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ATLAS Tile Calorimeter Temperature Data Analysis on a Continuous Basis

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This paper compares the historical temperature data of the ATLAS Tile Calorimeter (TileCal) drawers, extracted from the Detector Control System (DCS). ATLAS TileCal is an experimental tool used in particle physics for measuring the energy of particles. The TileCal DCS continuously monitors all the hardware and infrastructure for each subsystem. The Tile-in-One (TiO) tool is used to visualize and analyze this temperature study. The TiO is a collection of small, independent web tools called plugins. Plugins assess the quality of data and conditions for ATLAS TileCal. A change in temperature inside the drawers alters the photomultiplier tube (PMT) gain, resulting in readout electronics that give null results or data with lots of errors. Implying that those results may not be used for physics data. The TileCal drawers are water-cooled using a circuit below atmospheric pressure to prevent leaks, maintain stable temperatures, maintain constant PMT gain, and finally, maintain the stability of the electronics. A comparative analysis is done to determine the development of the leaks or improvements achieved in the cooling system and the stable values of the temperature in the drawers. The work aims to continuously study the variation of temperature in the module over a short period of time using the TiO platform and display it to a user in a friendly and intuitive manner using contemporary web technologies. The DCS provides temperature data through a dedicated interface called the DCS Data Viewer (DDV). The TiO temperature plugin is being developed by having the proper scripts that will easily query TileCal DCS using the DDV server. Currently, the temperature data is extracted and subsequently transformed into a form suitable for the visualizing library. The plots can be interacted with using the visualization tool. The biggest focus is on having the temperature plugin be stable and be able to display the status of the whole detector to be able to detect temperature problems at an early stage.

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