

Chez Pierre

Presents ...

Friday, October 2, 2026

12:00pm – 1:00pm

Duboc Room (4-331)



Special Chez Pierre Seminar

Giuseppe Carleo, EPFL

"Neural Quantum States as Precision Tools for Correlated Quantum Matter".

Strongly correlated quantum systems remain challenging to describe quantitatively, particularly when strong quantum fluctuations, competing correlations, and large system sizes must be treated on equal footing. I will present a theoretical and computational perspective on recent progress using neural quantum states, neural network representations of many body wave functions optimized with variational Monte Carlo. The emphasis will be on when these methods can become controlled tools for quantitative many body physics. I will discuss applications to frustrated quantum magnets, where large system sizes enable controlled extrapolation to the thermodynamic limit, and to interacting fermions, including competing stripe and superconducting correlations in the doped Hubbard model. I will also discuss neural states that describe entire families of Hamiltonians and recent approaches to real time quantum dynamics with quantitative error control. I will conclude with a brief perspective on the representation of many body wave functions.

Selected references: Carleo & Troyer, Science 355, 602 (2017); Rende et al., Nat. Commun. 16, 7213 (2025); Viteritti et al., arXiv:2602.02665, arXiv:2604.21978 (2026); Sinibaldi et al., PRL 136, 120402 (2026).