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Planar microchannel plate photomultiplier with VUV-UV-Vis full range response for fast timing and imaging applications

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Planar microchannel plate photomultipliers (MCP-PMTs) with alkali photocathodes are able to achieve single photon detection with excellent time (picosecond) and spatial (millimeter) resolution. They have recently drawn great interests in experiments requiring time of flight (TOF) measurement and/or Cherenkov imaging. Current MCP-PMTs have a response range of 300 nm –600 nm, limited by the window transmission and cathode materials. By replacing the glass window with fused silica, the detection range can be dramatically extended from 300 nm to 170 nm, providing much more efficient Cherenkov radiation detection.

The Argonne MCP-PMT detector group has recently designed and fabricated 6 cm x 6 cm MCP-PMTs with fused silica window. Initial characterization indicates that the fused silica window photomultiplier exhibits a transit-time spread of 57 psec at single photoelectron detection mode and of 27 psec at multi photoelectron mode (100 photoelectrons). Currently, we are testing the MCP-PMTs at Fermilab test beam facility for its particle detection performance and rate capability. The progress on new window exploration and characterization of the new MCP-PMT in beamline particle test will also be reported and discussed.

Registered

Yes

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