

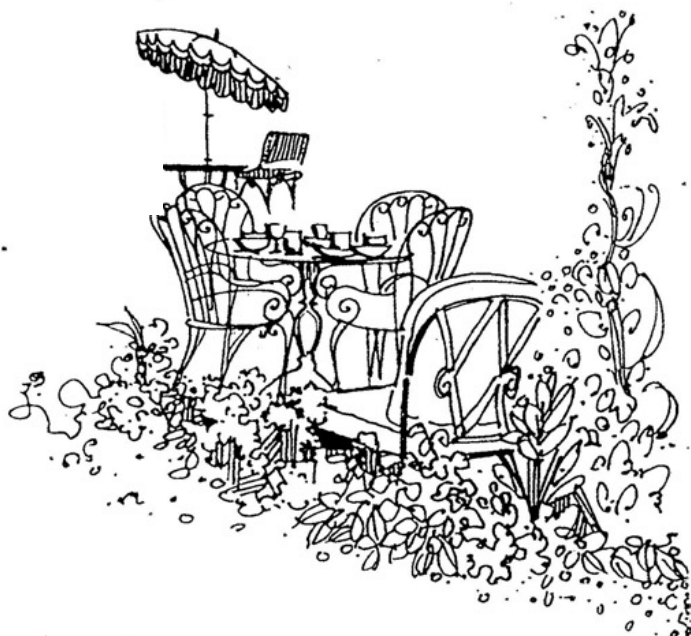
Chez Pierre

Presents ...

Monday, September 15, 2025

12:00 pm - 1:00 pm

Duboc room – 4-331



Chez Pierre Seminar

Alexander von Hoegen. MIT

“Controlling THz Light-Matter Coupling to Manipulate Layered Quantum Materials”

I will discuss how terahertz (THz) light-matter coupling can be controlled in both time and space to transiently manipulate the properties of layered quantum materials.

In this context, THz-driven collective modes provide a powerful route to reveal and dynamically shape the interplay between microscopic degrees of freedom. I will illustrate this by focusing on a quasi-two-dimensional magnetic material, where THz excitation stabilizes a new metastable magnetic ground state. This emergent phase arises from a unique interplay of magnetic fluctuations and strong spin-lattice coupling.

In the second part, I will show how THz light-matter interactions can be custom-tailored by engineering a sample's geometry and dielectric environment. This gives rise to distinctive resonances that confine electromagnetic waves to deeply sub-wavelength scales. By directly visualizing the THz electrodynamics in the layered superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$, I present spectroscopic evidence of a below-gap, two-dimensional superfluid plasmon. We observe clear plasmonic anisotropy, highlighting how geometry impacts the THz electrodynamics and ultimately enabling us to determine the plasmon dispersion. Together, these findings highlight the versatility of THz-driven approaches to control and probe emergent phenomena in layered quantum materials.