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Development of a low-cost fast-timing MCP photodetector

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Microchannel plate (MCP) based photodetectors feature fast timing, good position resolution and a compact form factor. We report detailed design, fabrication and characterization of a low-cost 6 cm x 6 cm fast timing photodetector based on microchannel plates. The whole assembly is made of low cost glass materials and hermetically sealed with bialkali photocathode in vacuum. A prototype MCP-photodetector exhibits gain over 10^7 level with good uniformity and photocathode quantum efficiency as high as 20%. The timing resolution reaches 20 ps and 70 ps at multi-PE and single-PE measurements, respectively. The spatial resolution reaches 0.5 mm at multi-PE measurement. Challenges and future improvements will also be presented and discussed.

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