

# *Chez Pierre*

Presents ...

**Monday, March 17, 2014**

**12:00pm**

**MIT Room 4-331**



## **Chez Pierre Seminar**

**Kenan Gindogdu**

North Carolina State University

### ***"Many-Body Effects in Valleytronics: Direct Measurement of Valley Lifetimes in Single-Layer Transition Metal Dichalcogenides. "***

Single layer transition metal dichalcogenides are 2D semiconducting systems with unique electronic band structure. Two-valley energy bands along with strong spin-orbital coupling lead to valley dependent carrier spin polarization, which is the basis for recently proposed valleytronic applications. These systems also exhibit unusually strong many body effects, such as strong exciton and trion binding, due to reduced dielectric screening of Coulomb interactions. Recently observed large photoluminescence helicity suggests beyond ns hole spin and valley lifetimes. But there is not much known about the impact of strong many particle correlations on spin and valley polarization dynamics. In this talk I will present direct measurements of ultrafast valley specific relaxation dynamics in single layer  $WS_2$  and  $MoS_2$ . We found that excitonic many body interactions significantly contribute to the relaxation process. Biexciton formation reveals hole valley/spin relaxation time in  $MoS_2$ . Our results suggest that initial fast intervalley electron scattering and electron spin relaxation leads to loss of valley polarization for holes.