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Quantum many-body dynamics of strongly interacting atom arrays HANNES BERNIEN, ALEXANDER KEESLING, HARRY LEVINE, SYLVAIN SCHWARTZ, AHMED OMRAN, ERIC ANSCHUETZ, Harvard University, MANUEL ENDRES, Caltech, VLADAN VULETIC, Massachusetts Institute of Technology, MARKUS GREINER, MIKHAIL LUKIN, Harvard University — The coherent interaction between large numbers of particles gives rise to fascinating quantum many-body effects and lies at the center of quantum simulations and quantum information processing. The development of systems consisting of many, well-controlled particles with tunable interactions is an outstanding challenge. Here we present a new platform based on large, reconfigurable arrays of individually trapped atoms[1]. Strong interactions between these atoms are enabled by exciting them to Rydberg states. This flexible approach allows access to vastly different regimes with interactions tunable over several orders of magnitude. We study the coherent many-body dynamics in varying array geometries and observe the formation of Rydberg crystals. [1] Science 354, 1024 (2016)

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