Contribution ID: **11** Type: **Poster**

Simulating Performance of Microchannel Plate Photomultipliers in Magnetic Fields

Wednesday 6 September 2023 10:50 (10 minutes)

Photon counting detectors are utilised in applications in medical imaging, nuclear and particle physics where a strong magnetic field is present, requiring a detector that can operate in these circumstances. An extremely important characteristic of photon counting detectors is the method of electron multiplication used. In vacuum tubes such as photomultiplier tubes (PMTs) and microchannel plates (MCPs), secondary electron emission (SEE) provides electron multiplication through an accelerating field across the dynode. MCPs are high gain, fast timing electron multipliers and our research seeks to model their operation in magnetic fields.

We illustrate how a PMT can be simulated using a model generated using Computer Simulation Technology (CST) Studio Suite software. The model consists of a photocathode, a small seven-pore MCP structure including electrodes, resistive and secondary electron emitting dynode surfaces, and a readout anode, with appropriate potentials applied to the components of the model. Magnetic fields can be applied to the model with different directions and amplitudes.

Using this simulation it is possible to produce the gain and timing characteristics of the PMT. We present simulation results from the modelled PMT, demonstrating electron multiplication performance and timing performance as a function of external magnetic field strength and direction. These results are compared to literature and previous results in a magnetic field. The simulation is repeated for single photons and multiple incident photons.

Your name

Emily Baldwin

Institute

University of Leicester

Email address

Ejb71@leicester.ac.uk

Author: BALDWIN, Emily

Co-authors: LAPINGTON, Jon; Dr LEACH, Steven

Presenter: BALDWIN, Emily

Session Classification: Poster Session I

Track Classification: Applications in Nuclear Physics