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Research on the performance of light reflecting materials for shashlik electromagnetic calorimeter

Electromagnetic calorimeter (Ecal) is an important part of the Multi Purpose Detector (MPD) at the NICA collider. A shashlik-type electromagnetic calorimeter is selected as MPD ECal. The particular goals of the MPD ECal are to measure of spatial positions and energy of photons and electrons. Therefore, the energy resolution of the detector is the most important performance. The light yield is an important factor that affecting the energy resolution of ECal. The reflective materials play the role of reflecting the light emitted by the scintillator and transmitted to the end of the WLS fibers. Therefore, research on the performance of light reflecting materials is crucial to increase the light yield and improve the energy resolution. A variety of fiber-end reflective materials and scintillator surface reflective materials were selected and tested. The best performance materials will be used for the production of shashlik ECal. In addition, Since MPD requires high position resolution of the calorimeter, the size of a single module is only 4x4cm², so more than 40,000 modules need to be produced. Not only that, to reduce the dead zones effect, all modules will be cut from two sides at an angle 1.5 degree. These pose a huge challenge to mass production. This article also gives a detailed description of the mass production process.

Secondary topics

Applications

Primary topic

Novel Materials

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