Dark matter searches with the PICASSO experiment at SNOLAB

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Abstract

Recent cosmological observations support the existence of dark matter as a significant constituent of the universe. The PICASSO experiment (Project in CAnada to Search for Supersymmetric Objects) uses super-heated C_4F_{10} droplets suspended in a gel as a target sensitive to WIMP-proton spin-dependent elastic scattering. A ^{19}F recoiling nucleus produces a heat spike in the droplet which triggers its full explosive evaporation. The phase transition is accompanied by a shock wave which is recorded by as set of piezoelectric transducers attached to the detector. A first phase of the experiment in SNOLAB used 19.3 g of active mass and was operated for half a year in 2004 (Phys. Lett. B 2005).

The phase II setup has been improved substantially in sensitivity by using an array of 32 detectors with an active mass of 80g each and largely reduced background. A more precise control of the temperature and pressure of the detectors allows for reduced systematic errors in the final result.

This poster will show the quality of the data taken during one year by the first set of phase II detectors installed underground, together with their expected sensitivity in the spin dependent sector.