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The optical conductivity of Ortho II $\text{YBa}_2\text{Cu}_3\text{O}_{6.5}$. THOMAS TIMUSK, JUNG-SEEK HWANG, JING YANG, SERGEI SHARAPOV, JULES CARBOTTE, McMaster University, DOUG BONN, RUIXING LIANG, WALTER HARDY, University of British Columbia — The a-axis optical properties of the ortho II phase of YBCO (every other chain filled, $T_c= 59$ K) were derived from reflectance data over a wide frequency and temperature range. Above 200 K the spectra are dominated by a broad background of scattering that extends to 1 eV. Below 200 K, in the normal state, a shoulder in the reflectance signals the onset of scattering at 400 cm^{-1} . Below the superconducting transition temperature the superconducting condensate appears. Its spectral weight is consistent, to within experimental error, with the FGT sum rule and with independent measurements of Gd ESR. We also compare our data with magnetic neutron scattering on samples from the same source that show a strong resonance at 31 meV. Extrapolating the optical conductivity to zero frequency yields the dc resistivity of Ortho II which is in good agreement with four-probe measurements. We find that the scattering rates can be modeled as the combined effect of the neutron resonance, a bosonic background and a density of states with a pseudogap.

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