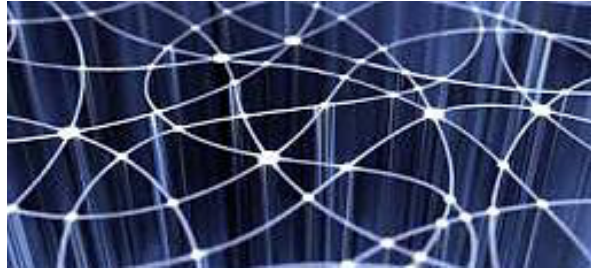


High-performance Signal and Data Processing: Challenges in Astro- and Particle Physics and Radio Astronomy Instrumentation



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Upgrade of the ATLAS TileCal Electronics

The Tile Calorimeter (TileCal) is the central hadronic calorimeter for the ATLAS experiment at the LHC. TileCal is a key detector for the measurement of hadrons, jets, hadronic tau decays and the determination of the missing transverse energy. Its performance in Run 1 has been excellent. The absolute energy scale for all of the 5182 read-out cells has been preserved through the different calibration systems. The main upgrade of TileCal will occur for the High Luminosity LHC phase (phase 2) which is scheduled around 2022. The upgrade aims at replacing the majority of the on- and off- detector electronics so that all calorimeter signals are digitized and sent to the off-detector electronics in the counting room. An ambitious upgrade development program is pursued where three different options are being evaluated for the front-end electronics. The option choice will be decided after extensive test beam studies. High speed optical links are used to read out all digitized data to the counting room. For the off-detector electronics a new back-end architecture is being developed. A demonstrator prototype read-out for a slice of the calorimeter with most of the new electronics, but also compatible with the present system, is planned to be inserted in ATLAS already in mid 2014 (at the end of the phase 0 upgrade).

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