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DARWIN – The Ultimate WIMP Detector

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The DARWIN (DARK matter WIMP search with liquid xenON) experiment will be the next-to-next generation direct search dark matter detector. Featuring a 40 t target mass liquid xenon time projection chamber it will reach a sensitivity to WIMP nuclear recoil cross-sections at the level of the “ultimate” irreducible background induced by coherent scattering of solar and atmospheric neutrinos. Hence DARWIN will probe the entire experimentally accessible parameter space for WIMP masses above a few GeV/c². Besides its excellent sensitivity to WIMP dark matter, DARWIN will explore a plethora of science channels in astroparticle and nuclear physics, e.g., the neutrinoless double beta decay of ¹³⁶Xe.

This talk reviews the DARWIN science program for dark matter searches and beyond. An overview of the detectors baseline design and the ongoing R & D program is provided and some of the technological alternatives currently under study are showcased briefly. The technical challenges owed to the detector size as well as its requirements in terms of detector backgrounds will be addressed.

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