

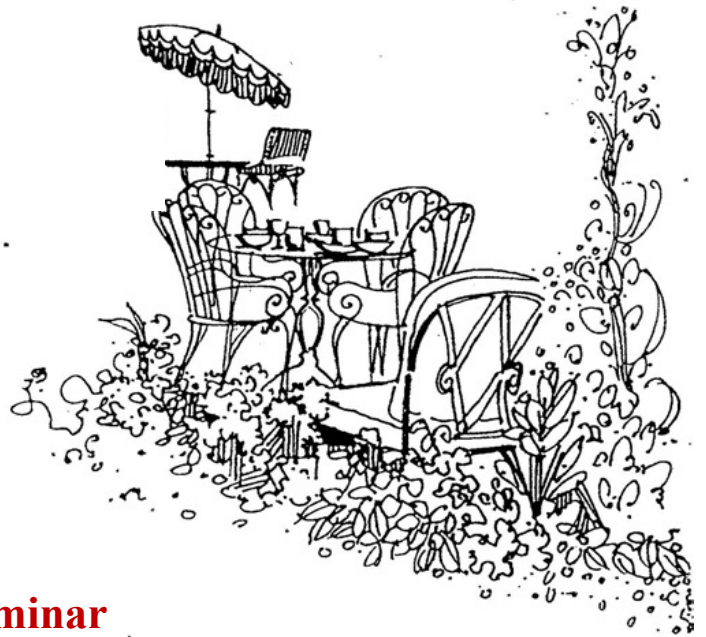
# Chez Pierre

Presents ...

Wednesday, May 1, 2024

12:00 pm -1:00 pm

Duboc Room – 4-331



## Chez Pierre Seminar

Liang Wu, University of Pennsylvania

### “Novel nonlinear optical response in 2D antiferromagnets”.

The family of monolayer two-dimensional (2D) materials hosts a wide range of interesting phenomena, including superconductivity, charge density waves, topological phases and magnetism. Antiferromagnets (AFMs) have also attracted enormous interest recently in spintronics due to the absence of stray fields and their terahertz resonant frequency. Despite the great advantages of antiferromagnetic spintronics, controlling and directly detecting antiferromagnetic order and other emergent order in 2D materials have been challenging. In my talk, I will first briefly mention the vestigial nematic orders in zig-zag ordered 2D AFMs (FePS<sub>3</sub> and FePSe<sub>3</sub>)[1-3]. Then I will focus on the Neel order in 2D AFMs (MnPS<sub>3</sub> and MnPSe<sub>3</sub>). I will show that we have developed a sensitive second harmonic generation (SHG) microscope and detected long-range Neel antiferromagnetic (AFM) order down to the monolayer in MnPSe<sub>3</sub>[4] and the bilayer in MnPS<sub>3</sub>[5]. In MnPSe<sub>3</sub>, we observed the switching of an Ising-type Neel vector reversed by the time-reversal operation. We rotated them by an arbitrary angle irrespective of the lattice by applying uniaxial strain. Finally, I will also talk about novel nonlinear optical response of MnPSe<sub>3</sub> and MnPS<sub>3</sub> to external fields such as spatially variant strain and magnetic field [6,7].

- 1.Zhang et al. [\*Nature Photonics\* 16, 311-317 \(2022\)](#)
- 2.Ni et al. [\*Nano Letters\* 22, 3283-3288\(2022\)](#)
- 3.Ni, et al. [\*arXiv:2308.07249\*](#)
- 4.Ni et al. [\*Nature Nanotechnology\* 16, 782-787 \(2021\)](#)
- 5.Ni et al. [\*Phys. Rev. Lett.\* 127, 187201 \(2021\)](#)
- 6.Ni, et al. [\*arXiv:2404.06010\*](#)
- 7.Ni, et al. under review