

## Search for an Infrared Electro-optic Effect in a Thin $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$ Superconducting Film

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We report on the effects of supercurrents on the ab-plane optical transmittance of a thin superconducting  $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$  film in the 40–350  $\text{cm}^{-1}$  (5–44 meV) frequency range, and at two temperatures 40 and 75 K below  $T_c$ . The electro-optic transmittance spectra are compared and contrasted with the current-free spectrum at each temperature.

The results at 75 K indicate that supercurrents below the critical current  $I_c(75\text{K})$  at this temperature have little effect on the transmittance, while above  $I_c(75\text{K})$  we observe marked changes. In contrast, at 40 K, the supercurrents trigger changes in the electro-optic transmittance even below the critical current  $I_c(40\text{K})$  at that temperature. We compare the electro-optic data with two-fluid model simulations of the transmittance, by assuming that the only effect of the current is to reduce the superfluid fraction of the condensate.

Sorting category: Ba Superconductivity

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