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Shubnikov-de Haas oscillation of $KTaO_3$ based electron gases LUDI MIAO, RENZHONG DU, QI LI, The Pennsylvania State University, QI LI'S LAB TEAM — Two-dimensional electron gases (2DEGs) at transition metal oxide (TMO) surfaces and interfaces have attracted much attention due to their exotic properties such as superconductivity, and ferromagnetism. Recently, $5d$ TMOs are hotly investigated due to their strong spin-orbit coupling (SOC), an indispensable element for topolotical insulating states. Among them, $KTaO_3$ not only hosts 2DEGs but also involves strong SOC. We have created $KTaO_3$ based electron gases, with low temperature mobility as large as $8000 cm^2V^{-1}s^{-1}$. Shubnikov de Haas oscillations in magnetoresistance have been observed at 1.8 K for field applied along various directions. Contributions from d_{xy} and $d_{xz/yz}$ bands are both seen. These oscillation curves exhibit a field direction dependence with 4-fold symmetry, revealing the cubic symmetry of Fermi surface of $KTaO_3$ based electon gases. Moreover, the intercept of oscillation indices is close to 0.5, a typical value for systems that involve strong SOC. Our results provide unique insights into the electronic structures of $KTaO_3$ based electron gases via magnetotransport measurements.

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