

New constraints on ultra heavy dark matter from the LUX-ZEPLIN (LZ) experiment

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Despite the bulk of gravitational evidence, little is known about the nature of dark matter (DM). New particles were invoked to explain this puzzle, with the weakly interacting massive particle (WIMP) and the QCD axion being the two most popular candidates. However, searches for these particles have so far come back empty-handed. Alternative dark matter candidates have been proposed, in particular, Ultra Heavy Dark Matter (UHDM), formed by composite blobs of dark matter particles held together by a hidden sector force. Following a process akin to Big Bang Nucleosynthesis and assuming a hidden sector force that is strongly self-interacting and long-range, successive dark matter constituents could fuse together in the early universe to form extraordinarily heavy blobs. As opposed to point-like dark matter, UHDM is expected to interact with most of the Standard Model particles it encounters, which would result in a multi-scatter event in a terrestrial experiment. In this talk, I will present a re-analysis of the first science data collected by the LUX-ZEPLIN (LZ) experiment to search for UHDM and show new constraints on the DM-nucleon cross section.

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