

# *Chez Pierre*

Presents ...

Monday, October 31, 2022

12:00 pm

Duboc Room - 4-331



## **Chez Pierre Seminar**

**Nicholas Read, Yale University**

### **“Some recent results in the rigorous theory of short-range spin glasses”.**

I will review progress on rigorous results about short-range spin glasses and other disordered spin systems. A major issue in short-range spin glasses is whether the low-temperature phase has many pure or "ordered" states, as predicted by Parisi's replica symmetry breaking (RSB) theory, or only one or two as predicted in the scaling-droplet approach. A key concept when analyzing this problem in the short-range case is that of a metastate, a probability distribution on the equilibrium (or Gibbs) states. I will review earlier results about the metastate, which constrain the allowed possibilities for the pure-state structure of short-range spin glasses. Recent progress (in collaboration with Newman and Stein) shows that, for a given Gibbs state drawn from the metastate, the Gibbs state can be a mixture of pure states, but those pure states are macroscopically indistinguishable. A further concept is that of an indecomposable metastate. For the latter, all pure states in all Gibbs states drawn from it are macroscopically indistinguishable, and the Gibbs states also possess further properties that seem very natural, as well as being compatible with RSB.