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Progress on the development of 6 cm × 6 cm microchannel plate photodetectors at Argonne National Laboratory

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Micro-channel plate (MCP)-based photodetectors simultaneously provide picosecond level time resolution, sub-mm level position resolution and high rate capability. The large-area picosecond photodetector (LAPPD) collaboration is developing new techniques to make large-area MCP- based photodetectors. Recently, Argonne National Laboratory (ANL) commissioned a photodetector processing system for producing small form factor, high quantum efficiency, 6 cm × 6 cm photodetectors based on Atomic Layer Deposition (ALD) functionalized MCPs and low cost glass packaging. Here we report the successful production of the first devices that are fully processed and hermetically sealed. We have measured quantum efficiency higher than 15%, gain of up to 107, single photoelectron time resolution of 57 ps, and position resolution better than 1 mm. The experience gained from this processing system will be transferred to industry for production towards larger area. The progress on the photocathode study, the photodetector production, the testing and characterization will be presented.

Oral or Poster Presentation

Oral

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