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Scintillating sampling ECAL technology for the Upgrade II of LHCb

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The aim of the LHCb Upgrade II is to operate at a luminosity of $1.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ to collect a data set of 300 fb^{-1} . This will require a substantial modification of the current LHCb ECAL due to high radiation doses in the central region and increased particle densities. A consolidation of the ECAL already during LS3 would reduce the occupancy in the central region and mitigate substantial ageing effects there after Run 3. Several scintillating sampling ECAL technologies are currently being investigated in an ongoing R&D campaign as the baseline solution: Spaghetti Calorimeter (SpaCal) with garnet scintillating crystals and tungsten absorber, SpaCal with scintillating plastic fibres and tungsten or lead absorber, and Shashlik with polystyrene tiles, lead absorber and fast WLS fibres. 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 15 ps at high energy were recently observed in test beam measurements of prototype SpaCal and Shashlik modules. Energy resolutions with sampling contributions of about $10\%/\sqrt{E}$ in line with the requirements were observed. The presentation will also cover results from detailed simulations to optimise the design and physics performance of the Upgrade II ECAL.

In-person participation

Yes

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