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Design and performance studies of a hadronic calorimeter for a FCC-hh experiment

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The hadron-hadron Future Circular Collider (FCC-hh) project studies the physics reach of a proton-proton machine with centre of mass energies up to 100 TeV and five times greater luminosities than at the High-Luminosity LHC. The new energy regime of the FCC-hh opens the opportunity for the discovery of physics beyond the standard model. At 100 TeV a large fraction of the W, Z, H bosons and top quarks are produced with a significant boost. It implies an efficient reconstruction of very high energetic objects decaying hadronically and producing high p_T jets in the detector. The reconstruction of those boosted objects sets the calorimeter performance requirements in terms of energy resolution, containment of highly energetic hadron showers, and high transversal granularity. We will present the current baseline technologies for the calorimeter system of the FCC-hh reference detector: a liquid argon (LAr) electromagnetic and a scintillator-steel (Tile) hadronic calorimeter. The talk will focus on the performance studies for hadrons, in terms of single particle and jet reconstruction. We will present the achieved energy resolutions and dependences on the sampling fraction and granularity. In addition, the design considerations will be discussed.

Presenter: FALTOVA, Jana (CERN)

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