MAR17-2016-020434

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Rotational Symmetry Breaking in a Trigonal superconductor Nb-doped Bi_2Se_3[1]

LU LI, University of Michigan

The search for unconventional superconductivity has been focused on materials with strong spin-orbit coupling and unique crystal lattices. Doped bismuth selenide (Bi_2Se_3) is a strong candidate given the topological insulator nature of the parent compound and its triangular lattice. The coupling between the physical properties in the superconducting state and its underlying crystal symmetry is a crucial test for unconventional superconductivity. In this paper, we report direct evidence that the superconducting magnetic response couples strongly to the underlying trigonal crystal symmetry in the recently discovered superconductor with trigonal crystal structure, niobium (Nb)-doped bismuth selenide (Bi_2Se_3). As a result, the in-plane magnetic torque signal vanishes at every 60°. More importantly, we observed that the superconducting hysteresis loop amplitude is enhanced along one preferred direction spontaneously breaking the rotational symmetry. This observation confirms the breaking of the rotational symmetry and indicates the presence of nematic order in the superconducting ground state of Nb-doped Bi_2Se_3.

[1]Supported by the Department of Energy under Award No. DE- SC0008110 (magnetization measurement)