Contribution ID: **559** Type: **Parallel**

The micro-Resistive-WELL detector for the phase 2 upgrade of the LHCb muon detector

Saturday, July 7, 2018 11:00 AM (12 minutes)

A phase 2 upgrade is proposed for the LHCb experiment in order to take full advantage of the flavor physics opportunities at the HL-LHC. This upgrade could be installed during Long Shutdown 4 of the LHC (2030) and is targeting a luminosity of 2x10^34 cm-2s-1, ten times that of the phase 1 upgrade. Hence it would require a completely revised detector strategy. One of the primary importance physics requirements will be a robust and efficient muon detection. The detector technology suited for the upgrade muon detector should reach a stable and efficient operation up to particle fluxes of several MHz/cm2 in the most illuminated region of the apparatus. It has to guarantee a radiation hardness and effective spark quenching up to integrated charges of C/cm2, and have a high granularity pixel readout to operate efficiently at high rate. In addition, it will be needed to replace large area of the external region of the apparatus designed to operate a much lower particle fluxes. The micro-Resistive-WELL (muRWELL) is one of the detector candidates to be used in the LHCb phase 2 upgrade. The muRWELL has been conceived as a compact, simple and robust Micro-Pattern Gaseous Detector (MPGD) for large area HEP applications requiring operation in harsh environment. The detector amplification stage is realized with a polyimide structure micro-patterned with a blind- hole matrix, embedded through a thin Diamond Like Carbon (DLC) resistive layer with the readout PCB. it is possible to achieve large gains (> 10^4) in very safe operation, thanks to the insertion of the resistive layer with surface resistivity typically in the range 10÷200 MOhm/square, mitigating the transition from streamer to spark. Different detector layouts are studied: the simplest one, based on a single-resistive layer with edge grounding, is designed for low-rate applications (up to 30-40 kHz/cm2), while more sophisticated schemes are under study for high-rate purposes (up to 2-3 MHz/cm2). The single-resistive layer scheme, under development with industrial partners, was extensively validated, and it is ready for applications in HEP. The high-rate versions of the muRWELL, based on different current evacuation schemes such as the double resistive layer, and the single-resistive layout with conductive/resistive-grid grounding, are object of an intense R&D phase, with the goal of optimizing the performances and the constructive process. Both of these detector layouts are suitable for the phase 2 upgrade of the LHCb muon detector: the single-resistive layer scheme aims at representing a cost-effective solution for the replacement of the external region of the apparatus, the high-rate scheme is a perfect candidate for the much more challenging inner region. After an introduction on the principle of operation of the detector, we will discuss the status of the R&D, giving an overview of the different architectures under study.

Primary authors: MUELLER, Katharina (Universitaet Zuerich (CH)); POLI LENER, Marco (INFN e Laboratori Nazionali di Frascati (IT))

Presenter: POLI LENER, Marco (INFN e Laboratori Nazionali di Frascati (IT))

Session Classification: Detector: R&D for Present and Future Facilities

Track Classification: Detector: R&D for Present and Future Facilities