Abstract Submitted
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Hint of a condensate in $\mathbf{K_{0.8}Fe_{2-y}Se_2}$[1] C.C. HOMES, J.S. WEN, Z.J. XU, G.D. GU, Condensed Matter Physics and Materials Science Dept., Brookhaven National Laboratory, Upton, New York — The optical properties of the iron-chalcogenide superconductor $K_{0.8}Fe_{2-y}Se_2$ with a critical temperature $T_c = 31$ K have been measured over a wide frequency range in the a-b planes above and below T_c. The conductivity is incoherent at room temperature, but becomes coherent (Drude-like) with $\omega_{p,D} \simeq 430 \pm 20$ cm^{-1} and $1/\tau_D \simeq 70 \pm 5$ cm^{-1} at $T \simeq T_c$; however, $\omega_{p,D}$ is an order of magnitude smaller than what is observed in other iron-based superconductors. The highly anisotropic nature of these materials suggests that the transport is best described by a sheet resistance $R_\Box = \rho_{dc}/d \simeq 64$ kΩ (per sheet), well above the threshold for the superconductor-insulator transition at $R_\Box = h/4e^2 \simeq 6.9$ kΩ. Below T_c, $\omega_{p,S} \simeq 220 \pm 20$ cm^{-1} resulting in a superfluid density $\rho_{s0} \equiv \omega_{p,S}^2 \simeq 48 \times 10^3$ cm^{-2}, placing this material on the scaling line $\rho_{s0}/8 \simeq 4.4\,\sigma_{dc}\,T_c$ observed for the cuprates, but in a region associated with Josephson coupling, suggesting this material is inhomogeneous and constitutes a Josephson phase.[2]

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[2]C. C. Homes *et al.*, arXiv:1110.5529

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