



TOPIC: Oscillations in PPMS Heat Capacity Measurements with Helium-3 in a Magnetic Field

PROBLEM: When performing heat capacity measurements in a PPMS with helium-3 and a magnetic field, it is possible to observe large oscillations in the temperature versus time data shown in the Measurement Status Viewer. These oscillations are caused by vibration of the heat capacity platform and the resultant change in magnetic flux enclosed by the wires which suspend the platform and make electrical contact to the thermometer and heater on the platform. The observed oscillations are quite pronounced and regular on the temperature versus time plot.

The oscillations are observed only in helium-3 systems, because the longitudinal magnetic field is in the plane of the heat capacity platform when the helium-3 refrigerator is used. In this orientation, the magnetic flux enclosed by the suspension wires changes at first order in the displacement of the platform. The oscillations are not observed in standard heat capacity measurements with the field perpendicular to the plane of the platform because the flux changes only at higher order in displacement for this orientation.

SOLUTION: Quantum Design supplies a platform stabilizer plug with helium-3 heat capacity systems. This plug uses a nylon filament to hold the platform steady. The user should always use this stabilizer plug to hold the heat capacity platform stationary, thereby preventing the oscillations. While the oscillations in the temperature versus time traces are present only when a magnetic field is applied, the plug should be used at all time to prevent other types of noise that can be caused by vibration of the platform.* If your stabilizer plug is missing or damaged, please contact Quantum Design service (service@qdusa.com) for a replacement.

*Note: See also the advisory "Scatter in Heat Capacity Data below 2 K due to Vibration of Heat Capacity Platform."