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Muon Response in Projective Geometry Configurations of the ATLAS Tile Calorimeter Test Beam

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The Tile Calorimeter, the central hadronic calorimeter of the ATLAS experiment, is in the process of being upgraded for the upcoming High Luminosity –Large Hadron Collider (HL-LHC). The Tile Calorimeter test beam set-up in the North Experiment Area at CERN Super Proton Synchrotron is used to test electronics and software for the HL-LHC upgrade of the calorimeter. This study aims to show, quantitatively, the muon tagging capability of the upgraded calorimeter. This information will be used in the first level trigger. Comparisons with the legacy readout will be shown. In addition, energy loss per path length (dE/dx) distributions have been measured using beams of muons. The analysis has been performed with the different photomultiplier gains for each radial layer of the calorimeter. Finally, the setup has been simulated using Geant 4 Monte-Carlo, and comparisons of data and Monte-Carlo simulations will be presented.

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