

Threshold verification in the PICO-60 detector and study of the growth and motion of nucleation bubbles

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The PICO-60 experiment searches for dark matter using superheated liquid C_3F_8 . The experiment is located at SNOLAB and is designed to be sensitive to spin-carrying dark matter particles. The PICO bubble chamber is a threshold detector that can be operated to be insensitive to minimally ionizing particles. Acoustic information is used to discriminate between nuclear recoil events and background alpha events.

It is very hard to directly measure the temperature and its variations inside a bubble chamber and understand the flow and heat distribution patterns in a superheated liquid. A new technique is being developed involving the growth and movement patterns of nucleation bubbles in the PICO-60 vessel to map the heat and flow distribution. The progress and results from this work will be presented in this talk. This measurement aims to verify the thermal and liquid simulations in this and future PICO detectors. Understanding the temperature profile inside the chamber allows to narrow the threshold uncertainty for dark matter searches in the future.

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