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Common Fermi-liquid origin of T2 resistivity and superconductivity in n-type SrTiO3 DIRK VAN DER MAREL, DOOK VAN MECHELEN, University of Geneva, IGOR MAZIN, Naval Research Laboratory — SrTiO3 is a semiconductor which, when doped with a low density of electrons, becomes a good conductor with relatively high mobility and strong temperature dependence of the electrical resistivity and the infrared optical conductivity. At low temperatures the material becomes superconducting with a maximum reported Tc below 1 K with a dome-shaped doping dependence of Tc, both in the 3D bulk material and at the 2D LaAlO3/SrTiO3 interface. The DC resistivity below 100 K has a T^2 temperature dependence. The quasiparticles are in the anti-adiabatic limit with respect to electron-phonon interaction, which renders the interaction mediated through phonons effectively non-retarded. We apply Fermi-liquid theory for the T^2 term in the resistivity, and combine this with expressions for Tc and with the Brinkman-Platzman-Rice (BPR) sum-rule to obtain Landau parameters of n-type SrTiO3. These parameters are comparable to those of liquid 3He, indicating interesting parallels between these Fermi-liquids despite the differences between the composite fermions from which they are formed.

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