CALOR 2024

第２０回 素粒子・原子核物理学
カロリメータ検出器国際会議
（つくば国際会議場, 2024年5月20日〜２４日）

Contribution ID: **93**   Type: **Oral**

Sampling calorimeter to measure the photon's incident angle

Friday 24 May 2024 14:30 (20 minutes)

We will present a sampling calorimeter to measure the photons' incident angle. A three-dimensional fine-segmented calorimeter will measure the profiles of generated shower particles along the photon's direction, which indicates the incident angle. A toy detector is designed for a feasibility study by simulation based on the GEANT4, a block consisting of alternating layers of a 1-mm-thick lead absorber and a 5-mm-thick plastic scintillator. The plastic scintillator is segmented into 15-mm-wide strips, alternately oriented in the vertical and horizontal directions. The energy deposits of each strip are used to train the machine learning algorithm (XGboost) to deduce the given angle. The obtained angular resolution is 1.3 degrees for 1 GeV photon.

We fabricate a small-size sampling calorimeter to confirm the simulation results. We use 0.15-mm-thick tungsten strips instead of lead plates and 1mm-square scintillating fibers instead of plastic scintillators for better energy resolution. The simulation study for the updated version indicates no significant difference in the angular resolution. The detector is made of 24 layers, each of which contains 16 modules. We completed the detector fabrication and performed a beam test in January this year.

In this talk, we will report on the sampling calorimeter for the angle measurement, including its design and fabrication and the performance test result using the positron beam.

Author: LIM, GeiYoub

Presenter: LIM, GeiYoub

Session Classification: New technologies/New concepts 3