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Two-dimensional electrons on KTaO3 surfaces PUMSUK PARK, Texas State Univ, BYOUNGHAK LEE, Texas State Univ/Univ of Texas at Austin — The two-dimensional electron gas systems at the interface of polar/non-polar oxides interfaces, e.g. $LaAlO_3$(LAO)/$SrTiO_3$(STO), have received considerable attention due to interesting phenomena stemming from strong electron-electron interactions. A recent experiment [1] showed that the (001) surface of $KTaO_3$ (KTO) can induce two-dimensional electron gas even without external doping. KTO differs from widely studied STO in that KTO has more than 20 times stronger spin-orbit coupling. We carried out density functional theory calculations of vacuum-cleaved KTO surface structure to study the electronic and spin properties of the two-dimensional electrons. The electric field that arises from the surface polarization makes the conduction electrons near the surface, resulting in an orbital ordering similar to LAO/STO interface. Despite the strong spin-orbit coupling, about 400 meV, our result shows the Rashba spin splitting in this perovskite oxide is much smaller than that of conventional semiconductors, which is a good agreement with the angle-resolved photoemission measurement.[1] P. D. C. King, et al. Phys. Rev. Lett. 108, 117602 (2012).

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