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Studies of Xenon-Doped Argon with the CHILLAX Experiment

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Xenon and argon are widely used target media for low cross-section experiments including neutrino physics and dark matter searches. Xenon-doping of dual phase argon time projection chambers (TPCs) at the O(1%) level may substantially improve detector sensitivity. However, the large temperature discrepancy between the argon and xenon phase transition points can cause instabilities in a xenon-doped argon detector such as unwanted xenon distillation. The CHILLAX experiment at LLNL is investigating the challenges and benefits of xenon-doping of argon. We discuss the results of various stability experiments conducted within CHILLAX, which have thus far culminated in housing liquid argon doped with 2.35% xenon mole fraction with excellent stability. We also discuss recent work aiming to quantify the scintillation, ionization, and electroluminescence performance of argon from xenon-doping.

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Early Career

Yes

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