

Abstract Submitted
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Optical magnetometry of superconductors using nitrogen - vacancy centers in diamond films¹ K.R. JOSHI, N. M. NUSRAN, KYUIL CHO, M. A. TANATAR, S. L. BUD'KO, P. C. CANFIELD, R. PROZOROV, Ames Laboratory, Ames, IA 50011 — Spin-dependent fluorescence of nitrogen - vacancy (NV) centers in diamond has emerged as a promising tool for non-invasive sensitive magnetometry with excellent sensitivity. In this work, we employ ensembles of NV centers implanted at the surface of a diamond film to study magnetic induction as the function of position, magnetic field and temperature in superconductors after different cooling/heating protocols and magnetic history. One of the motivations of our work is to study the structure of the Meissner expulsion upon field cooling, where we observe significant deviations from the simple, textbook example. Another is to determine the lower superconducting critical field, H_{c1} . Conventional Nb is compared with borocarbides ($\text{LuNi}_2\text{B}_2\text{C}$) and iron-pnictides ($\text{CaKFe}_4\text{As}_4$).

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