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Transverse-Field Ising Dynamics by Rydberg Dressing OGNJEN MARKOVIC[1], VICTORIA BORISH, JACOB HINES, SHANKARI RAJAGOPAL, MONIKA SCHLEIER-SMITH, Stanford University — Optical control of atomic interactions is a powerful tool for studying quantum many-body physics. I will present recent results on generating long-range Ising interactions between ground-state atoms by Rydberg dressing, i.e., coupling to Rydberg states with an off-resonant laser field. We perform Rydberg dressing on a cold dilute gas of cesium atoms and measure the resulting mean-field dynamics via Ramsey spectroscopy, detecting characteristic one-axis twisting dynamics. We additionally emulate a transverse-field Ising model by adding a periodic microwave drive and detect dynamical signatures of the ferromagnetic-paramagnetic phase transition. This work paves the way for future studies ranging from creating arrays of spin-squeezed states via local optical control to investigating Floquet phases in spin chains with periodically driven interactions.

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