

IMPROVING THE ROBUSTNESS OF THE ATLAS CALORIMETER SOFTWARE TRIGGER*

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The ATLAS trigger is made up of a hardware component at level one (L1) and a software component known as the High Level Trigger (HLT) comprised of level two (L2) and the Event Filter (EF) building phase. Between these levels, an event rate of 40 MHz must be reduced to about 200 Hz for recording to mass storage.

An important goal for ATLAS is to look for new physics, e.g. supersymmetric models (SUSY). SUSY predicts the existence of new particles, some of which will not leave visible signatures in the detectors. This contributes to a large missing energy signature in the detector. The HLT is designed to give an early indication of these SUSY searches which can be quickly filtered using missing transverse energy (E_T^{miss}) algorithms embedded in the HLT.

Since all calorimeter cells are accessed to calculate E_T^{miss} for a given event, this serves as a natural point at which to check for cells with unphysical energies corresponding to their detector sampling. Even though we understand the detector quite well, still there is sporadic noise and unphysical measurements which can happen routinely in the calorimeter, biasing the E_T^{miss} signature.

We are devising tools which aim to calibrate the detector and isolate the noise in the calorimeter which would otherwise alter the E_T^{miss} signature. While tools exist to mask channels from a database loaded with pre-existing noisy cells *before* a run begins, currently nothing is done to fix sporadic cells during online running.

Until the detector, physical environment, and any hardware problems are completely understood, rejecting any event from written storage based on the E_T^{miss} is premature. Information about suspicious events, however, may be very valuable for online monitoring and bad channel masking; therefore, results from these studies will contribute in the form of ‘suspicious’ flags. These flags will be studied offline with early ATLAS data and may eventually be used to reject events online.

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