Sensor Installation Checklist

Environmental filters

Aspects of the experiment environment that will limit certain sensors from consideration

- ☐ **Minimum measurable temperature _____ K**
- ☐ **Maximum measurable temperature _____ K**
- ☐ **Maximum survivable temperature _____ K**
- ☐ **Maximum magnetic field _____ T**
- ☐ **Ionizing radiation**
- ☐ **Maximum vacuum _____ Pa**

Sensor ranking

Features allowing qualitative or quantitative methods to rank remaining sensor options

- ☐ **Accuracy _____ at _____**
  e.g., 10 mK at 4.2 K
- ☐ **Resolution**—most easily intercomparable with dimensionless sensitivity (S_D)
- **Packaging features:**
  - ☐ Lead wires (insulation, bundling, material, strain-relief)
  - ☐ Size
  - ☐ Ease of mounting
  - ☐ Removable from installation?
  - ☐ Thermal response time

Sensor selection resources

Sensor Selection Guide

Cryogenic Temperature Sensor Selection Guide

Cryogenic temperature sensor characteristics

Sorry, we have way too many resources available!

Additional installation resources

Sensor installation instructions

Experimental Techniques: Cryostat Design, Material Properties and Superconductor Critical-Current Testing by Jack Ekin.

Matter and Methods at Low Temperatures by Frank Pobell.

Experimental Techniques in Low-Temperature Physics (Monographs on the Physics and Chemistry of Materials) by Guy K White.

NIST Cryogenic Database

Installation

Consider how each of these aspects of sensor installation may affect temperature measurement quality

- **Sensor placement**
  - ☐ Close to temperature of interest location
  - ☐ Further away from heaters
- **Wiring considerations**
  - ☐ Number of required sensor leads
  - ☐ Sensor wire type
  - ☐ Routing away from heater leads and AC signal lead
- **Thermal anchors**
  - ☐ Anchors at each temperature stage for sensor wires
  - ☐ Type of anchor based on wire choice
  - ☐ Number of wraps if using bobbin
  - ☐ Thermal interface materials and securing methods
- **Sensor mounting (3 different styles)**
  - ☐ Flat packages (e.g., SD, BC, BG packages)
    - ☐ Surface preparation
    - ☐ Thermal interface material/adhesive
    - ☐ Additional securing method
    - ☐ Wire insulation and strain relief

  OR ☐ Insertion (e.g., AA, LR, platinum wire wound)
    - ☐ Hole diameter and depth
    - ☐ Thermal interface material/adhesive
    - ☐ Beware blind holes!
    - ☐ Wire thermal anchoring

  OR ☐ Bolt down (e.g., CU, CD, BO, AL, AM, RS packages)
    - ☐ Mounting hole location, drilling, and tapping
    - ☐ Bolt selection
    - ☐ Thermal interface material
- **Optical radiation**

Sensor should not be in view of surfaces at significantly different temperatures, use:

- ☐ Baffles
- ☐ Reflective tape
- ☐ Super insulations