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**Combined Angle-Resolved Photoemission Spectroscopy and Theoretical Study of the Surface Electronic Structure of $SrTiO_3$** RICHARD C. HATCH, KURT FREDRICKSON, CHUNGWEI LIN, MIRI CHOI, AGHAM B. POSADAS, HOSUNG SEO, ALEXANDER A. DEMKOV, Department of Physics, The University of Texas at Austin, TX 78712, USA — The surface electronic structure of the O $2p$-derived valence band states of (001)-oriented, $TiO_2$-terminated $SrTiO_3$ is measured along various crystallographic directions using angle-resolved photoemission spectroscopy (ARPES). A comparison of ARPES spectra to *ab initio*, density functional theory (DFT) band structure calculations as well as the theoretical band structure calculated at the tight binding level are in excellent agreement. ARPES measurements also reveal a mid-gap state located roughly 0.5 eV above the valence band which we interpret as a surface state. This interpretation is supported by DFT calculations of an $SrTiO_3$ slab which reveals the existence of a surface state located in the gap roughly 0.5 eV above the projected valence band.

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