523rd ASRC Seminar

Date: 13:30 ～15:00, 18 July

Location: Meeting room 302, ASRC Building

Speaker: Prof. Dirk Manske
(Max-Planck-Institut for Solid State Research)

Title: Theory for Collective Modes and Interface Effects of non-centrosymmetric Superconductors

We present a systematic study of the response and pairing properties of non-centrosymmetric superconductors (NCS).
Starting from a matrix kinetic theory, we formulate a general response theory that allows to study various optical experiments and gauge properties [1]. We provide one particular example of electronic Raman scattering in which we predict to determine the unknown singlet-triplet ratio [2].
In a next step, we solve the matrix kinetic equations in the presence of strong asymmetric Rashba-type spin-orbit coupling (ASOC). Particular emphasis is on the existence, the dispersion and the general role of the so-called Leggett mode, which arises as a consequence of interband pairing correlations. The occurrence of this massive collective mode of the order parameter is analyzed in view of its experimental observability in all physically relevant spin-independent collisionless response functions like the Lindhard density response, the dielectric function, the current response (dynamic conductivity) and the electronic Raman response [3,4].
Finally, we study the consequences of pairing mixing between singlet and triplet correlations for interface effects. Particular characteristic features are observed in the vicinity of a diffuse ferromagnet [5].

[1] L. Klam, D. Manske, and D. Einzel, Kinetic Theory for Response and Transport in Non-Centrosymmetric Superconductors (32 pages) in 'Non-centrosymmetric superconductors', Lecture Notes in Physics 847 (2012), Spinger, Berlin, Heidelberg; Eds.: E. Bauer and M. Sigrist.
[2] L. Klam, D. Einzel, and D. Manske, Phys. Rev. Lett. 102, 027004 (2009).
[3] N. Bittner, L. Klam, D. Einzel, and D. Manske, preprint.
[4] N. Bittner, D. Einzel, and D. Manske, unpublished.
[5] G. Annunziata, D. Manske, and J. Linder, Phys. Rev. B 86, 174514 (2012).

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