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Eco-friendly gas mixtures for future RPC detectors

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Resistive Plate Chambers are operated in several experiments tipically with large fractions of Tetrafluoroethane (C2H2F4) commonly known as R134a, a gas with a high Global Warming Potential (GWP) that has been recently banned by the European Union.
Within the HEP Community, many studies are ongoing to find a good replacement for such component for RPCs working in avalanche mode. One interesting alternative is the Tetrafluoropropene (C3H2F4) called HFO1234ze with a GWP of 6 that has been shown to have reasonable performance with respect to the R134a.

Since a few years a joint collaboration between ALICE, ATLAS, CMS, LHCb/SHiP and CERN groups is in place with the goal to study the performance of RPCs operated with eco-friendly gas mixtures under irradiation at GIF++.

The performance of several chambers with different layout and electronics has been studied during dedicated beam tests, with and without gamma irradiation at GIF++. The RPCs have been operated with different gas mixtures based on CO2 and HFO1234ze gases. Results of these tests together with the future plans for aging studies of the chambers will be presented.

In-person participation

Yes

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