

Chez Pierre

Presents ...

Monday, October 6, 2025

12:00 pm -1:00 pm Duboc

Room – 4-331



Chez Pierre Seminar

Inti Sodemann, University of Leipzig

“Gifts from moiré to quantum Hall and back”

Moiré materials are providing amazing platforms where strong interactions and topology coexist in novel ways. Their realization of nearly "Ideal Chern bands" has been argued to be crucial in the emergence of recently discovered fractional quantum Hall states at zero magnetic field. However, the nature of even the most archetypical Laughlin states and its competition with other phases remains poorly understood in this setting. We will show that the Laughlin wave-function in such ideal Chern bands does not realize only the well-known fractionalized phase of matter but also a variety of other complex states. By exploiting its exact mapping to a classical Coulomb gas, we will demonstrate that the Laughlin state undergoes a Berezinskii-Kosterlitz-Thouless phase transition from its usual plasma state into a dielectric state, with correlations that decay as power-laws with continuously varying exponents and gaplessness that appears to be beyond the Goldstone mode paradigm. We will discuss some of our speculations on the relevance of this finding to moire materials and its possible connections to critical states in other settings.

If time permits, I will also highlight some of our recent findings of emergent non-equilibrium Fermi and non-Fermi liquids when electrons are illuminated by coherent radiation and make the case for the feasibility of their realization in clean materials under low frequency radiations (microwaves to terahertz).