Particles and Nuclei International Conference 2017 (PANIC2017)

Contribution ID: 230

Type: not specified

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 3.35×10^{2} kg.day, it has the world leading spin-independent exclusion limit over a wide range of WIMP masses allowing to exclude cross sections above 1.1×10^{-46} cm²2 for a WIMP mass of 50 GeV/c²2 (90 % CL). For spin-dependent interactions, cross sections above 1.6×10^{-41} cm²2 and 5×10^{-40} cm²2 are also excluded for for a WIMP mass of 35 GeV/c²2 (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 2.3×10^{-48} cm² for a WIMP mass of 40 GeV/c² 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.

Presenter: LOPES, Isabel (LIP, University of Coimbra) **Session Classification:** Dark matter and cosmology

Track Classification: 4) Dark matter and cosmology