

Scintillator hodoscope with a few millimeter position resolution for cosmic-ray test stand

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An large prototype of the analogue hadron calorimeter for the International Linear Collider (ILC) was constructed and performance studies in beam are underway. The detection layers of the hadron calorimeter are highly segmented into 30-mm square scintillator tiles, each readout individually with a SiPM. A large number of detection tiles of the prototype ($\sim 22,000$ tiles in total) had to be tested and calibrated. As an efficient tool to calibrate multiple layers simultaneously, a cosmic-ray test stand was newly developed. The test stand was designed to determine the cosmic-ray track precisely for precise tile calibration. Each top and bottom counter is a plastic scintillator plate ($42 \times 42 \times 6\text{cm}^3$) readout with wavelength shifting fibers embedded on top and bottom surfaces orthogonally at 5 mm intervals. The two dimensional incident position can be reconstructed from the signal distribution at the fibers with a few mm position resolution. Five to six fibers are bundled periodically to reduce the number of readout channels.

The measured performance of the scintillator hodoscope and the results from the calibration of the detection layers in the cosmic-ray test stand will be presented.

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