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Jet sub-structure studies in full simulation for highly boosted objects at 100 TeV proton-proton collisions of the FCC-hh (10'+5')

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The physics reach of the Future Circular Collider in hadron mode (FCC-hh) with a centre of mass energy of 100 TeV and unprecedented luminosity has been studied and published in a Conceptual Design Report (CERN-ACC-2018-0058). In order to exploit the full physics potential of such a collider, a conceptual detector design has been developed and tested in fast as well as full-simulations within the common software framework *FCCSW*.
The discovery reach for new heavy resonances, like Z' or graviton decaying into bosons or top quarks, highly depends on the performance of the detector system. Their signals occur with a strong boost in the central region of the detector. The successful reconstruction of e.g. $Z' \to t\bar{t}$ especially depends on the calorimeter granularity, necessary to distinguish the three body topology of the jets sub-structure from the QCD background.
The reconstruction of boosted, and highly energetic jets sets the calorimeter performance requirements in terms of shower containment, energy resolution and granularity.

We will present the performance of the FCC-hh reference detector in terms of jet energy resolution, discuss the challenges of a 100 TeV proton-proton machine and show first results of jet sub-structure studies, that use multivariate analysis techniques to distinguish boosted W and Z bosons from QCD jets in full *FCCSW* simulations. The results will be compared to results of fast-simulations using the *Delphes* package. Finally, the prospects including particle flow algorithms will be discussed.

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