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Doping LXe TPCs with helium for light dark matter

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Next generation liquid xenon TPCs are poised to increase our sensitivity to dark matter by more than an order of magnitude over a wide range of possible dark matter candidates. In this talk I will describe an idea to expand the reach and flexibility of such detectors even further, by adding helium to the xenon to enable searches for very light dark matter and combining high and low Z targets in the same detector. The reach of a He-doped xenon dark matter detector can potentially extend down to ˜50 MeV dark matter masses. In this talk, I will describe an experimental program to develop helium doping as an upgrade to a next generation xenon detector and model the expected sensitivity of such an upgrade.

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