



Contribution ID: 107

Type: not specified

New Physics Searches with LUX and LZ

Monday, 3 September 2018 15:42 (15 minutes)

The frontier of experimental particle physics research, and especially astroparticle physics research, frequently involves the detection of signals that are both rare, fewer than an event per year per kilogram of target, and small, with energy depositions at the keV scale. A prime example is the direct search for dark matter, although other signatures for new physics are also being sought, such as axions and various neutrino signals. The key technology that has evolved to meet this challenge is that of the ultra low background two-phase time projection chamber, typically deployed deep underground. The Large Underground Xenon (LUX) instrument was a leading such device. Now dismantled to make way for its successor, analysis of legacy data continues. Both the main scientific results of LUX and the novel approaches taken to calibration and characterisation of the detector will be presented.

With a 50 times larger fiducial mass, and an increased background rejection power due to the specially design veto systems, LUX-ZEPLIN (LZ) is presently under construction and is due to take first data in 2020. It will have a sensitivity at least two orders of magnitude beyond current best limits for the leading dark matter candidates. An overview of the LZ experiment will be presented, as well as sensitivity projections for a range of other candidates signals.

Selected session

Astroparticle Physics

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Session Classification: Astroparticle Physics