

Feasibility study for development of a PET device based on Multi-gap Resistive Plate Chambers

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The Multi-gap Resistive Plate Chambers (MRPCs) provide excellent timing as well as position resolutions at relatively lower cost. Therefore, they can be used in medical imaging applications such as PET where precise timing is a crucial parameter of measurement. We have designed and fabricated several six-gap glass MRPCs and extensively studied their performance. In this paper, we describe the detector, electronics and the data acquisition system of the setup. We present here the data analysis procedure and initial results of our studies to measure the absolute position of a radioactive source (Na-22) using time of flight (TOF) as well as hit position information and hence to demonstrate their potential applications in medical imaging. We also present the Geant4 based simulation results on the efficiency of our detector as a function of number of gaps and the converter thickness.

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