Studies on Electrostatic Field of a Resistive Plate Chamber

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Abstract

Resistive plate chambers (RPC) (Figure 1) are fast gaseous detectors, having a simple design and construction, good time resolution, high efficiency and low cost production. These are extensively used in high energy physics and astroparticle physics experiments. A large number of RPCs will be used as the main detector element for India's mega science project, namely India Based Neutrino Observatory (INO). So, detailed study of this detector is very crucial for the scientific community. RPCs consist of two parallel plates made from very high resistivity material and separated by a gas volume are considered. High voltage is applied on the plates using 2μm thick graphite coating (Figure 2). COMSOL Multiphysics® has been used to generate the potential (Figure 3) and field (Figure 4) profiles within a Glass RPC and the effect of different detector components like spacers, frame, graphite coating on the field configuration is studied. The result obtained will be compared with neBEM (nearly exact Boundary Element Method) toolkit developed at SINP, Kolkata.

Reference

1.Dr. Saikat Biswas, "Development of high resolution gas filled detector for high energy physics experiments", figure 3.10.

Figures used in the abstract

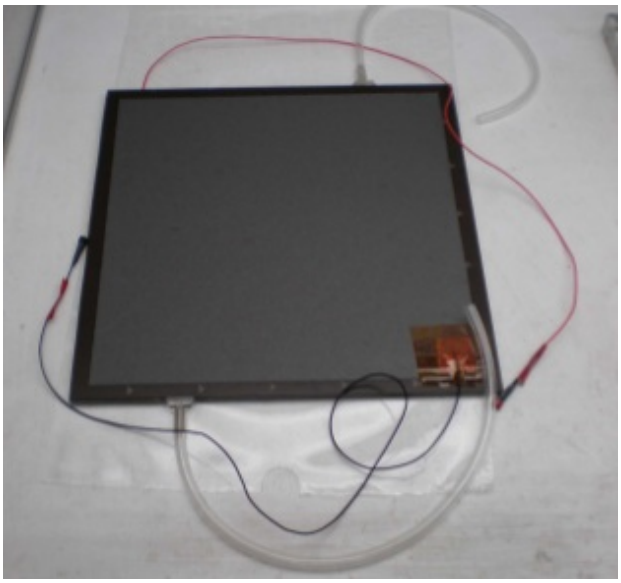

Figure 1: Resistive plate chamber [1]

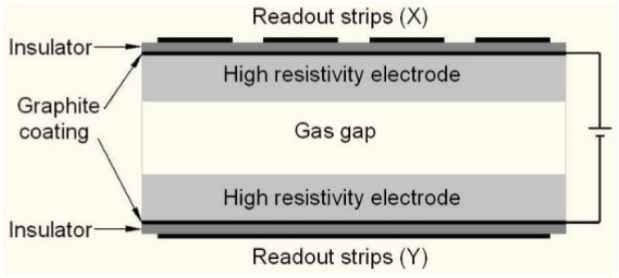

Figure 2: Schematic diagram of a RPC

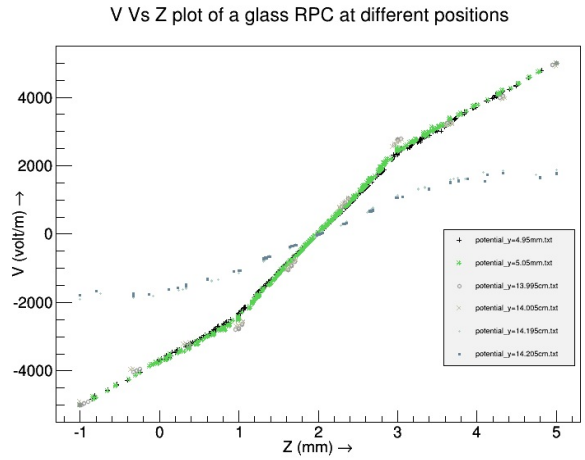

Figure 3: Electric potential variation at different locations of a RPC

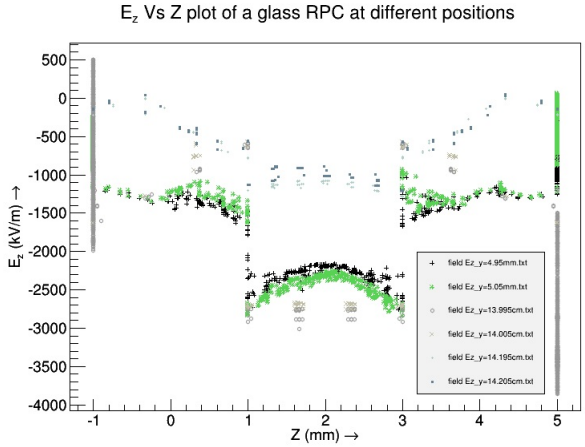

Figure 4: Electric field (z-component) variation at different locations of a RPC