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P1.70: R&D of Fast Timing Multi Anode MCP-PMT for Radiation Imaging

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The time performance of photodetector is a critical parameter for the development of Radiation Imaging Detectors based on time of flight (TOF) technique, for example TOF positron emission tomography (TOF-PET). In 2020, the proposal of roadmap toward the 10 ps TOF-PET challenge [1] places higher requirement on the time performance of the photodetector. Microchannel Plate Photomultiplier (MCP-PMT) is a popular candidate photodetector of TOF-PET for its high gain, good detection efficiency, single photon detect ability, magnetic field resistance, ultimately its good time resolution and spatial resolution. This manuscript introduces the R&D of fast timing MCP-PMT with 8*8 anodes with a rise time (RT) less than 300 ps and Transit time spread (TTS) less than 40 ps under single photon mode. In addition to the performance evaluation of the MCP-PMT itself, the performance of this kind of MCP-PMT coupled with crystal array also be calibrated under proton and neutron beam respectively, including the energy resolution and uniformity, the time resolution and uniformity. The experiment is in progress, and the relevant results are being analysed step by step, and the full results will be presented in a formal report or article.

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