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Liquid Argon R&D for LBNE and the 35-ton prototype

The Long-Baseline Neutrino Experiment 35-ton prototype detector was built to evaluate and demonstrate liquid argon time projection chamber design elements specific to the full-scale LBNE far detector, such as modular anode plane assembly elements and membrane cryostat technologies. The work presented here relates to several areas of liquid argon detector R&D involving argon purity and high voltage discharge. Due to the large fields needed to drift charged particles and the comparatively low electric breakdown voltages of liquid and gaseous argon, a CMOS camera system is developed to monitor, identify, and diagnose electric discharge such as coronae or sparks on certain TPC elements. A stainless steel housing was also designed to isolate the camera and components from the ultra-pure argon in the detector. A recirculating liquid argon test stand is being built to investigate the effect of argon purity on processes such as electric discharge as well as electron diffusion.

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