Contribution ID: **25** Type: **Talk**

Status and Perspectives of MCP-based photodetectors

Wednesday, September 17, 2025 9:25 AM (30 minutes)

Finely pixelated Micro-Channel Plate Photomultipliers (MCP-PMTs) are vacuum photosensors often used in Imaging Cherenkov detectors, such as Belle II TOP, future LHCb TORCH and PANDA DIRC detectors, as well as ePIC pfRICH and hpDIRC. This type of PMTs can have gain up to 10^7 and higher, timing resolution below 50 ps and sub-mm position resolution in a single photon mode, as well as peak quantum efficiency exceeding 30% in a wavelength range suitable for aerogel and fused silica radiators. MCP-PMTs exist in both capacitively coupled and DC-coupled implementations, and allow quite some flexibility in adjusting their anode pixellation to the needs of a particular detector. Being equipped with 10 mm or smaller diameter pore MCPs, these photosensors exhibit a sufficiently high resilience to magnetic fields up to ~2 T. Atomic Layer Deposition (ALD) coating applied to MCPs allow them to survive integrated photon fluence equivalent to dozens of C/cm^2 of extracted anode charge at a nominal bias voltage, before photocathode starts showing signs of a substantial degradation.

The talk will provide a state of the art overview of this technology, use cases in presently running and future experiments, as well as discuss perspectives of MCP-PMT performance improvements, illustrated in particular by recent evaluation results of the first so-called High Rate Picosecond Photo Detectors (HRPPD) by Incom Inc.

Author: KISELEV, Alexander (Brookhaven National Lab)

Presenter: KISELEV, Alexander (Brookhaven National Lab)

Session Classification: Photon sensor techniques for Cherenkov imaging counters

Track Classification: Photon sensor techniques for Cherenkov imaging counters