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Design and performance of the integrator based read-out in Tile Calorimeter of the ATLAS experiment

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TileCal, the central hadronic calorimeter of the ATLAS experiment at the CERN Large Hadron Collider (LHC), is built of steel and scintillating tiles with redundant readout by optical fibers and uses photomultipliers as photodetectors. It provides measurements for hadrons, jets and missing transverse energy. To equalize the response of individual TileCal cells with a precision better than 1% and to monitor the response of each cell over time, a calibration and monitoring system based on a Cesium 137 radioactive source driven through the calorimeter volume by liquid flow has been implemented. This calibration system relies on dedicated readout chain based on slow integrators that read currents from the TileCal photomultipliers averaged over milliseconds during the calibration runs. During the LHC collisions the TileCal integrator based readout provides monitoring of the beam conditions and of the stability of the TileCal optics, including stability of the photomultiplier gains. The work to be presented will focus on the architecture, implementation and performance of the TileCal integrator based readout during the calibration runs and during the LHC collisions.

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