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Electronic properties of $LaAlO_3/SrTiO_3$ superlattices: interface charge density, Fermi surfaces, plasmon and optical spectra[1] SE YOUNG PARK, ANDREW J. MILLIS, Columbia University — We present calculations of the charge density profile, Fermi surface topology, plasmon and optical excitation spectra of the electron gas at the $LaAlO_3/SrTiO_3$ interface. The calculations are based on a self-consistent Hartree/RPA approximation and a tight binding parametrization of the band structure. The subband occupancy is determined as a function of polar discontinuity magnitude and dielectric constant. The number of occupied xy bands changes significantly whereas for all reasonable polar discontinuity and dielectric constant profiles only one yz and one xz bands are occupied. These yz and xz band give dominant contributions to the long-distance tail of the interface charge. The plasmon and optical absorption spectra are determined. The results are compared with experimental data.

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