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Tunable quantum glasses and phase transitions of atoms and photons: firstpredictions for glassy physics with many-body cavity QED[1]
PHILIPP STRACK, SUBIR SACHDEV, Harvard University — Recent studies of strongly interacting atoms and photons in opticalhave rekindled interest in the Dicke model of atomic qubitsto discrete photon cavity modes. In this talk, we argue thatof the Dicke model with variable atom-photon couplings canrise to a ground state phase diagram exhibiting quantum phasebetween paramagnetic, ferromagnetic, and a spin glass phase. These quantum optics realizations of quantum glasses are distinctive to condensed matter systems and provide new opportunities for glassy physics with many-bodyQED. The photon-mediated random couplings between the atomic qubitsIsing spins) are truly long-ranged and the theory for these systemsanalytically tractable. We compute atomic and photon spectralfunctions across this phase diagram, and outline how ourcan be observed in experiments.

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