

Real Space Imaging of the Superconducting Vortex Lattice: Recent Results and Prospects

Hermann Suderow

Com Dpto Física de la Materia Condensada, Instituto Nicolás Cabrera, IFIMAC,

Universidad Autónoma de Madrid, Spain

Email: hermann.suderow@uam.es

Abstract— This talk reviews vortex lattice imaging using scanning probe microscopes and discuss recent prospects. It introduces the measurement technique and how it can be applied to superconductors and the measurement of the vortex lattice. Examples of the observation of vortex core and lattice in different compounds are given, together with recent results providing insight into the properties of vortices in layered superconductors and in tilted magnetic fields [1,2]. Two gap superconductivity and scattering by impurities, including the related vortex pinning effects, are presented using the recent example of the 1144 family of pnictide superconductors [3]. The peculiar recent observation of vortex creep on cooling is also presented and explained [4].

[1] Tilted vortex cores and superconducting gap anisotropy in 2H-NbSe₂, JA Galvis et al, Communications Physics 1, 30 (2018).

[2] Attractive interaction between superconducting vortices in tilted magnetic fields, A. Correa et al, Communications Physics 2, 31 (2019).

[3] Influence of multiband sign-changing superconductivity on vortex cores and vortex pinning in stoichiometric high-Tc CaKFe₄As₄, A. Fente, et al., Physical Review B 97, 134501 (2018).

[4] Thermal creep emerging from cooling a tilted vortex lattice in uniaxial superconductor Roland Willa et al, <https://arxiv.org/abs/1906.06294>, to appear in Physical Review Research (2020).

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