



Co-sponsored with Department of Physics and Astronomy

**Professor Jeremy Levy**  
**University of Pittsburgh**

*Etch-a-Sketch Nanoelectronics*



*Prof. Jeremy Levy*

Electronic confinement at nanoscale dimensions remains a central means of science and technology. I will describe a novel method for producing electronic nanostructures at the interface between two normally insulating oxides, LaAlO<sub>3</sub> and SrTiO<sub>3</sub>. Conducting nanostructures are written, erased and reconfigured under ambient conditions at room temperature, similar to the operation of an etch-a-sketch toy. A wide variety of devices can be created, including nanowires, tunnel junctions, diodes, field-effect transistors, single-electron transistors, superconducting nanowires, and nanoscale THz emitters and detectors. After an introduction, I will focus on two recent results: the discovery of a novel phase in which electrons form pairs without becoming superconducting, and the discovery of electronically controlled ferromagnetism at room temperature. Both phenomena occur in the same family of LaAlO<sub>3</sub>/SrTiO<sub>3</sub> heterointerfaces.

**Dr. Jeremy Levy** is a Distinguished Professor of Condensed Matter Physics at the University of Pittsburgh in the Department of Physics and Astronomy, and Director of the Pittsburgh Quantum Institute. He received an A.B. degree in physics from Harvard University in 1988, and a Ph.D. degree in physics from UC Santa Barbara in 1993. After a postdoctoral position at UC Santa Barbara, he joined the University of Pittsburgh in 1996. His research interests center around the emerging field of oxide nanoelectronics, experimental and theoretical realizations for quantum computation, semiconductor and oxide spintronics, quantum transport and nanoscale optics, and dynamical phenomena in oxide materials and films.

Dr. Levy is Director of the Pittsburgh Quantum Institute, the Center for Oxide-Semiconductor Materials for Quantum Computation, a Multidisciplinary University Research Initiative (MURI) on Quantum Preservation, Simulation and Transfer in Oxide Nanostructures, and a NSF Nanoelectronics for 2020 and Beyond program, and a Class of 2015 National Security Science and Engineering Faculty Fellow (NSSEFF). He is a Fellow of the American Physical Society, and is the recipient of the 2008 Nano50 Innovator Award, and the NSF Career Award. He has received the University of Pittsburgh's Chancellor's Distinguished awards for research (2004, 2011) and teaching (2007).

**Host:**  
**Professor Evgeny**  
**Tsymbal**  
**Department of**  
**Physics and Astronomy**

**Please Post**

**Thursday, February 11, 4:00 pm**  
**136 Jorgensen Hall**  
**Refreshments at 3:30 in Jorgensen Atrium**