



Poster session 4 – Friday 8 July

P4.010 The novel trigger system of DEAP-3600

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DEAP-3600 is a direct-detection dark matter experiment based at SNOLAB, 2km beneath Sudbury, Canada. It contains 3600kg of liquid Argon, in which nuclear and electronic recoils cause scintillation. WIMP interactions would cause nuclear recoils, and are expected to occur at micro-Hertz frequency or less; Argon-39 beta decays cause electronic recoils, and occur at kilo-Hertz frequency.

Pulse shape discrimination against Argon-39 backgrounds requires high-accuracy and high-rate digitization for relatively long acquisition periods, producing data rates comparable to LHC experiments. To address this challenge, on-board suppression is used in each channel, together with custom trigger hardware and software. To prevent the data acquisition system from being saturated by beta decays, the trigger system constantly analyses data from the detector. The system always triggers if it sees a nuclear-like event, but ignores a configurable fraction of electronic-like events.

This poster details the development and commissioning of this flexible trigger system, which drastically reduces the amount of data written to disk, without sacrificing sensitivity to discovering WIMPs.