10th Beam Telescopes and Test Beams Workshop



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Study of the ATLAS Tile Calorimeter response to beams of particles using Phase II upgrade readout

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The Large Hadron Collider (LHC) Phase II upgrade aims to increase the instantaneous accelerator luminosity. A new readout system of the ATLAS Tile Calorimeter (TileCal) is needed to meet the trigger's requirements, to cope with the higher radiation levels and the ageing of the current electronics. It has to handle longer latencies of up to $35 \mu s$ at such high pileup levels.

Prototypes of the upgrade TileCal electronics have been tested using the beam from the Super Proton Synchrotron (SPS) accelerator at CERN. Data were collected in 2016-2018 with beams of muons, electrons and hadrons at various incident energies and impact angles. Furthermore, data were collected during 2021 beam test campaigns where the final version of Phase II upgrade readout was tested.

This presentation summarizes the beam test campaigns, the upgrades of the calorimeter electronics, the trigger and particle identification systems. The results obtained analyzing muon, electron and hadron data are discussed.

Authors: Dr BOUMEDIENE, Djamel Eddine (Université Clermont Auvergne (FR)); ZAKAREISHVILI, Tamar (Ivane Javakhishvili Tbilisi State University (GE))

Presenter: ZAKAREISHVILI, Tamar (Ivane Javakhishvili Tbilisi State University (GE))

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