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The LZ dark matter experiment

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The LUX-ZEPLIN (LZ) experiment is a next-generation search for Weakly Interacting Massive Particles, scaling the very successful double-phase xenon technology to multi-tonne target mass. LZ will be deployed at the 4850-ft level of the Sanford Underground Research Facility (South Dakota, USA) after completion of LUX, which is presently operating there. At its core, LZ will feature a 7-tonne (active) liquid xenon TPC surrounded by two outer 'veto' detectors. Particle interactions in the WIMP target generate two signatures: prompt scintillation light and ionisation charge, the latter transduced to a pulse of electroluminescence light in a thin gaseous layer above the liquid. Our strategy is to mitigate radiogenic backgrounds from detector materials through a combination of self-shielding, precise vertex location, coincidence vetoing, and xenon purification –to expose a background from astrophysical neutrinos. Electron recoils from solar pp neutrino scattering can be mostly discriminated by the ratio of the two signatures, which differs from that for nuclear recoil interactions which should be generated by WIMPs. We present the project status and the sensitivity reach of this exciting instrument.

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