

CALIBRATION OF CERNOX THERMOMETERS AT LOW TEMPERATURES AND HIGH MAGNETIC FIELDS USING THE PULSED FIELD FACILITY AT LOS ALAMOS

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Thermometer calibrations pose a difficult problem at high magnetic fields [1]. Commercially available Cernox chips are very useful resistance thermometers at low temperatures, but display a high sensitivity to magnetic fields. Few good standards exist that are (1) easy to use, (2) suitably field independent, and (3) inexpensive, with which to calibrate magnetic field sensitive thermometers. At the pulsed field facility at NHMFL-LANL, we utilize the short time of the magnet pulse to keep the temperature constant while monitoring the field dependent resistance.

First, the thermometer under field calibration is stabilized at zero field at a desired temperature. Next, the magnet is pulsed to the desired field strength (currently up to 60 T at NHMFL-LANL). Assuming the temperature remains constant during the pulse, a profile of Resistance vs. Field may be obtained for each temperature, after which Resistance vs. Temperature for the desired field may be obtained. This method was used to obtain data down to the pumped ^4He range, but is easily extended to ^3He temperatures. The resulting calibrations can then be used in the high-field DC magnets at the NHMFL-Tallahassee down to ^3He temperatures.

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References

[1] e.g. Brandt, B.L., *et al.*, Rev. Sci. Instr., **70**, 104 (1999).