Electrical and Computer Engineering Seminar  
Wednesday, November 2, 2011 1:30-3PM  
Hall of Fame Conference Room

**Into the Flat Land -- Novel transport of strongly correlated two-dimensional electron systems**

**Jian Huang, Physics Department, Wayne State University**

Electrons are quantum mechanical objects that exist in all physical systems and most systems contain a large number of them. Understanding the states of electrons, how they interact with the environment and each other, is a vital scientific subject and has played a critical role in advancing modern science and technologies. Analogous to water, electrons manifest both gaseous states at high temperatures and liquid states at low temperatures. Another form of the states is solid which was predicted but never observed. To obtain evidence of this solid state of electrons is not only important to understand how the most basic force among the electrons can radically affect the quantum states, but also allow scientists to utilize remarkable properties in developing quantum electronics and spintronics. As nanotechnology marks the opening of the 21st century, semiconductor technologies have greatly improved. A novel type of ultra-high purity semiconductor device, named HIGFET (heterojunction-insulated-gate field-effect-transistor), has become available as a result of a recent breakthrough. I will describe our experiments with 2D systems realized in HIGFETs in terms of fabrication, low-temperature transport measurement techniques, and the experimental data that confirms an interaction-driven nature of an unusual quantum state.

**Jian Huang’s brief bio:** I grew up in Beijing, China. After graduating from Peking University with a Bachelor degree in physics in 1992, I worked for AT&T (Bell Labs) for one and a half years. I then started my graduate training in theoretical physics in superconductivity and quantum theory at University of South Carolina (under Professor James Knight). This study of general solid state theory laid a solid foundation from which I greatly benefited later as an experimentalist. During the following four years at Michigan State University (with Professor Norman Birge) I focused on experimental investigation of the quantum phase coherence effect in mesoscopic systems. Upon graduation, in January 2002, I worked as a postdoc at the Electromagnetic Division at NIST where I concentrated on developing quantum-based voltage standard requires both high level electronics and device fabrication. Desiring to pursue fundamental physics, in the end of 2002, I joined Professor Dan Tsui's group at Princeton University, working on understanding of the fundamental electron-electron interaction in many-body system. I greatly benefited through working with Dan along some great physicists such as Phil Anderson and others. Two years later, I was promoted to Research Staff. In 2007, I joined Taylor University as an assistant professor. Though my main responsibility there was teaching, I maintained a strong interest for research. In fall 2010, I joined the Physics Department at Wayne State University.

*All students, faculty, and public are welcome.*

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