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Week 2 Progress Report

Summary - Based on the work of last week, a cold finger redesign was constructed and tested. A third redesign is required to obtain better cooling. Considering the dewar for the cooling process, several modifications are needed to make this more efficient.

Results - Prototype II was successful in cooling down the bottom of the cryostat to temperatures under -77 C. The temperature reached was -82 C and held the temperature for around one hour. Based on the success of prototype II the cold-finger method will be adequate for slow freezing NH3. In order to minimize the time spent cooling down the system another prototype is needed. Prototype III will be made of copper, and instead of having 4 small fingers, one $1x1x3$in finger will be mounted. Copper will be used because it has a larger thermal conductivity than Aluminum which means its better at conducting heat. The thermal conductivity of Copper is 386 W/mK and of Aluminum is 204 W/mK. The 4L dewar seems to work well but just need a better cover. The cover needs a port for pouring LN2 in, measuring the depth of LN2, and is modular for easy access to the cryostat.

Further Goals - Assemble prototype III, model the thermodynamics of the system to learn what the temperature is inside the cryostat based on the temperature outside, and add level-meter for LN2 in dewar.