Abstract Submitted
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Hamiltonian engineering for studying many-body dynamics in strongly interacting Rydberg systems[1] NITHIWADEE THAICHAROEN, SEBASTIAN GEIER, TITUS FRANZ, ALEXANDER MÜLLER, ANDRE SALZINGER, ANNIKA TEBBEN, CLÉMENT HAINAUT, GERHARD ZÜRN, MATTHIAS WEIDEMÜLLER, Heidelberg University — Dipolar interacting Rydberg spin systems have been an ideal platform to study non-equilibrium phenomena of isolated quantum systems. Their tunable strong, long-range interactions provide new opportunities to investigate the dynamics of strongly correlated many-body quantum systems with beyond nearest-neighbor coupling. Here, the system can either relaxes to a thermal equilibrium or reaches nonthermal-fixed points, where effect of disorders, external fields and fluctuations play important roles [1]. In this work, we present an experimental realization of a dipolar spin-1/2 model by coupling two strongly interacting Rydberg states utilizing a microwave field. We propose a scheme to engineer the Hamiltonian of the system using dynamical pulse sequence of the microwave field to identify if the initial order of the system persist after time evolution of the system. The resulting global magnetization after the dynamics extracted from the systems utilizing a state-tomography technique and a selective ionization will be discussed.

[1] A. Piñeiro Orioli et al., PRL **120**, 063601 (2018)

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