Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Ferromagnetism and conductivity in atomically thin SrRuO3 HANS BOSCHKER, CAMERON HUGHES, TAKAYUKI HARADA, Max Planck Inst, TOMOYA ASABA, michigan, RAY ASHOORI, MIT, ALEXANDER BORIS, Max Planck Inst, HANS HILGENKAMP, twente, MEGAN HOLTZ, cornell, LU LI, michigan, JOCHEN MANNHART, Max Planck Inst, DAVID MULLER, cornell, XIAO RENSHAW WANG, twente, DARRELL SCHLOM, ARSEN SOUKIASSIAN, cornell — Atomically thin ferromagnetic and conducting electron systems combine the advantages of two-dimensional electron systems with those of magnetic materials, i.e., state control by electric and magnetic fields is expected to be possible. Most magnetic and conducting transition metal oxide materials, however, lose their functional properties well before the single-unit-cell layer thickness is reached; typically a non-conducting and non-magnetic dead-layer is present. SrRuO3 has been proposed to be a half-metal if a single unit-cell-thick layer is embedded in a SrTiO3 matrix [1]. Here we present (SrRuO3)1–(SrTiO3)5 superlattices of exceptional quality [2]. In these superlattices the electron system comprises only a single RuO2 plane. We observe conductivity down to 50 mK, a ferromagnetic state with a Curie temperature of at least 30 K, and signals of magnetism persisting up to ˜100 K. [1] Verissimo-Alves, M., García-Fernández, P., Bilc, D.I., Ghosez, P. & Junquera, J., Phys. Rev. Lett. 108, 107003 (2012). [2] Hughes, C.R., et al., arXiv:1609.08901 (2016).

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Date submitted: 18 Oct 2016 Electronic form version 1.4