Condensed Matter Theory Center Seminar

Tuesday, December 1
11:00 am – 12:30 pm
2205 Toll Physics Building

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"Quantum critical glasses and many-body delocalization"

Abstract: Isolated systems that evade thermalization exhibit behavior more commonly associated with quantum ground states: for instance, fully many-body localized (MBL) systems show area law entanglement in every eigenstate and robust ordering phenomena. First, I will apply real-space renormalization group ideas to study a class of "quantum critical glasses" in which (nearly) every eigenstate exhibits logarithmic entanglement scaling conventionally associated with one dimensional critical ground states. Such "infinite randomness" phases are believed to describe critical points between distinct MBL phases, or stable critical phases of anyonic spin chains [1]. I will also point out an example where an infinite randomness fixed point of a non-interacting theory is disrupted by interactions that break either ergodicity or symmetry, preventing the stabilization of certain types of symmetry-protected topological order by localization [2]. Finally, I will discuss a simple microscopic model and its associated scaling theory for the transition out of the MBL phase, where ergodicity is restored sharply at an unusual critical point [3].

References:

[1] Phys. Rev. Lett. 114, 217201 (2015).
[2] arXiv:1510.04282 (2015).
[3] Phys. Rev. X. 5, 031033 (2015).

Based on joint work with R. Vasseur, A.C. Potter and A.J. Friedman.

Host: Will Cole
Web: http://www.physics.umd.edu/cmtc/seminars.html