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Development of membrane cryostats for large liquid argon neutrino detectors

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A new collaboration is being formed to develop a multi-kton long baseline neutrino experiment that will be located at the Surf Underground Research Facility (SURF) in Lead, SD. In the present design, the detector will be located inside a cryostat filled with 40 kton of ultra pure liquid argon (less than 200 parts per trillion of oxygen equivalent contamination).

To qualify membrane technology for future very large-scale and underground implementations, a strong prototyping effort is ongoing: several smaller detectors of growing size with associated cryostats and cryogenic systems will be designed and built at Fermilab and CERN. They will take physics data and test detector elements in different configurations, filtration systems for liquid argon, design options, tank configurations and installation procedures.

A 35 ton prototype is already operational at Fermilab and will take data with single-phase detector in the spring. A similar size prototype with dual-phase detector is being constructed at CERN and will be operational next year. In the coming years a 260 ton prototype with single-phase detector will be constructed and exposed to a neutrino beam at Fermilab. The refurbished ICARUS T600 (760 ton) will be on the same beam line at 600 m.

In parallel two larger cryostats will be constructed at CERN and exposed to beams of particles, 500 ton with single-phase, 800 ton with dual-phase detectors.

After the prototyping phase, the multi-kton detector will be constructed. After commissioning, it will detect and study neutrinos from a new beam from Fermilab.

These cryostats will be engineered, constructed, commissioned, qualified by an international engineering team.

This contribution will present the ongoing effort on development of the cryostats, and detail requirements, current status of design and construction and how we plan to go from 35 ton to multi-kton device.

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