Contribution ID: **46** Type: **presentation**

Characterisation and operations of the Multianode Photomultipliers Tubes for the LHCb RICH detectors

Friday 16 September 2022 11:00 (25 minutes)

The upgraded LHCb RICH detectors are equipped with Multianode Photomultiplier Tubes, covering a total area of approximately 4 square metres. In order to achieve the same excellent hadron identification performance as during LHC Run 1 and 2 at five times the instantaneous luminosity, the photon detectors have to be sensitive to single photons with repetition rates of up to 100 MHz/cm^2 and to have a very low noise count rate.
The main properties of the photomultipliers are presented, together with the characterisation of an unexpected source of noise observed in the Hamamatsu R11265 Multianode Photomultiplier Tubes, extending up to several microseconds after the primary signal. The quality control results and the mitigation strategies to operate the photon detectors and to perform optimal single-photon counting at 40 MHz are described.

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Session Classification: Photon detection techniques for Cherenkov counters

Track Classification: Photon detection techniques for Cherenkov imaging counters