

Abstract Submitted
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Theory of optical response and ellipsometry spectra of LaAlO₃/SrTiO₃ heterostructures¹ SE YOUNG PARK, ANDREW MILLIS, Columbia University — We present a theory of the optical and ellipsometric properties of the electron gas at the LaAlO₃/SrTiO₃ (LAO/STO) interface. The reflectivity and ellipsometry angles are obtained by calculating the random phase approximation (RPA) dielectric constant including the optical phonon of STO and the charge response of the electron gas. We find a dip in the ellipsometry angle at the plasma edge of STO phonon that is related with in-plane Drude response and a peak in high energy from the plasmon excitation of yz and xz electrons and show how these may be related to subband occupancy and scattering rates. Comparison of the theory to published data indicates that about 80% of electrons in xy band are inert to optical transition, possibly explaining the discrepancy in charge density between transport measurements and polar catastrophe scenario.

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