MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Monday, January 23, 2017
4:10 – 5:00 PM
Barnard/EPS 103

2D Spectroscopy of 2D Materials: Deciphering the Quasiparticle Zoo in Atomically Thin Semiconductors

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Abstract:

Atomically thin semiconductors, such as transition metal dichalcogenides (TMDs), are a recent addition to the family of 2D van der Waals materials that includes graphene and hexagonal boron nitride. TMDs provide a new platform for ultrathin nanostructures and devices with novel functionality that stems from their unusual band structure and exceptionally strong light-matter interaction. In monolayer TMDs, strong Coulomb interactions lead to several tightly bound quasiparticles, including excitons (electron-hole pairs) and trions (charged excitons), that govern the optical and electronic response of the material.

In this talk, I will discuss how the complex optical response of excitonic states in monolayer TMDs can be disentangled using 2D coherent spectroscopy, which correlates the optical absorption and emission energies of the material. The 2D spectral maps reveal previously unknown properties and unexpected phenomena associated with optical coherence, quantum coherent energy transfer, and optical manipulation of novel spin-valley coupling. Opportunities for integrated photonics with TMDs and possible strategies for controlling the light-matter interaction and the valley degree of freedom as a novel information carrier will also be presented.

Host: Randy Babbitt

***** Refreshments served in the Barnard Hall second floor atrium at 3:45 *****
Dr. Moody is a candidate for Physics Faculty Position