

Simulation studies on the Effect of SF₆ in the RPC gas mixture

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The India based Neutrino Observatory (INO) collaboration is planning to build a 50 kton magnetized iron calorimeter (ICAL) detector to study neutrino oscillations and measure their associated parameters[1]. ICAL will use 28,800 glass Resistive Plate Chambers (RPCs) of 2m X 2m in size and operated in the avalanche mode, as its active detector elements. As a part of the detector R&D to develop the RPCs required for this detector, we studied the effect of Sulfur hexafluoride (SF₆) in the gas mixture on various RPC parameters. In this paper, we present a comparative study of signal development on the RPC pick-up electrodes using simulation and experimental data. In this study, the primary interactions of the incident particle in RPC gas volume is calculated using HEED[2], while the electron transport parameters are computed using MAGBOLTZ[3]. We used nearly exact Boundary Element Method (neBEM)[4] solver to calculate the weighting field and the electric fields accurately. And finally, the induced signal is obtained following the Ramo's theorem[5].

References:

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