

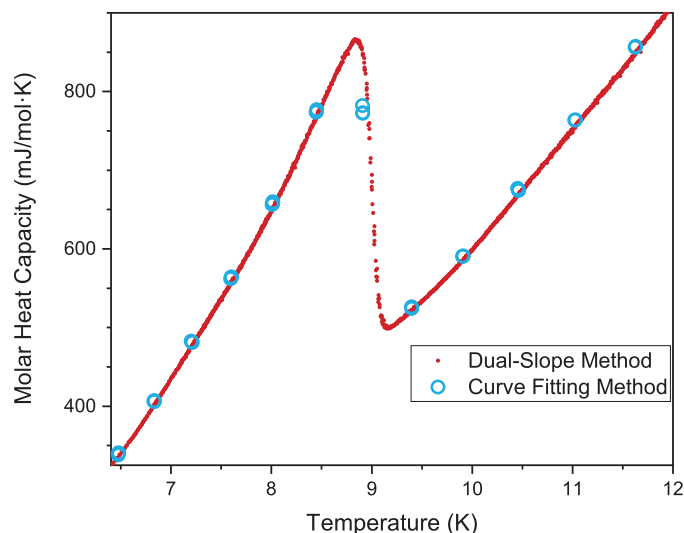
Heat Capacity

DynaCool (D650) / PPMS (P650) / VersaLab (V650)

The Heat Capacity Option leverages a puck-based microcalorimeter design capable of measuring sample heat capacity across the full range of temperature and field afforded by the PPMS®. Operating in high vacuum, a sample is subjected to a thermal pulse and its temperature response is recorded as in a traditional semi-adiabatic relaxation technique. Fitting algorithms based on a model of the thermal circuit extract sample heat capacity from this curve. Typical measurements collect heat capacity as a function of temperature; measurements under a constant field are possible after using the automated field calibration function of the software.

Key Features:

- Software-automated addenda (background) signal collection and subtraction
- Advanced fitting algorithms measure and account for finite thermal conduction between the calorimeter and sample for improved measurement accuracy
- Measurement heat pulse duration is determined by the sample time constant τ , dynamically adapting to changes in sample heat capacity as it evolves with temperature
- Unique mounting station hardware ensures hassle-free sample mounting and minimizes the risk of damage to delicate calorimeter wiring
- Alternate slope-fitting analysis mode available in post processing for high resolution sampling of sharp first-order transitions
- Units system can be user-specified to report intrinsic properties like specific heat capacity



A superconducting transition is shown for a sample of NbTi alloy near 9 K. The open blue circles indicate data collected using the default curve fitting technique on a number of small heat pulses while the smaller closed red points were acquired using the slope-fitting analysis of a single large heat pulse.



Heat Capacity Puck installed in the Sample Mounting Station

Optional Vertical Puck Kit (P111), shown with Heat Capacity Frame



Heat Capacity Specifications (for Zero Field)

Heat Capacity [C_p]

Accuracy: $\pm 5\%$ for 2 K to 300 K; $\pm < 2\%$ typical
Resolution: 10 nJ/K @ 2 K

Addenda Characteristics

Calorimeter Platform Area
(maximum sample footprint): 3 mm \times 3 mm
Typical Addenda Magnitude: 0.2 μ J/K @ 2 K; 15 mJ/K @ 400 K

Operational Range 1.8 to 400 K; 0 to 16 T

Specifications are subject to change without notice.