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Cryogenic setup for calibration of temperature sensors

Content :

A top loading cryogenic setup for calibration of multiple temperature sensors from 4.2 to 300K has been designed. An OFHC copper sensor holder is attached to a thin walled Stainless Steel (SS) pipe which is loaded into the inner pipe of two concentric SS pipes. A manganin heater is wound at both ends of the sensor holder to minimize thermal gradients for accurate calibration. The gradient along the sensor holder arising due to radiation is further reduced by a heater wound on the lower end of the inner pipe. This heater is used to keep the temperature of the wall of the inner pipe facing the sensor holder as close to the temperature of the sample holder. The space between the inner and outer SS pipe is highly evacuated whereas the inner tube housing the sensor holder is backfilled with He exchange gas to minimize thermal gradient in the sample holder. The heat flow to and from the sensor holder have been optimized using CAE software (ANSYS) for uniform temperature along the sensor holder and a smooth and stable temperature sweep from 4.2 to 300K. The setup has been designed for KF based system for quick assembly and operation.

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