Out of equilibrium systems sometimes have a real hard time relaxing to equilibrium. They tend to never find it for very long time scales, they get trapped on a very broad range of time and space scales, they age, they lose Markovianity (or gain memory), they can be rejuvenated etc. Good examples of these phenomena are seen in dynamics of glassy systems, or in diffusion on critical percolation clusters (the “ant in the labyrinth”). In this colloquium talk, I will try to survey some of the mathematics of the phenomena linked to slow relaxation for complex out of equilibrium statistical mechanical systems, using mainly the very simple ansatz introduced by the physicist J.P. Bouchaud. This simple “trap model” is now well understood. Its surprising relevance for harder questions is also slowly being proved. I will give some of the recent advances about the simple Bouchaud model and its scaling limit on various graphs. I will finally explain the relevance and the shortcomings of this ansatz for the more difficult examples mentioned above, as well as some of the numerous open questions.

This is based on joint work with J. Cerny, T. Mountford, A. Bovier, V. Gayrard. Lecture Notes covering part of this talk can be found here:


Thursday, September 28
4:15 p.m.
Room 380-W

http://math.stanford.edu/coll/0607/