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HGCAL detector performance and system validation with particle beams

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The HGCAL is a new endcap calorimeter for CMS in the high-luminosity LHC phase. With 600 m² of silicon sensors and 300 m² of scintillating tiles, the HGCAL will provide precise spatial, energy, and timing information of particles and particle showers in its active volume. With unprecedented precision comes the challenge to process and transmit large amounts of trigger primitive data and event data over O(10k) optical fibres.

For almost a decade, multiple aspects of the detector technologies and of the frontend and backend electronics have been progressively validated in beam tests of increasing complexity. At the same time these systems have provided the opportunity to construct vertically integrated chains of frontend and back electronics that have recently used final pre-production parts.

In this contribution, the measured performance of detector prototype chains will be presented, along with an overview of the integration achievements, and the studies defining the layout and optimization of the optical fibre plant connecting the frontend electronics to the backend electronics.

Secondary track

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