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IDEA Dual-Readout calorimetry hardware

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Dual-Readout calorimetry is a relatively new calorimetric technique able to overcome the non-compensation problem by means of two independent scintillation and Cherenkov light signal detections. Scintillating photons provide a signal proportional to the whole energy deposition in the calorimeter while Cherenkov photons emitted in clear fibers provide a signal almost exclusively related to the electromagnetic component (electrons and positrons).

Fluctuations in the electromagnetic and non-electromagnetic component of hadronic induced showers represent the major limit to reach resolutions needed in experiments at future leptonic colliders. With a Dual-Readout calorimeter, by looking at the two independent signals, it is possible to estimate, event by event, the electromagnetic fraction and to correctly reconstruct the primary hadron energy. The expected energy resolution for single hadron detection, together with the excellent particle identification capability, makes a Dual-Readout fiber calorimeter one of the most promising options for future leptonic colliders.

In this poster, we review the main benefits and open problems of a new Silicon photomultiplier-based (SiPMs) readout system tested with electrons at the SPS-H8 line. Thanks to their high photon detection efficiency, high granularity and compactness, SiPMs represent the best readout solution in order to bring this technique into future collider experiments.

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