



ARIADNE+: Large-Scale Demonstration of 3D Optical Readout for Dual-Phase Liquid Argon TPCs at the CERN Neutrino Platform.

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Liquid Argon Time projection Chambers (LArTPCs) are the future for long-baseline-neutrino-oscillation physics around which the international neutrino community is rallying, with the common goal of discovering new physics beyond the Standard Model, which holds the key to our understanding of phenomena such as dark matter and the matter-antimatter asymmetry. The **ARIADNE** programme is dedicated to developing a novel scalable optical readout system for such next-generation kiloton-scale liquid argon (LAr) neutrino detectors, offering excellent tracking performance and low detection thresholds. Building on the successful demonstration at the 1-ton scale with the ARIADNE detector in Liverpool, a 20-ton experiment, **ARIADNE+**, has been conducted at the CERN Neutrino Platform to evaluate scalability toward integration in large-scale experiments such as those planned within the **DUNE** programme.

ARIADNE+ employs four Timepix3 cameras to image the secondary scintillation light (S2) generated by a novel glass THGEM array. The system leverages the native 3D and zero-suppressed data output of Timepix3, with a precise 1.6 ns timing resolution. Stable operation and successful recording of cosmic muon events mark a key demonstration of this technology's suitability for future kiloton-scale neutrino experiments.

In my presentation, I will discuss the innovative design concepts that make ARIADNE+ unique and highlight the advantages these technologies bring to the next generation of LArTPC detectors.



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