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Pump-probe excitation spectroscopy of insulating cuprates DEREK SAHOTA, Department of Physics, Simon Fraser University, HANNA DABKOWSKA, Brockhouse Institute for Materials Research, McMaster University, GRAEME LUKE, Department of Physics and Astronomy, McMaster University, RUIXING LIANG, Department of Physics and Astronomy, University of British Columbia, J. STEVEN DODGE, Department of Physics, Simon Fraser University — We examine the transient optical response of optically thick single crystals of the insulating cuprates La_2CuO_4, $YBa_2Cu_3O_6$, and $Sr_2CuO_2Cl_2$, as a function of probe wavelength, pump excitation wavelength, and pump fluence. At pump-probe time delay $t > 1$ ps, the transient reflectance spectrum mimics a change in temperature, while for $t < 1$ ps we observe a non-thermal response for which this description fails. The pump-probe signal saturates at a characteristic fluence that depends on pump wavelength. In all three materials, the saturation fluence reaches a minimum at a pump photon energy 0.6 eV above the optical absorption peak associated with the charge transfer gap. We associate both the pump-probe spectrum and its saturation behavior with the thermalization of the initial photoexcited state, and argue that the saturation spectrum indicates a relaxation bottleneck just above the charge transfer gap.

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