Probing superconductivity with magnetic field: anisotropy revealed

Ilya Vekhter
Louisiana State University

Superconductivity is one of the first discovered, and to this day one of the most exciting, examples of the collective phenomena in solids. Its study combines fundamental research into the properties of novel materials with the potential for industrial applications. In this talk I will first review the ideas and concepts that form the basis for our understanding of superconducting order, and will emphasize the consequences of the energy gap in the excitation spectrum of superconductors. I will pay special attention to (relatively new) classes of superconductors where this gap is strongly anisotropic, and discuss the importance of experimental determination of this anisotropy for uncovering the underlying physics. I will focus specifically on the proposal that applied magnetic field can probe the anisotropy of the gap, and review theoretical predictions and recent experimental results on several classes of unconventional superconductors.