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# Nuclear Physics in Liquid Argon with DEAP-3600

*Sunday, 15 February 2026 10:45 (15 minutes)*

With the technical complexity required by ongoing dark matter direct detection experiments, as well as requiring more refined background rejection techniques, some direct detection experiments have the ability to investigate neutrinos as well. One such detector in recent years involves the liquid argon based DEAP-3600 experiment. The detector assembly allows for nearly 3600 kg of liquid argon scintillator to be used for direct detection experiments in the low-background environment 2 km underground at SNOLAB in Sudbury, Canada.

This talk will go over a brief history of the DEAP experiment, discuss basic technical details on the current experimental design, and the data analysis techniques being used for ongoing search efforts utilizing the large detector mass (3.3 tonnes) of DEAP. This will inform a discussion on the most recent results regarding precision measurements of the radioactive properties of $^{39}$Ar –a measured specific activity of $(0.964 \pm 0.001_{stat} \pm 0.024_{sys})$ Bq/(kg·atmAr) and a half-life of $(302 \pm 8_{stat} \pm 6_{sys})$ years. Additionally, the scintillation quenching factor of α-particles in liquid argon will be covered, namely the extrapolation of the quenching factor down to the low energy region of 10 keV. This will be followed by a discussion of the ongoing efforts towards the neutrinoless double electron capture search via $^{36}$Ar using the DEAP experiment and how these efforts allow for the investigation into the nature of neutrinos.

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