Contribution ID: **92** Type: **Poster**

Study of the Effects of Radiation at the CERN Gamma Irradiation Facility on the CMS Drift Tubes Muon Detector for the HL-LHC

Monday 15 July 2019 19:40 (20 minutes)

The CMS drift tubes (DT) muon detector, built for standing up the LHC expected integrated and instantaneous luminosities, will be used also in the High Luminosity LHC (HL-LHC) at a 5 times larger instantaneous luminosity and, consequently, much higher levels of radiation, reaching about 10 times the LHC integrated luminosity. Initial irradiation tests of a spare DT chamber at the CERN gamma irradiation facility (GIF++), at large (˜O(100)) acceleration factor, showed aging effects resulting in a degradation of the DT cell performance [1]; however, full CMS simulations have shown almost no impact in the muon reconstruction efficiency over the full barrel acceptance and for the full integrated luminosity. A second spare DT chamber was moved inside the GIF++ bunker in October 2017. The chamber was being irradiated at lower acceleration factors, and only 2 out of the 12 layers of the chamber are switched at working voltage when the radioactive source is active, being the other layers in standby. In this way the other non-aged layers are used as reference and as a precise and unbiased telescope of muon tracks for the efficiency computation of the aged layers of the chamber, when set at working voltage for measurements. An integrated dose equivalent to two times the expected integrated luminosity of the HL-LHC run has been absorbed by this second spare DT chamber and the final impact on the muon reconstruction efficiency is under study. Direct inspection of some extracted aged anode wires presented a melted resistive deposition of materials. Investigation on the outgassing of cell materials and of the gas components used at the GIF++ are underway. Strategies to mitigate the aging effects are also being developed. From the long irradiation measurements of the second spare DT chamber, the effects of radiation in the performance of the DTs expected during the HL-LHC run will be presented.

References: [1] CMS-TDR-016, The Phase-2 Upgrade of the CMS Muon Detectors

Author: MEYER, Arnd (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: GONZALEZ, Juan (Universidad de Oviedo (ES))

Session Classification: Wine & Cheese Poster Session

Track Classification: Detector R&D and Data Handling