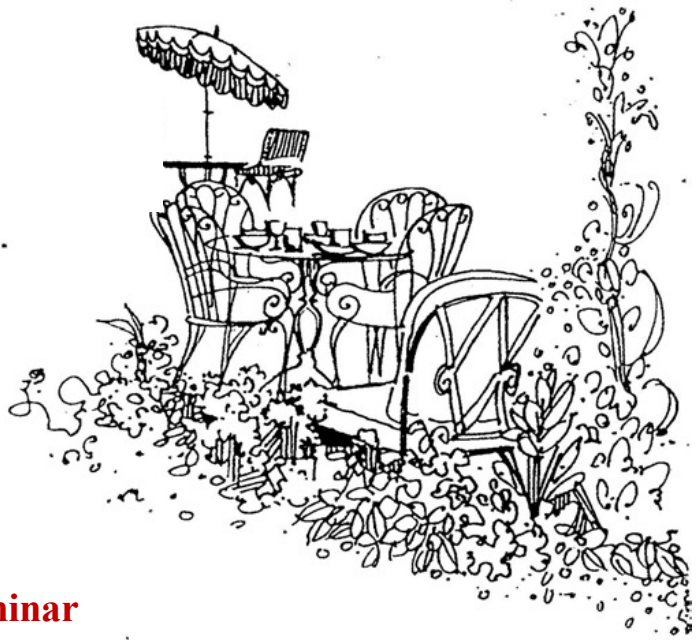
Chez Pierre

Presents ...

Monday, May 6, 2024

12:00 pm -1:00 pm

Duboc Room – 4-331



Chez Pierre Seminar

Cui-Zu Chang, Pennsylvania State University

"The Art and Science of Molecular Beam Epitaxy —From Quantum Anomalous Hall Effect to Interfacial Superconductivity".

In this talk, I will briefly introduce the molecular beam epitaxy (MBE) growth mechanism and then focus on my research, which centers on the MBE growth of quantum materials, spanning from topological materials to interfacial superconductors. I will talk about two solid-state phenomena with zero resistance: the quantum anomalous Hall (QAH) effect and the interface superconductivity. The QAH insulator is a material in which the interior is insulating but electrons can travel with zero resistance along one-dimensional conducting edge channels. Owing to its resistance-free edge channels, the QAH insulator is an outstanding platform for energy-efficient electronics and spintronics as well as topological quantum computations. With many efforts, we were the first to realize the QAH effect in MBE-grown Cr- and V-doped topological insulator (TI) thin films. I will briefly talk about the route to the QAH effect and then focus on our recent progress on the high Chern number QAH effect and three-dimensional QAH effect in MBE-grown magnetic TI multilayers. Finally, I will talk about the interfacial superconductivity in MBE-grown magnetic TI/iron chalcogenide heterostructures. Moreover, the magnetic TI/iron chalcogenide heterostructures fulfill the three essential ingredients of chiral topological superconductivity, i.e. ferromagnetic, topological, and superconducting orders, and thus provide an alternative platform for the exploration of chiral Majorana physics towards the scale topological quantum computations.