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**Coherence measurement of kicked Rydberg wave packets** JOEL MURRAY, HAIDAN WEN, SANTOSH PISHARODY, PHIL BUCKSBAUM, University of Michigan — Terahertz half-cycle pulses (HCP) are used to excite Rydberg wave packets. The states of these wave packets can be viewed as a data register, with information stored in the phase differences between the states. We characterize the operation of a weak HCP on the wave packet, observing the changes in phase and amplitude of each state. We have performed a measurement of the mutual coherence between Rydberg states detected in ramped- field ionization, following the operation of the HCP. We find that coherence is retained, but there exist particular times during the evolution of the wave packet when the HCP induces the loss of correlation between some pairs of Rydberg states. Simulations suggest that this apparent decoherence is due to coherent population transfer to other angular momentum manifolds. Since coherence is retained after the HCP, we are able to perform further coherent operations on the register.

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