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Optical properties of $BaFe_{1.85}Co_{0.15}As_2$[1] J.J. TU, Dept. of Physics, CCNY/CUNY, New York, L.J. LI, G.H. CAO, Z.A. XU, Dept. of Physics, Zhejiang University, Hangzhou 310027, China, C.C. HOMES, Condensed Matter Physics and Materials Science Dept., Brookhaven National Laboratory, Upton, New York — The detailed in-plane optical properties of the electron-doped iron-arsenic superconductor $BaFe_{1.85}Co_{0.15}As_2$ have been determined over a wide frequency range above and below $T_c = 25$ K. Despite being a multiband system, the normal state reveals that a single (electron) band dominates the low-frequency conductivity, which can be modeled by a single Drude component with plasma frequency $\omega_{p,D} \simeq 7840$ cm^{-1} and scattering rate $1/\tau_D \simeq 126$ cm^{-1}, determined just above T_c. For $T \ll T_c$ the superconducting plasma frequency is $\omega_{p,S} \simeq 5200$ cm^{-1} ($\lambda_{eff} \simeq 3000$ Å), indicating that less than half the free carriers in the normal state have collapsed into the condensate, suggesting that this material is not in the clean limit. There are two energy scales for the superconductivity, $\Delta_1(0) = 3.1 \pm 0.2$ meV and $\Delta_2(0) = 7.4 \pm 0.3$ meV. This corresponds to either the gapping of the electron and hole pockets, respectively, or an anisitropic s-wave gap on the electron pocket; both views are consistent with the $s^{\pm}$ model.[2]

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[2]J. J. Tu *et al.*, Phys. Rev. B **82**, 174509 (2010).

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