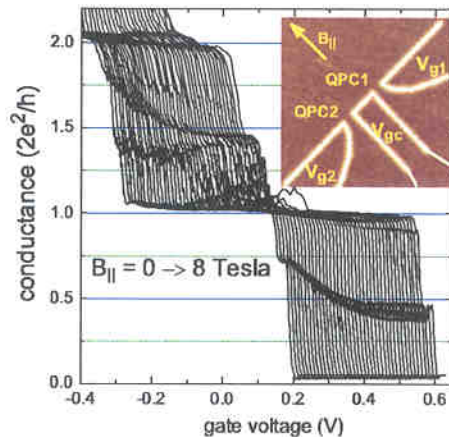


THE FALL 2006 CONDENSED MATTER SEMINAR SERIES PRESENTS:

Prof. Leonid Rokhinson (Purdue University)

*"Spin Separation in Cyclotron Motion"*



We demonstrate spatial separation of carriers with opposite spin orientations in a non-magnetic semiconductor. An ability to manipulate spin of charge carries in a controllable fashion is central to the rapidly developing field of spintronics, as well as for the development of spin-based devices for quantum information processing. However, creation of spin-polarized currents is proven to be a formidable challenge and, previously, required either injection from magnetic materials or application of strong Zeeman magnetic field. We show that in a non-magnetic semiconductor with spin-orbit interactions spins can be spatially separated in a " spin spectrometer " , utilizing difference in momenta and, thus, cyclotron radii, for two spin polarizations. For holes in GaAs almost 100% bipolar spin filtering has been achieved in magnetic focusing geometry with spatial separation of polarized beams by 0.2 microns. We confirmed spin polarization of the injected currents by applying strong Zeeman field and using point contacts as spin filters. Spin-orbit interaction constant has been measured directly in these experiments. The new technique of spin injection/detection opens a possibility to investigate density and electric field dependence of spin-orbit interactions, spin dynamics at a few tenths of picoseconds without RF fields, and shed light on such outstanding problems as " 0.7 anomaly " in quantum point contacts by measuring spin polarization of charge carriers.

**Wed., Oct. 18, 2006**

**304 Robeson Hall**

**4:00 P.M.**