Supplementary information: Carrier-controlled ferromagnetism in SrTiO$_3$

Pouya Moetakef$^1$, James R. Williams$^2$, Daniel G. Ouellette$^3$, Adam Kajdos$^1$, David Goldhaber-Gordon$^2$, S. James Allen$^3$, and Susanne Stemmer$^1$

$^1$Materials Department, University of California, Santa Barbara, California, 93106-5050, USA
$^2$Department of Physics, Stanford University, Stanford, California, 94305-4045, USA
$^3$Department of Physics, University of California, Santa Barbara, California, 93106-9530, USA

Figure S1 shows the magnetoresistance of a 4 nm GdTiO$_3$/0.8 nm SrTiO$_3$/4 nm GdTiO$_3$/LSAT heterostructure at temperatures between 12 and 2 K. The carrier concentration for this sample at room temperature is $8.22 \times 10^{14}$ cm$^{-2}$ and at 2 K it is $1.52 \times 10^{15}$ cm$^{-2}$, corresponding to a 3D carrier concentration of $1.9 \times 10^{22}$ cm$^{-3}$.

Figure S1: magnetoresistance of a 4 nm GdTiO$_3$/0.8 nm SrTiO$_3$/4 nm GdTiO$_3$/LSAT heterostructure at temperatures between 12 and 2 K. Hysteresis appears below ~ 10 K in sweeps with increasing and decreasing B, respectively (see arrows).

**Figure S2:** (a) Resistance and (b) carrier density as a function of temperature for two GdTiO$_3$/SrTiO$_3$ heterostructures.