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Instrumentation of the very forward region at future linear colliders –design and R&D by the FCAL Collaboration

Detectors closing the very forward region in experiments at future linear colliders have to match specific requirements. The forward region design is affected by a phenomenon called beamstrahlung which at high centre of mass energies creates a severe e+e- pair background, leading to annual doses of several MGy in the very forward calorimeters. On the other hand, since beamstrahlung depends on the detailed collision parameters, measuring the pair background may provide a fast luminosity estimate. For the measurement of the luminosity through Bhabha scattering rates, high reconstruction accuracy in the polar angle of electromagnetic showers is mandatory. Due to high occupancy, the very forward calorimeters need a fast readout. In this talk, we report on the optimisation of the design of the very forward region for an ILC and CLIC detector, comprising two calorimeters, LumiCal and BeamCal. Requirements on the mechanical design of LumiCal and the readout electronics are derived. In addition, first results on the sensor R&D for these future forward calorimeters are reported.

Primary authors: Prof. ABRAMOWICZ, Halina (High Energy Physics Department School of Physics & Astronomy); Dr LOHMANN, Wolfgang (DESY-Zeuthen)

Co-author: Mr SADEH, Iftach (Tel Aviv University)

Presenter: Mr SADEH, Iftach (Tel Aviv University)

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