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A first insight in the superconductivity and electronic structure of $\text{LaFeAs}_{1-y}\text{O}_{0.9}\text{F}_{0.1}$

Upper critical field $B_{c2}(T)$ data for disordered As deficient $\text{La}_{0.9}\text{F}_{0.1}\text{FeAs}_{1-y}$ in a wide temperature and field range up to 47 T are reported. Due to the large initial slope of $d_{B_{c2}}/dT = -5.4\text{T/K}$ near $T_c = 28.5\text{ K}$ the in-plane $B_{c2}(T)$ shows a clear flattening already near 23 K above 30 T pointing to Pauli-limited behavior with $B_{c2}(0)$ about 63 T. The results are discussed in terms of disorder effects within conventional and unconventional superconductivity, i.e. with respect to the symmetry of the superconducting order parameter as well as with future high-field applications of Fe-based pnictide superconductors. We report also on the observation of a plasma edge near 400 meV in a reflectance study corresponding to an unscreened in-plane plasma energy of about 0.92 eV considerably below the LDA predictions of about 2.2 eV. On the basis of the in-plane penetration depth $\lambda_L(0) = 254\text{ nm}$ [1] a relative small value of the total electron-boson coupling constant $\text{tot} = \text{el-ph} + \text{el-sp} = 0.5 - 0.25$ can be estimated adopting an effective single-band clean limit picture. This points to a high-frequency boson involved in a weak or medium coupling non-phonon mechanism or to an unusual phonon mediated superconductivity, see e.g. [2].

[1] H. Luetkens et al., arXiv: 0804.3115.

[2] H. Eschrig, arXiv: 0804.0186.