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Dark Matter Direct Detection at the Ton Scale with the XENON Experiment

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For over a decade the XENON Collaboration has been a pioneer in the field of dark matter direct detection. The collaboration has achieved world-leading sensitivities in WIMP-nucleon interactions using liquid xenon time projection chambers (TPCs), first with the XENON10 and later with the XENON100 experiments. This year the next phase, XENON1T, will begin data-taking with an unprecedented one ton fiducial (three tons total) volume of ultra pure liquid xenon as both target and detection medium, and should reach sensitivities down to 10-47 cm2 after two ton years of exposure. The upgrade to the ton scale is only possible due to a massive research and development program encompassing every aspect of the detector. This program is ongoing and will enable a seamless upgrade from XENON1T to a true multi-ton detector, XENONnT, with the goal of an order of magnitude increase in sensitivity. XENONnT will reuse the XENON1T infrastructure but feature a 7 ton active volume. It will be the penultimate iteration leading to the DARWIN experiment, a 30 ton liquid xenon WIMP detector designed to reach sensitivities down to 10-49 cm2. This talk will discuss the current and future stages of the XENON experiment in the context of the global dark matter search.

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