

Development of DLC-RPC for Radiative Decay Counter of MEG II Experiment

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The RPC with very thin material budget using MPGD technology has been developed for MEG- II experiment; muon to positron + gamma rare decay experiment. To improve the background rejection, low energy (< a few MeV) positrons coming from radiative decay should be detected under intense muon beam (around 4×10^6 muons per unit cm²) penetrating in the detector. Very small material budget (<0.001 x radiative length), high counting tolerance (> 4 MHz / cm²) and fine timing resolution (< 1 nano second) are required for this counter. We have developed thin RPC detectors that consist of polyimide film as substrate and DLC (Diamond Like Carbon) as resistive electrodes with around 10 MW/sq. of surface resistivity. The thin RPC is stacked to four layers by small pillars (400-micron height) as support structures using photo lithographic technology. The prototype small detectors are produced and tested using muon beam, X-rays and fast neutrons, and results are very promising. The test chamber with segmented HV feeder is now producing and testing. This RPC will be installed in MEG-II experiment in early next year (2023). Recent development status and results of performance tests will be presented.

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