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Induced ferromagnetism and antiferromagnetism in perovskite quantum wells CLAYTON JACKSON, JACK ZHANG, SUSANNE STEMMER, University of California Santa Barbara — We report on induced magnetism in thin $SrTiO_3$ quantum wells embedded in ferrimagnetic $GdTiO_3$ and antiferromagnetic $SmTiO_3$, respectively. The $SrTiO_3$ quantum wells contain a high density of mobile electrons ($7x10^{14}$ cm^{-2}). We show that the longitudinal and transverse magnetoresistance in the structures with $GdTiO_3$ are consistent with anisotropic magnetoresistance, and thus indicative of induced ferromagnetism in the $SrTiO_3$. Measurements of the sheet and Hall resistances as a function of temperature in the structures with $SmTiO_3$ are consistent with two-dimensional itinerant antiferromagnetism induced in the $SrTiO_3$ layer as a result of the confinement of an extreme charge density coupled with proximity affects from the neighboring $SmTiO_3$. The studies show that the properties of thin $SrTiO_3$ quantum wells can be tuned to obtain magnetic states that do not exist in the bulk material.

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