



Contribution ID: 62

Type: **Poster Presentation**

Data Acquisition and Readout for the LUX Dark Matter Experiment

LUX is a two-phase (liquid/gas) xenon time projection chamber designed to detect nuclear recoils from interactions with dark matter particles. Signals from the LUX detector are processed by custom-built analog electronics which provide properly shaped signals for the trigger and data acquisition (DAQ) systems. The DAQ is comprised of commercial digitizers with firmware customized for the LUX experiment. Data acquisition systems in rare event searches must accommodate high rate and large dynamic range during precision calibrations involving radioactive sources, while also delivering low threshold for maximum sensitivity. The LUX DAQ meets these challenges using real-time baseline suppression that allows for a maximum event acquisition rate in excess of 1.5kHz with virtually no deadtime. This talk describes the LUX DAQ, and the novel acquisition techniques employed in the LUX experiment. Data processing and reduction techniques are also described.

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Track Classification: Trigger and Data Acquisition Systems