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Performance assessment of the compact calorimeters for future electron-positron collider

The FCAL collaboration is preparing large-scale prototypes of special calorimeters to be used in the very forward region at future electron-positron colliders. The very forward region sets challenging requirements on several detector parameters, such as detector compactness, radiation hardness, or readout ASICs parameters. In our concept, two compact calorimeters are foreseen, LumiCal and BeamCal. Both are designed as sandwich calorimeters with very thin sensor planes to keep the Molière radius small, facilitating the measurement of electron showers in the presence of the background. Silicon sensor prototypes and dedicated FE ASICs have been developed and produced. The ASICs have been designed to cope with the timing and dynamic range requirements. In the recent beam tests, a multi-plane compact prototype was equipped with thin sensor planes fully assembled with the new readout electronics and installed in 1 mm gaps between tungsten plates of one radiation length thickness. The status of the calorimeter prototype development will be presented, including selected performance results, obtained in a 5 GeV electron beam at DESY, as well as the expected performance obtained from simulation.

Primary experiment

FCAL Collaboration

Author: Dr GHENESCU, Veta (Institute of Space Science (RO))

Presenter: Dr GHENESCU, Veta (Institute of Space Science (RO))

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