

LTD-14 Abstract

Magnetic Penetration Effects in Small Superconducting Devices

T.R. Stevenson, J.S. Adams, M.A. Balvin, S.R. Bandler, K.L. Denis, W.-T. Hsieh, D.P. Kelly, P.C. Nagler, J.-P. Porst, J.E. Sadleir, G.M. Seidel, S.J. Smith

The temperature dependent behavior of a superconducting body in an applied magnetic field involves flux penetration/expulsion both from screening currents (within a magnetic penetration depth) and variations in the superconducting order parameter (locally to form vortices or a mixed state, or globally in the Meissner effect). The temperature dependence of the magnetic penetration depth, in particular, has been used to make highly sensitive macroscopic thermometers. For the microscopic device volumes required in sensitive low temperature photon detectors, properties of actual thin film materials, non-uniformity of applied magnetic fields, and the influence of measurement circuit dynamics are complicating factors. We discuss the various penetration effects as demonstrated in a particularly promising combination of material and geometry that we have used to make sensitive x-ray microcalorimeters.