindrical symmetry of the pads has been replaced by a set of rectangular pads that are arranged into a geometry along the beam axis to improve implantation control. The new detector chamber design has several technical improvements that enhance the overall usability of the setup.

In this presentation a description of the AstroBox2 detector and results from the commissioning tests are given, and future physics experiments discussed.

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Primary author: Dr SAASTAMOINEN, Antti (Cyclotron Institute, Texas A&M University, College Station, TX, USA)

Co-authors: Ms SPIRIDON, Alexandra (Cyclotron Institute, Texas A&M University, College Station, TX, USA); Dr ROEDER, Brian (Cyclotron Institute, Texas A&M University, College Station, TX, USA); Dr POLLACCO, Emmanuel (IRFU, CEA Saclay, Gif-sur-Yvette, France); Dr PASCOVICI, George (IFIN-HH, Bucharest-Magurele, Romania); Dr TRACHE, Livius (IFIN-HH, Bucharest-Magurele, Romania); Prof. TRIBBLE, Robert (Cyclotron Institute, Texas A&M University, College Station, TX, USA)

Presenter: Dr SAASTAMOINEN, Antti (Cyclotron Institute, Texas A&M University, College Station, TX, USA)

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