NPA Seminar

Wright Laboratory

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Direct Dark Matter Searches with LUX and LZ

The identification of dark matter is presently one of the greatest challenges in science, fundamental to our understanding of the Universe. Liquid Xe detectors have been a game changer in the field of dark matter detection, bringing about astonishing improvements in sensitivity over the past decade. The Large Underground Xenon (LUX) detector operated at Sanford Underground Research Facility (SURF) in South Dakota until late 2016, and set world-leading limits on WIMP dark matter at the time. Since then, the LUX collaboration has continued to analyze its extensive data taken in the 4 years of operation with new analysis methods, and testing additional dark matter candidate hypotheses. The LUX-ZEPLIN (LZ) collaboration has grown out of these two precursor experiments, with the goal of constructing a next generation dark matter detector in the same location with 7 tonnes of fully active liquid xenon. This experiment aims to achieve unprecedented sensitivity to weakly interacting massive particles (WIMPs) and is projected to reach a WIMP-nucleon spin-independent cross section of about 1.6x10−48 cm2 in 3 years of operation, pushing its sensitivity close to an irreducible background set by cosmic ray neutrinos. The LZ experiment is well underway, and slated to start operations in 2020. This talk will present the latest results of LUX, emphasizing the advances in the detector calibration and data analysis, followed by an overview of the LZ detector design, current project status and timeline.

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