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MONTE CARLO STUDIES OF ECO-FRIENDLY GAS MIXTURES FOR RPC DETECTORS USING GEANT4+GARFIELD++

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In this work, we investigate the performance of Resistive Plate Chambers (RPC) using Geant 4 and Garfield++. RPCs detectors are commonly operated with a freon-based gas mixture containing C₂H₂F₄ and SF₆, both with a very high global warming potential. The present work aims at contributing to the search for eco-friendly gas

mixtures for RPCs detectors. Based on the studies presented by Verzeroli (2022), some alternatives to C₂H₂F₄ are tested in simulations, such as CO₂, He and iC₄H₁₀. Moreover, Novec 4710 was studied as a substitution of

SF₆. The RPC performance is evaluated by calculating the efficiency of the detector and the cluster size. Finally,

in preparation for the implementation of these gas mixtures in the detector's lab of UNAM, the performance of

the detector with atmospheric muons using C₂H₂F₄ and SF₆ is reported.

References

Verzeroli M. (2022). Studies of eco-friendly gas mixtures for rpc detectors at cern lh experiments. CERN-THESIS-2022-040.

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