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Measurements of a Multi-anode Microchannel Plate Detector System with 100 picosecond event timing

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We describe a multi-anode microchannel plate (MCP) detector with a 16 x 16 discrete pixel array designed for 100 picosecond single photon timing at count rates in the MHz range. The pixel array is instrumented using a 256 channel PETsys TOF ASIC evaluation kit, capable of single photon timing to better than 100 picoseconds and maximum count rate of 640 kHz/channel.

The timing performance of the TOFPET multichannel timing ASIC was measured using electronic stim signals, a Photek PMT210 high speed single anode MCP photomultiplier detector and the multi-anode MCP detector. Both MCP detectors were tested using a pulsed laser operated in single photon counting mode.

The PETsys electronics performance was measured at 43 ps rms using the on-board generated stim pulse synchronous with the TDC clock. MCP detector measurements were made using illuminated using a pulsed laser with a pulse width of ~40 ps. The time over threshold (ToT) feature of the PETsys ASIC was used to correct the amplitude walk of the due to the MCP pulse height distribution and a single photon timing resolution of better than 100 ps rms was measured.

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