Title

Upgrading the LBL Magnet Test Facility 1.8K Subatmospheric Refrigeration System

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UP-GRADING THE LBL MAGNET TEST FACILITY'S 1.8K SUB-ATMOSPHERIC REFRIGERATION SYSTEM,* A.F. Lietzke, R.A. Armer, P.A. Bish, J.B. Rechen, R. Schafer and C.E. Taylor, Lawrence Berkeley Laboratory, Berkeley, CA 94720 - High-current (10kA), high-field (10 Tesla) accelerator magnet testing at 1.8K requires a refrigeration system (45 watts) that is stable, predictable and easy to operate. Operational difficulties with the original system suggested that improvements might be obtained by altering the heat-exchanger geometry in a manner to facilitate the control of the superfluid coolant level. The old heat-exchanger ($0.68m^2$) was a gold-plated coil of copper tubing (D=2.54cm, L=8.5m), which provided a liquid helium reservoir (4.3L) whose liquid-level was difficult to control below 1.9K using pressure (evaporation rate) as a control variable.

A new heat-exchanger of equivalent heat-transfer area has been installed. It has a significantly larger 2-phase (evaporation) area at the exhaust end of the heat-exchanger, so that 1) large changes in the liquid level do not significantly alter the evaporative-cooling rate and 2) the liquid level can be monitored. The new heat-exchanger is a bottom-fed pot (6.9L) whose area ($0.84m^2$) is enhanced by many small tubes (N=204, D=9.5mm, L=105mm).

Other changes include: 1) reducing a pumping bottleneck (to increase the cool-down rate), and 2) installation of liquid-level sensors to provide a better liquid-level control variable.

Test results of the new system will be reported.

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