ARPES Studies of Low-energy electronic structure of the strong spin-orbit semimetal SrIrO$_3$ YUEFENG NIE, PHILIP D.C. KING, HAOFEI WEI, MASAKI UCHIDA, JOHN HARTER, ERIC MONKMAN, DANIEL SHAI, DARRELL SCHLOM, KYLE SHEN, Cornell University — The similar energy scales of spin-orbit coupling and electron-electron correlation strength lead to exotic $J_{\text{eff}} = 1/2$ Mott insulating ground states for layered Ruddlesden-Popper 5d iridates, Sr$_{n+1}$Ir$_n$O$_{3n+1}$. A metal-insulator transition occurs upon increasing dimensionality from the two-dimensional layered Sr$_2$IrO$_4$ to the three-dimensional perovskite SrIrO$_3$. However, little is known about the electronic structure and nature of the metallic states in SrIrO$_3$. We synthesized epitaxial SrIrO$_3$ films on (001) LSAT substrates by molecular beam epitaxy and investigated their electronic structure using angle-resolved photoemission spectroscopy. We find an exotic semimetallic state comprised of massive hole-like bands, whose extrema are pinned very close to the chemical potential, and rapidly dispersive electron bands which dominate the transport. Intriguingly, the bandwidths of SrIrO$_3$ are smaller than in its Mott insulating counterpart Sr$_2$IrO$_4$, indicating that metal-insulator transitions in Ruddlesden-Popper iridates are not simply driven by band narrowing resulting from reduced dimensionality.