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Optical Probe of Strong Correlations in $LaNiO_3$ Thin Films M.K. STEWART, R.K. SMITH, B.C. CHAPLER, D.N. BASOV, University of California - San Diego, J. LIU, J. CHAKHALIAN, University of Arkansas — We present an optical study of $LaNiO_3$ in the range between 10 meV and 6 eV. Thin films of varying thickness were epitaxially grown by pulsed laser deposition on $LaAlO_3$ and $SrTiO_3$ substrates. The samples were investigated using near-normal incidence reflectance and variable angle spectroscopic ellipsometry at temperatures ranging from 20 K to 298 K. Several interband transitions are evident in the optical conductivity above 1 eV, in good agreement with band structure calculations. No Drude peak is observed however, in stark contrast with theoretical works predicting a finite density of states at the Fermi energy. This experimental finding of a vanishing Drude spectral weight, compared to a finite electron kinetic energy obtained from band structure calculations, is indicative of strong electronic correlations in $LaNiO_3$. A resonance centered at 40 meV is observed, which appears to be caused by multiple, overlapping phonon modes.

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