**CONDENSED MATTER/BIOPHYSICS SEMINAR**

***Presented by Dr. Igor Berkutov*,** WSU Postdoctoral Fellow, Department of Physics & Astronomy. Dr. Berkutov is working with Professor Jian Huang.

**Title: Quantum effects in the Silicon and Germanium based p-type quantum wells**

**Date: January 25, 2013**

**Time: 2PM**

**Where: Room 245 of the Physics Research Building**

**Abstract:**

With low power dissipation, high integration levels, good noise immunity, high

cost-effectiveness and reliability, silicon technology occupies a dominant position in

microelectronics. However, the low mobilities of electrons and holes in silicon limits its

application to relatively low frequencies, leaving III–V materials such as Gallium Arsenide (and

related materials) to fulfill roles in mobile communications and the like. Germanium has many

advantageous properties compared to silicon. There is a tree times increase in bulk electron

mobility, and four times increase in bulk hole mobility in germanium as compared to silicon.

Silicon-germanium layer can be deposited by epitaxial growth on conventional silicon wafers. The

interface between the SiGe and Si provides a region of high electron mobility enabling the

resulting device to have the necessary speed for microwave and millimeter wave applications. In

addition to this desire to contribute directly to the semiconductor industry, silicon-germanium

alloy strained-layer systems can be studied from the perspective of the fundamental physics of

semiconductors. The results of these studies (often at liquid-helium temperatures or employing

large magnetic fields) can then be considered when optimizing the design of industry-level

devices for room-temperature operation.

In this talk I would like to present our investigations which concerns of quantum effects in

silicon and germanium based heterostructures with hole type of conductivity. This study mostly

connected with investigation of magnetoquantum (such us Shubnikov-de Haas oscillations) and

quantum interference effects (such us weak localization, hole-hole and spin-orbit interactions).