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Electronic Properties of $SrIrO_3$ Heterostructures NEIL CAMPBELL, TREVOR ANDERSON, CHANG-BEOM EOM, MARK RZCHOWSKI, UW Madison — Strongly-correlated oxide electronic materials have sparked significant interest due to their wide-ranging electronic properties, including 2-dimensional electron gasses, superconductivity, and semi-metallic behavior. Strong spin-orbit interactions have been predicted to introduce additional behaviors due to their interplay with electron-electron interactions. Perovskite $SrIrO_3$ exhibits strong spin-orbit coupling from the heavy iridium atoms, and has been shown to exhibit metal-insulator transitions induced by temperature, thickness, and strain. We probe these states with magnetotransport measurements of ultrathin $SrIrO_3$ films epitaxially layered with polar and nonpolar oxides. The $SrIrO_3$ heterostructures show a low-temperature transition to a state with enhanced magnetoconductivity, and their sheet resistances exhibit a strong dependence on the interfacing oxide. Understanding these observations will give further insights into the relationship between spin-orbit and electron correlations at oxide interfaces, and lead to design rules for strong spin-orbit coupled heterostructures.

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