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An Application of Micro-channel plate photomultiplier tube to Positron Emission Tomography

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We are exploring the large area flat panel (8”x8”) micro-channel plate photomultiplier tube (MCP PMT) under development for an application to positron emission tomography (PET) instrumentation.A high speed waveform sampling with transmission-lines was adopted to achieve fast timing and efficient signal read-out from MCP PMT.As a demonstration of the concept,detector modules were built using 2”x2” Photonis Planacon MCP PMTs (XP85022) and prototype transmission-line boards. The signals from MCP PMT through transmission-line were sampled by DRS4 evaluation boards (PSI) running at 5 GS sampling. LYSO crystals were optically coupled on the surface of MCP PMT and exposed to Na22 source.Preliminary results from experiments show ˜14% (FWHM) of energy resolution at 511 keV and
˜350 ps (FWHM) for coincidence time resolution.3 mm (FWHM) of resolution was measured for the position along the transmission-line by using time difference. The detail of the study will presented.

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