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Coherent many-body dynamics in cold Rydberg gases THOMAS POHL, ITAMP, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, MIKHAIL D. LUKIN, Physics Department, Harvard University, Cambridge, MA — Recent realizations of ultra-cold ensembles of Rydberg atoms opens up unique possibilities for exploring non-equilibrium quantum dynamics of many body system with strong, long-range interactions. Here we will report on theoretical progress in describing the evolution of Rydberg populations in cold gases for various types of interactions. Special emphasis will be placed on excitation schemes that provide a more intuitive understanding of the gas evolution and reveal effects of atomic disorder and quantum correlations on the collective excitation dynamics.

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