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The LHCb PicoCal

The aim of the LHCb Upgrade II is to operate at a luminosity of about 1.0 x 10^{34} cm^{-2} s^{-1} to collect a data set of 300 fb^{-1}. The required substantial modifications of the LHCb electromagnetic calorimeter during Long Shutdown 4 (LS4) due to high radiation doses in the central region and increased particle densities are referred to as PicoCal. An enhancement of the ECAL in LS3 anticipates key features of the PicoCal.
Several scintillating sampling ECAL technologies are currently being investigated in an ongoing R&D campaign in view of the PicoCal: Spaghetti Calorimeter (SpaCal) with garnet scintillating crystals and 3D-printed tungsten absorber, SpaCal with scintillating plastic fibres and lead absorber, and Shashlik with polystyrene tiles, lead absorber and fast WLS fibres. For all technologies, energy resolutions with sampling contributions of about 10%/sqrt(E) in line with the requirements were measured in a test beam campaign.
Timing capabilities with tens of picoseconds precision for neutral electromagnetic particles and increased granularity with denser absorber in the central region are needed for pile-up mitigation. Time resolutions of better than 20 ps at high energy were observed in test beam measurements of prototype SpaCal and Shashlik modules. The presentation will also cover results from detailed simulations to optimise the design and physics performance of the PicoCal.

Secondary track

Author: ROLOFF, Philipp (CERN)

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