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A square PMT module with 256 channels of <100 ps timing accuracy

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Photek have developed a square microchannel plate (MCP) PMT using 6 μm pore MCPs to achieve superior timing, compared to the previous generation which used 15 μm pores. The native anode pattern is 64x64, but for this module the pattern is ganged to a 16x16 design using an epoxy bonded PCB giving an anode size of 3.3x3.3 mm² in a 53x53 mm² active area. The electronic front-end is the TOFPET2d ASIC from Petsys Electronics, a combined amplifier / discriminator / TDC with 30 ps time bins and capable of 480 kHz per channel count rate, with sufficient dynamic range to allow for the gain variation inherent in large area MCP-PMTs. Communications is through gigabit ethernet. The outer envelope of the combined PMT and electronic front-end package allows for close packing on 4 sides with outer dimensions of 60x62 mm giving a 76% fill factor. We present results showing the uniformity of detection efficiency, single photon timing accuracy and count rate capability. We will show simulations of the recoil electrons seen in the timing data, and cross-talk data from a new 32x32 readout format.

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