

Performance of eco-friendly alternative gas mixtures in CMS iRPC detector in the HL-LHC environment

Friday 19 July 2024 20:40 (20 minutes)

The RPC detectors in the CMS experiment operate with a gas mixture made of 95.2% C₂H₂F₄, known to be a greenhouse gas. Several eco-friendly alternatives to C₂H₂F₄, such as HFO, have been studied in the last few years in order to find an alternative mixture with low Global-Warming Potential (GWP), while maintaining the performance of the RPC chambers. Another way to improve the RPC standard gas mixture GWP, could be replacing between 30% and 40% of the C₂H₂F₄ with CO₂. Studies of Eco-gas and CO₂ based mixtures are carried out at the CERN Gamma Irradiation Facility (GIF++), where the LHC Phase-2 conditions are mimicked by a 13.6TBq radiation source and a muon beam. This poster presents the performance of a 1.4 mm gap RPC chamber with several alternative gas mixtures in a high gamma background environment, as well as future perspectives of aging studies.

Alternate track

1. Sustainability (accelerators, detectors, computing)

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Session Classification: Poster Session 2

Track Classification: 12. Operation, Performance and Upgrade (incl. HL-LHC) of Present Detectors