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Complex optical properties of $BaFe_2As_2$[1] C. C. HOMES, Y. M. DAI, Brookhaven National Laboratory, Upton, New York, A. AKRAP, Université de Genève, CH-1211 Genève 4, Switzerland, S. L. BUD'KO, P. C. CANFIELD, Ames Laboratory, Ames, Iowa — The complex optical properties of $BaFe_2As_2$, the parent material for numerous iron-based superconductors, have been examined over a wide frequency range above and below the structural and magnetic transition at $T_N \simeq 140$ K. The minimal description of this multiband material requires the use of the two-Drude model, revealing a strong, broad component, and a weaker, much narrower component. Above T_N both components display a weak temperature dependence; however, at T_N both scattering rates decrease dramatically. Below T_N the broad component shows little temperature dependence, while for the narrow component $1/\tau \simeq 30 \rightarrow 3$ cm^{-1} for $T \simeq T_N \rightarrow 5$ K. The transition results in a reconstruction of the Fermi surface, revealing Dirac-like cones in the electronic dispersion[2]. Dirac and Weyl materials display very small scattering rates at low temperature; we speculate that the collapse of $1/\tau$ in the coherent component is a consequence of these non-parabolic bands.

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[2]Z. P. Yin *et al.*, Nat. Phys. **7**, 294 (2011)

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