

# Searching for Dark Matter with LUX and LUX-ZEPLIN

*Sunday, 3 September 2017 14:50 (25 minutes)*

The identification of dark matter is presently one of the greatest challenges in science, fundamental to our understanding of the Universe. Weakly Interacting Massive Particles (WIMPs) that arise naturally in several models of physics beyond the Standard Model are compelling candidates for dark matter.

The Large Underground Xenon (LUX), operated at the Sanford Underground Research Facility under Lead, South Dakota (USA), is a dual phase xenon time projection chamber with 250 kg of active mass. Based on an exposure of  $3.35 \times 10^4$  kg.day, it has the world leading spin-independent exclusion limit over a wide range of WIMP masses allowing to exclude cross sections above  $1.1 \times 10^{-46}$  cm<sup>2</sup> for a WIMP mass of 50 GeV/c<sup>2</sup> (90 % CL). For spin-dependent interactions, cross sections above  $1.6 \times 10^{-41}$  cm<sup>2</sup> and  $5 \times 10^{-40}$  cm<sup>2</sup> are also excluded for a WIMP mass of 35 GeV/c<sup>2</sup> (90 %CL) for neutron and protons interactions, respectively. The innovative use of 83mKr and CH3T sources dissolved in the xenon and a collimated beam of mono-energetic 2.45 MeV neutrons from a DD generator to calibrate the detector for electron and nuclear recoils respectively played a key role in achieving this unprecedented sensitivity.

LUX-ZEPLIN (LZ) is a second-generation dark matter experiment, successor of LUX, featuring a 7-tonne active liquid xenon target (from a total of 10 tons of xenon) that will run in the same installations as LUX. Its current projected sensitivity is  $2.3 \times 10^{-48}$  cm<sup>2</sup> for a WIMP mass of 40 GeV/c<sup>2</sup> and 5.6 tons fiducial mass with 1000 live-days of data taking, covering a substantial range of theoretically motivated dark matter candidates.

In this talk, we will present the last results of LUX, emphasizing the advances in the detector calibration and data analysis, followed by an overview of the LZ detector design, planned program, current project status and timeline.

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