

RPC performance with new environmentally friendly gas mixtures in presence of LHC-like radiation background

Thursday 28 May 2020 09:54 (18 minutes)

Resistive Plate Chamber (RPC) detectors are widely used at the CERN LHC experiments. They are operated with a gas mixture containing C₂H₂F₄ and SF₆, both greenhouse gases (GHG) with a high global warming potential (GWP). The search of new environmentally friendly gas mixtures is necessary to reduce GHG emissions and costs as well as to optimize RPC performance.

Several new gases with low GWP have been identified as possible replacements for C₂H₂F₄ and SF₆, for example in the family of the hydrofluoroolefins and 3M Novec fluids. More than 60 eco-friendly gas mixtures have been investigated on 2 mm single-gap RPCs, by measuring the detector performance in terms of efficiency, streamer probability, induced charge, cluster size and time resolution. RPCs performance and aging properties were also studied at the CERN Gamma Irradiation Facility (GIF++) with some selected eco-friendly gas mixtures.

A complete overview of the results obtained in laboratory and at GIF++ will be presented.

Funding information

Authors: MANDELLI, Beatrice (CERN); GUIDA, Roberto (CERN); RIGOLETTI, Gianluca (Universite Claude Bernard Lyon I (FR))

Presenter: MANDELLI, Beatrice (CERN)

Session Classification: Sensors: Gaseous Detectors

Track Classification: Sensors: Gaseous Detectors