Abstract Submitted
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The LUX experiment - trigger and data acquisition systems ERYK DRUSZKIEWICZ, University of Rochester, LUX COLLABORATION — The Large Underground Xenon (LUX) detector is a two-phase xenon time projection chamber designed to detect interactions of dark matter particles with the xenon nuclei. Signals from the detector PMTs are processed by custom-built analog electronics which provide properly shaped signals for the trigger and data acquisition (DAQ) systems. During calibrations, both systems must be able to handle high rates and have large dynamic ranges; during dark matter searches, maximum sensitivity requires low thresholds. The trigger system uses eight-channel 64-MHz digitizers (DDC-8) connected to a Trigger Builder (TB). The FPGA cores on the digitizers perform real-time pulse identification (discriminating between S1 and S2-like signals) and event localization. The TB uses hit patterns, hit maps, and maximum response detection to make trigger decisions, which are reached within few microseconds after the occurrence of an event of interest. The DAQ system is comprised of commercial digitizers with customized firmware. Its real-time baseline suppression allows for a maximum event acquisition rate in excess of 1.5 kHz, which results in virtually no deadtime. The performance of the trigger and DAQ systems during the commissioning runs of LUX will be discussed.

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