



Contribution ID: 68

Type: **Oral presentation**

## Extension of the MCP-PMT lifetime

*Tuesday, 6 September 2016 10:30 (25 minutes)*

A micro-channel-plate photomultiplier tube (MCP-PMT) has the best timing resolution for single photon detection, which enabled us to realize the novel RICH detector, the TOP counter, for particle identification in Belle II. A major concern about using MCP-PMTs under a high background environment like Belle II is a short lifetime of the photocathode because the quantum efficiency drops as a function of the integrated output charge of the MCP-PMT due to outgassing from the MCP. We succeeded in extending the lifetime of the square-shaped MCP-PMT for the TOP counter step-by-step: from less than  $0.1 \text{ C/cm}^2$  of the lifetime to about  $1 \text{ C/cm}^2$  with a conventional MCP, about  $9 \text{ C/cm}^2$  by applying atomic layer deposition (ALD) to the MCP, and more than  $15 \text{ C/cm}^2$  by further improvement, while the estimated integrated output charge in Belle II is about  $3 \text{ C/cm}^2$ . Especially more than  $15 \text{ C/cm}^2$  was measured for all 10 samples. This talk will also cover a difference of the performance between the conventional and ALD-MCP-PMTs as well as a degradation of the performance under a high background.

### Registered

Yes

**Primary author:** MATSUOKA, Kodai (Nagoya University)

**Co-authors:** SUZUKI, Kazuhito (Nagoya University); KOBAYASHI, Kazuho (Nagoya University); INAMI, Kenji (Nagoya University); OMORI, Raita (Nagoya University); HIROSE, Shigeki (Nagoya University); IJIMA, Toru (Nagoya University); MAEDA, Yosuke (Nagoya University); KATO, Yuji (Nagoya University)

**Presenter:** MATSUOKA, Kodai (Nagoya University)

**Session Classification:** Photon detection for Cherenkov counters

**Track Classification:** Photon detection for Cherenkov counters