

In-plane magnetic field anisotropy in FFLO state in layered superconductors

M.D. Croitoru^a, M. Houzet^b, and A. Buzdin^a

^aUniversité Bordeaux I, LOMA, F33405 Talence Cedex, France

^bCEA, Grenoble, DRFMC/SPSMS/LCP, F38054 Grenoble Cedex 9, France

During the last 40 years a lot of theoretical and experimental studies have been devoted to layered superconductors. In particular in some organic layered superconductors the in-plane critical field is mainly determined by the paramagnetic limit. This feature favors the formation of the Fulde-Ferrell-Larkin-Ovchinnikov state (FFLO state). There have been observed several hints indicating the experimental realization of the FFLO state in organic superconductors. In this work we provide the quasi-classical description of the anisotropy of the in-plane critical field in uniform and non-uniform (FFLO) phases of layered superconductors, taking into account the interlayer Josephson coupling. Near T_c we generalize the Lawrence-Doniach model for the case of high magnetic fields.

We show that the anisotropy of the onset of superconductivity may change dramatically in the FFLO state as compared with the uniform superconducting phase. The study of the character of this anisotropy gives an important information on the orientations of the FFLO modulation vector. Our results can qualitatively describe the recent experimental data by S. Yonezawa et. al.¹

¹S. Yonezawa, S. Kusaba, Y. Maeno, P. Auban-Senzier, C. Pasquier, K. Bechgaardm and D. Jérôme, Phys. Rev. Lett. 100, 117002 (2008).