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The use of Machine learning to improve quality control for the ATLAS Phase-II Upgrade LVPS bricks at CERN

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Abstract. The Tile Calorimeter (TileCal), a sampling hadronic calorimeter covering the central region of the ATLAS experiment, will require new electronics to meet the requirements of the High-Luminosity LHC (HL-LHC). This talk will demonstrate how deep neural networks can improve quality control of the new Low Voltage Power Supply (LVPS) boards in the contest of the ATLAS Phase-II Upgrade program for HL-LHC. Deep Neural Networks (DNNs) as a machine learning algorithm is used to analyze complex data from the LVPS Boards. The first initial testing done on the boards determined their reliability and performance. A total of eleven tests with a binary metric of PASS/FAIL make up the initial test station. The measurements are stored in a database and the multi-dimensional data is explored and then analyzed by a DNN algorithm. The DNN model classifies the data and produces significant insights with predictions about the quality of the LVPS boards. These forecasts will help the Quality Control of the upgraded TileCal LVPS. Pre-production and production of the LVPS boards will commence this year generating more data than before.

Primary authors: PHADAGI, Khathutshelo (iThemba Labs); KUMAR, Mukesh (University of the Witwatersrand)

Presenter: PHADAGI, Khathutshelo (iThemba Labs)

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