Weekly Seminar

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Abstract

The $LaAlO_3/SrTiO_3$ heterostructure is a potential candidate for a high mobility two-dimensional electron system with novel electronic and magnetic properties. Although $LaAlO_3$ and $SrTiO_3$ are both large-gap band insulators, the interface is conductive, and even superconducting below 200 mK. Negative electronic compressibility is observed as the carrier density is tuned through electric field effect [1]. Magnetic ordering has been proposed to arise from the d-electrons transferred by polarization discontinuity. However the magnetization of this system has not previously been studied, because of the small volume of the interface. Using torque magnetometry, we detect the magnetic moment of the interface system directly [2]. Our results indicate the existence of a magnetic ordering at the two-dimensional conductive interface. More importantly, the same magnetic behavior persists even when the sample is superconducting, which suggests an unconventional two-dimensional superconducting phase.

[1] Lu Li, C. Richter, S. Paetel, T. Kopp, J. Mannhart, and R. C. Ashoori Science 332, 825 (2011)
[2] Lu Li, C. Richter, J. Mannhart, and R. C. Ashoori Nature Physics 7, 762 (2011)

About the Speaker

Lu Li got his bachelor degree from USTC in 2002 and his Ph.D. from Princeton University in 2008. From 2008 to 2011, he had been the Pappalardo Fellow in department of Physics, Massachusetts Institute of Technology. From 2011 to present, he has been an assistant professor in Department of Physics, University of Michigan at Ann Arbor.