Cryo-Thermometry Using Thick Film Resistors

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Abstract

Here I present my findings on the suitability of thick-film barium ruthenate resistors for use as cryo-thermometers on the yet-to-be-built superconducting wigglers at CESR. These resistors are highly desirable as thermometer candidates due to their cheapness and portability, and all current results indicate that they will work well. In addition to tests done to obtain T-R (temperature vs resistance) graphs and equations for each kind of resistor, tests were done on the resistors' response to I^2R heating. The resistors show high sensitivity (dR/dT) to temperature change, especially below 20 Kelvin, and should work well as cryo-thermometers. The resistors still need to be tested for their response to high magnetic fields, and more accurate resistance measurements need to be made before a final curve can be fit and they can be put into service.