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C2Po1F-02: Design Improvements in Liquid Argon Purification Techniques in DUNE Cold Electronics Test Cryostat

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A proposed design for the removal of impurities with high electronegativity from liquid argon for the purpose of neutrino detector research is described. The design will utilize a commercially available submersible, cryogenic pump to circulate liquid argon through an external filter containing molecular sieve and activated copper media, removing water and oxygen, respectively. The existing state-of-the-art vapor-driven filter design provides a throughput of 0.5 L/min, while the capacity of the submersible pump design is at least 4 L/min, though potentially greater depending on total losses within the filtration piping assembly. An additional benefit of the new design will be the ability to regenerate the filter media in situ without stopping the experimental testing. The following work will describe the design, operation, and expected performance using CFD analysis.

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