Contribution ID: **20**   Type: **Oral Presentation**

GEANT4 Simulations for Astrobox2 and the MDM-Oxford Spectrometer Detector Upgrade

Monday, 18 May 2015 12:05 (25 minutes)

During the commissioning of the prototype AstroBox1 detector at TAMU [1], it was noticed that a gas detector with Micro Pattern Gas Amplifiers (MPGAD) [2] had two applications. First, such a detector was useful for detecting low-energy protons (< 1 MeV) from beta-delayed proton decay because the energy deposit of the beta-particles in the gas was small and the signal from the proton energy loss in the gas could be amplified many times by the MPGAD. Second, it was noticed that the detector also could be used as a high-resolution gas detector for heavy-ions. These two applications were successfully modeled by GEANT4 simulations [1, 3].

With these applications in mind, the Astrobox2 detector has been designed to attempt to improve upon the results obtained with Astrobox1, and an MPGAD has been installed into the MDM-Oxford Spectrometer detector [4]. These two devices have been simulated in the GEANT4 framework as part of the design process. The simulations have been useful in the understanding of the data obtained with these devices.

I plan to present a brief overview of the Astrobox2 and Oxford detector upgrade and to explain how the devices are currently being modeled in the GEANT4 framework using a few example cases. The simulations will be compared to existing experimental data, if available.

[1] E. Pollacco et al., Nucl. Instr. and Meth. A 723 (2013) 102-108.
[2] Y. Giomataris et al., Nucl. Instr. and Meth. A 376 (1996) 29.
[3] S. Agostinelli et al., Nucl. Instr. and Meth. A 506 (2003) 250.
[4] J.S. Winfield et al., Nucl. Instr. and Meth. A 251 (1986) 297.

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Session Classification: Session 2

Track Classification: Techinical issues