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Shubnikov-de Haas Oscillations in $LaTiO_3/SrTiO_3$ Heterostructures MICHAEL VEIT, Stanford Univ, BRAD RAMSHAW, MUN CHAN, Los Alamos National Laboratory, YURI SUZUKI, Stanford Univ — Emergent metallic behavior in heterostructures of the Mott insulator $LaTiO_3$ and the band insulator $SrTiO_3$ was observed for the first time more than a decade ago. It has often been compared to other oxide systems which have a two-dimensional Fermi surface, but there have been few studies probing the dimensionality of the metallicity in this system. We have studied the transport properties of thin films of $LaTiO_3$ on $SrTiO_3$ substrates. Our measurements have indicated that the entirety of the $LaTiO_3$ film is conductive with an additional contribution near the interface. When the film thickness is on the order of 3-4 unit cells, we observe two sets of Shubnikov-de Haas oscillations - low frequency oscillations with a frequency of 2T and high frequency of 36T. We attribute the observation of these two sets of oscillations to a Rashba splitting which creates a smaller inner Fermi pocket and a larger outer Fermi pocket. These results are consistent with our measurements of in plane anisotropic magnetoresistance and a weak antilocalization correction to the magnetoconductance Further measurements on the angular dependence of the oscillations indicate that their frequency does not change, thus indicating that the Fermi surface is more three-dimensional.

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