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Latest Improvements of Microchannel-Plate PMTs

Microchannel-plate (MCP) PMTs were identified as the only suitable photon sensors for the DIRC detectors of the PANDA experiment at FAIR. PANDA is a hadron physics experiment which employs a high intensity antiproton beam of up to 15 GeV/c to perform high precision measurements of, among others, objectives like charmonium spectroscopy and search for gluonic excitations. As the long-standing aging problems of MCP-PMTs were recently overcome by coating the MCP pores with an atomic layer deposition (ALD) technique, we have investigated further improved 2-inch MCP-PMTs. The latest PHOTONIS devices reach a DQE = QE*CE > 25% and lifetimes of >20 C/cm^2 IAC without any sign of aging. Also the newly developed 2-inch MCP-PMTs of Hamamatsu are maturing and now usable in high rate environments. In this talk the status of our long-term lifetime measurements and the performance of the currently most advanced ALD-coated MCP-PMTs will be presented. In addition, first results obtained with a new quality assurance setup for MCP-PMTs will be discussed. This setup consists of a modular PADIWA/TRB DAQ system to measure the response of up to 300 anode pixels simultaneously. The system is very flexible and allows a glance "inside the MCP-PMT": background parameters like position dependent dark count rates and ion afterpulsing will be accessible as well as temporal and spacial distributions of recoil electrons and the effects of electronic and charge-sharing crosstalk among the anode pixels.

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