

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

^a*S. Mohammed, ^aR.Hasan, ^bN.Majumdar, ^bS.Mukhopadhyay, ^cB. Satyanarayana

^aDepartment of Physics, Aligarh Muslim University, Aligarh, 202002, INDIA

^b Applied Nuclear Physics Division, Saha Institute of Nuclear Physics, 1/AF Bidhannagar, Kolkata 700064, INDIA

^cDepartment of High Energy Physics, Tata Institute of Fundamental Research, Mumbai 400005, INDIA

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 hexaflouride (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].

Rererences:

- [1] INO Project Report, INO/2006/01, May 2006
- [2] Igor Smirnov, HEED, program to compute energy loss of fast particles in gases, Version 2.10, CERN.
- [3] S. Biagi, MAGBOLTZ, program to compute gas transport parameters, Version 8.9.6, CERN.
- [4] N.Majumdar, S. Mukhopadhyay, Nucl. Instr. Meth. Phys. Research, A 566, p.489 (2006)
- [5] S. Ramo, Proc. IRE 27, p.584 (1939)

*Email address: saliminamu@yahoo.com (S.Mohammed)