

A development of HBD for the J-Parc E16 experiment

Spontaneous breaking of the chiral symmetry is considered to be the origin of hadron mass, however, the experimental confirmation is not given yet. J-PARC E16 experiment was proposed to investigate the origin of the mass through the mass modification of vector mesons in a finite density environment. The mass of the vector mesons which are produced in p+A reactions, are measured through the electron-positron decay. A Cherenkov detector with a large acceptance and fine segmentations is required for the electron identification. Hadron Blind Detector (HBD) is ideal for the purpose, which is a mirror-less, windowless Cherenkov detector with a stack of Gas Electron Multipliers (GEMs) on top of which CsI is evaporated. CF₄ works as amplification gas and cherenkov radiator.

We have developed a prototype of HBD for the J-PARC E16. It is constructed with a CsI LCP-GEM with a thickness of 100 μ m, and double kapton-GEMs with a thickness of 50 μ m or a LCP-GEM. The use of thicker GEM leads to larger gain at the first stage and tolerance to sparks due to the lower voltage operation, compared to triple 50 μ m kapton-GEMs which is used for the PHENIX experiment.

A beam test was performed with an electron beam and the prototype successfully detected Cherenkov radiation. However, the number of photoelectrons was only two due to the degradation of CsI photocathode. Another beam test with improvement will be performed on Nov. 2009. The performance of the prototype will be reported.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

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