

Cooldown procedure for the 2nd sound resonator

AM

1. Pump on dewar vacuum with roughing pump—use TC gauge to measure pressure
2. Place insert into dewar
3. Test all electrical connections—continuity and leakage to ground
4. Sweep resonances in air—calculate u_{air}
5. Flush with He gas: insert stainless tube/rubber hose into top and insert stoppers
6. Measure change of f_R until frequency stabilizes—calculate u_{He}
7. Close stopcock and turn off roughing pump
8. Transfer liquid nitrogen (LN) into outer dewar
9. Maintain $p_{\text{He}} > 1$ atm while cooling
10. Monitor cooldown with T vs t program (LamdaFluke.vi)

PM

1. Check thermometer—record temperature
2. Inner dewar should be filled with He gas at 1 atmosphere
3. Sweep some resonances
4. Slowly vent the LHe storage dewar
5. Measure He level—record on wall chart
6. Make sure the correct fittings are in place on transfer tube and dewar
7. Slowly insert long end of xfer tube into storage dewar—vent valves should be closed so pressure will increase
8. Attach He gas hose to storage dewar—increase pressure to a few psi
9. Check flow from short end of xfer tube—increase pressure until you detect a flow
10. After about 5 min, cold gas should appear—place xfer tube into dewar port
11. Make sure connection to tube is tight and that vent port is open
12. Maintain a modest flow of vapor from vent
13. Liquid He will accumulate at the bottom—turn on back light and look for interface
14. Fill to about 45 cm on ruler—this should take less than 10 min
15. To stop xfer, shut valve to He gas at storage dewar and slowly withdraw xfer tube—use a glove!
16. Lab partner also removes xfer tube from dewar
17. Check the thermometer to see that it reads LHe temperature, about 4.2 K
18. Sweep a 1st sound resonance and calculate u_{HeI}
19. To lower temperature, start pumping on bath with large pump through the small bypass valve—it should take 15-30 min to pump below T_λ
20. Once below T_λ , open large valve slowly to reach 1.6 K
21. Sweep 2nd sound resonances, calculate u_{HeII}
22. Increase temperature by throttling back on pumping valves