

# ALETHEIA: Hunting for low-mass dark matter with liquid helium-filled TPCs

*Monday 25 August 2025 16:40 (20 minutes)*

The evidence of dark matter from astrophysics and cosmology is overwhelmingly robust, yet the evidence of dark matter from particle physics is continuously null. ALETHEIA aims to hunt for low-mass dark matter with liquid helium-filled TPCs. Thanks to such unique advantages as (a) ease to purify, (b) no radioactive isotopes, and (c) potentially strong ER/NR discrimination, liquid helium-filled TPCs would achieve especially low backgrounds. As a result, 1 ton\*yr ALETHEIA data is supposed to reach the B-8 neutrino floor/fog cross-section, or  $10^{-45}$  cm<sup>2</sup>. In this talk, I will present the R&D progress we have made in the past five years or so, which demonstrate that a single-phase liquid helium TPC is technologically viable. Research on a dual-phase TPC is currently underway.

## Collaboration you are representing

On behalf of ALETHEIA collaboration

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