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The PICO 0.1 bubble chamber calibration

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The search for dark matter calls for increasingly sensitive experiments. For several decades now, scientists have built more and more sensitive detectors in the hope to directly detect WIMPs, a type of candidate particles for dark matter. WIMPs should interact with normal matter by elastic scattering with nuclei. Experiments are typically performed underground to shield them from cosmic and atmospheric radiation. However, an important background radiation for dark matter experiments is neutrons present underground, whose response in detectors is indistinguishable form that of a WIMP. The full understanding of the neutrons'response in dark matter detectors is, therefore, of the utmost importance. The PICO collaboration presently operates two bubble chambers in the SNOLAB underground laboratory in Sudbury, Ontario. An effort is being made by the collaboration towards the understanding of those chambers'behavior. To this aim, multiple calibration chambers have been built. The PICO 0.1 chamber is operated at the Tandem Van de Graaff facility of the Université de Montréal where a proton beam is used to produce mono-energetic neutrons from the $^{51}V(p,n)^{51}Cr$ reaction. This chamber has shown to be one of the cleanest and most reliable chamber designed by the collaboration, which makes it the perfect detector to perform the neutron calibration. This talk will explain the goal and experimental method of the measurements. Preliminary results of the calibration will also be presented.

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