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The replacement and refurbishment of Gap Scintillator Counters for the ATLAS Tile Calorimeter Phase-I Upgrade

We report on the replacement of E3E4 (Crack) and refurbishment of Minimum Bias Trigger Scintillator (MBTS) counters as part of phase-I upgrade during the long shutdown 2 (LS2) at CERN. Crack and MBTS counters, situated between the central and extended Tile Calorimeter barrels, are used for correcting the electromagnetic energy responses and for providing inputs to the trigger, respectively. During the LHC Run-2 data-taking period in 2015-2018, Crack and MBTS scintillators were deteriorated by radiation and had to be replaced with more radiation-hard scintillators and optimised geometry prior to High-Luminosity LHC Run-3. The phase-I upgrade has been ongoing since the beginning of the LHC LS2. The upgrade activities which were finalized with a strong contribution from South Africa consisted of the re-design of the crack and MBTS detector modules, their assembly, qualification and characterization using radioactive sources (strontium-90 and cesium-137), as well as their installation on the ATLAS detector. The University of the Witwatersrand was previously involved in the radiation qualification and selection of the scintillator material to be used in the counter production.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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