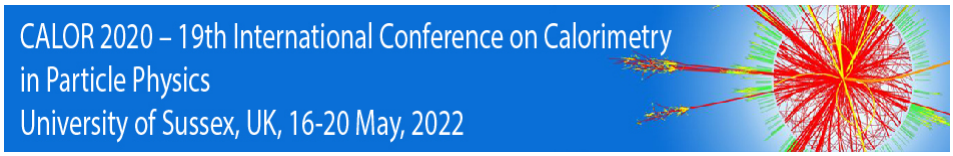

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A Burn-in test station for the ATLAS Phase-II Tile-calorimeter low-voltage power supply transformer-coupled buck converters

The Tile Calorimeter (TileCal) is a sampling hadronic calorimeter covering the central region of the ATLAS experiment, with steel as absorber and plastic scintillators as active medium. The High-Luminosity phase of LHC (HL-LHC), delivering five times the LHC nominal instantaneous luminosity, is expected to begin in 2029. To prepare TileCal for the new conditions of the HL-LHC, a Phase-II upgrade will be required. The upgrade will take place during the long shutdown from December 2025 until the beginning of 2029. It will encompass the replacement of both on- and off-detector electronics, the implementation of new on-detector mechanics as well as the replacement of Photo-multiplier tubes located in the most exposed regions of the detector. The on-detector electronics of the Tilecal are powered by 256 Low-Voltage Power Supplies (LVPS) which themselves contain eight transformer-coupled buck converters known as Bricks. These Bricks function to step-down bulk 200 V DC received from off-detector to the required 10 V DC. A Brick failure will result in the front-end electronics to become offline for a commensurate time. Therefore, the reliability of the LVPS Bricks is of the utmost importance as access to them is limited to approximately once per year due to them being located within the inner barrel of ATLAS detector. To ensure the reliable operation of 2048 Bricks once on-detector an extensive quality control procedure is to be implemented which includes Burn-in testing. The Burn-in procedure subjects the Bricks to sub-optimal operating conditions which function to stimulate failure mechanisms within the Bricks. This results in components that would fail prematurely within TileCal failing within the Burn-in apparatus, known as a Burn-in station, thereby allowing for their replacement which subsequently improves the reliability of the Brick population. The Burn-in station is of a fully custom design in both its hardware and software due to the unique nature of its application. The development of the Burn-in station as well as the Burn-in procedure that it employs will be explored in detail, culminating in preliminary Burn-in results of the latest LVPS prototypes produced.

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