

Looking for low-mass WIMPs with TREX-DM

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The Weakly Interacting Massive Particles, which appear in supersymmetric extensions of the Standard Model, are one of the strongest candidates to form the Dark Matter of the Universe. The lack of a positive signal during the last 30 years in the search of “standard WIMPs”, during which the experimental efforts have reached remarkable levels of sensitivity, and the lack of proof of supersymmetry in the data of LHC so far, have made attractive the lower end of the WIMP mass. Looking for low-mass WIMPs ($< 10\text{GeV}$) requires the use of light elements and a low energy threshold, aspects for which the current experiments are not optimized. We propose another experiment to look for low-mass WIMPs, TREX-DM. TREX-DM is a gas time projection chamber (TPC) equipped with novel micromesh gas structures (Micromegas) readout planes. The detector will hold, in the fiducial volume, ~ 20 litres of pressurized gas up to 10 bar, which corresponds to approx. 0.300 kg of Ar at 10 bar, or alternatively 0.160 kg of Ne. The energy threshold foreseen is well below 0.4-keVee and the expected background level is better than 10 counts $\text{keV}^{-1} \text{kg}^{-1} \text{d}^{-1}$, according to the screening of all the components of the detector. Based on the background model, for a level of the order of 1 count $\text{keV}^{-1} \text{kg}^{-1} \text{d}^{-1}$, TREX-DM could give competitive results in the search for low mass WIMPs. The experiment has recently been approved by the Underground Laboratory of Canfranc (Laboratorio Subterráneo de Canfranc) and is expected to be commissioned by the end of the current year. We will report on the status of the project.

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