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CMS CSC longevity study

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Cathode Strip Chambers (CSCs) are used in the muon system of the CMS experiment (CERN). There are four muon stations on both endcaps consisting of 540 CSCs operating with 40%Ar+50%CO2+10%CF4 gas mixture. The chamber longevity study is particularly important in anticipation of the future LHC upgrade into HL-LHC and the scheduled upgrade of the CMS detector which will result in a significant background increase in the forward region. The CSC longevity is studied with two CMS CSCs ME1/1 and ME2/1 at the Gamma Irradiation Facility (GIF++, CERN), where the charge accumulation rate is about 30 times higher than that at the HL-LHC conditions. Now the accumulated charge for these CSCs is close to the triple HL-LHC charge value. During the irradiation three working gas mixtures were studied: 40%Ar+CO2 with different fractions of CF4, namely 10%, 5% and 2%. The tests did not show any degradations of the chamber performance. Search on reduction or possible replacement of the CF4 in the working gas mixture is also ongoing in a laboratory, including the longevity studies with small CSC prototypes.

Primary author(s) : Mrs. KUZNETSOVA, Ekaterina (NRC «Kurchatov Institute» - PNPI); Mr. PALICHIK, Vladimir (JINR, Dubna); Mr. PERELYGIN, Victor (JINR, Dubna)

Presenter(s) : Mr. PERELYGIN, Victor (JINR, Dubna)

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