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Dual-Readout Fibre-Sampling Calorimeter for next lepton collider

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Precision measurements at future lepton colliders require excellent energy resolution, especially in multi-jet events, to successfully separate Z, W, and Higgs decays. The dual-readout method, which uses both scintillation and Cherenkov light, has proven to be a promising solution. This technique provides two independent energy measurements of the hadronic shower, allowing event-by-event compensation for the electromagnetic fraction fluctuations.

Different detector geometries were investigated using small prototypes qualified on beam and data-tuned simulations. Among these, a design employing capillary tubes stands out for its ease of assembly, high accuracy, and cost-effectiveness. In this context, we present HiDRa, the 65×65×250 cm³ High-Resolution Highly Granular Dual-Readout Demonstrator. Its main goal is to evaluate performance in terms of linearity and energy resolution with a high-energy hadron beam.

This talk will discuss the solution adopted to build the demonstrator. We will present the latest simulation results for this prototype and compare them with recent test beam data. In addition, we will show the latest performance obtained in the simulation with the “4 π ” detector geometry, implemented using the capillary tube design.

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