

Coexistence of Superconductivity and Magnetism in YNiBC Superconductor

Sung-Ik Lee^{a, b}

^a *National Creative Research Initiative Center for Superconductivity and Department of Physics,
Pohang University of Science and Technology, Pohang 790-784, Korea*

^b *Quantum Material Lab., Korea Basic Science Institute, Daejeon 305-333 Hankuk University, Seoul, Korea*

The coexistence of the superconductivity and magnetism in the $\text{Ho}_{12}\text{xDyxNi}_2\text{B}_2\text{C}$ is studied by using Ginzburg-Landau theory. This alloy shows the coexistence and complex interplay of superconducting and magnetic order. We propose a phenomenological model which includes two magnetic and two superconducting order parameters accounting for the multi-band structure of this material. We describe the magnetic fluctuations and order and demonstrate that they lead to anomalous behavior of the upper critical field. The doping dependence of T_c in $\text{Ho}_{12}\text{xDyxNi}_2\text{B}_2\text{C}$ showing a reentrance behavior is analyzed yielding very good agreement with experimental data.

keywords : superconductivity, magnetism, Two-Gap Superconductivity