

**Friday, December 8th**

**4:10 – 5:00 PM**

**Barnard Hall 103**

**Tuning Magnetic Interaction in Two-Dimensional  
Semiconductors**

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Abstract: In this presentation, I will provide a comprehensive explanation of the basic magnetic interaction in solids and how we can manipulate these interactions to create magnetic materials with specific properties, particularly focusing on two-dimensional ferromagnetic semiconductors. I will use Vanadium-doped  $WSe_2$  as an example to explore the interplay between the long-range magnetic interaction and the direct exchange interactions, and how they compete with each other. At low doping concentrations, where the long-range interaction is weak, magnetic fluctuations with a large random telegraph signal become apparent. As the concentration of V increases, stable in-plane ferromagnetic and out-of-plane antiferromagnetic orders emerge, which can be adjusted by applying bias. At high V concentrations, the competition between direct antiferromagnetic and long-range ferromagnetic exchange interactions arises, resulting in the strange metal characteristic of high- $T_c$  superconductivity. The principle of experimental measurements for each section will also be explained in detail for non-specialists.

Host: Nicholas Borys

***\* Refreshments served in the Barnard second floor atrium at 3:45. \****