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Noise-induced Decoherence of Stark Wavepackets Studied Using an Echo Technique[1] WEI ZHAO, JEFFREY MESTAYER, JIM LANCASTER, F. BARRY DUNNING, Department of Physics and Astronomy, Rice University, SHUHEI YOSHIDA, Vienna University of Technology, CARLOS REINHOLD, Oak Ridge National Laboratory, JOACHIM BURGDORFER, Vienna University of Technology — The decoherence of high-nStark wavepackets induced by noise is examined using a quantum beat echo technique. Noise, i.e., coupling to the environment, causes irreversible dephasing of the wavepacket and reduces the amplitude of the echoes. Here we apply synthesized noise to Stark wavepackets and quantify their robustness against decoherence by measuring the size of the echoes. The wavepackets are produced by sudden application of a transverse dc field to quasi-one-dimensional n=350 Rydberg atoms. Their subsequent evolution is monitored using a half-cycle probe pulse. The technique can be applied on timescales much shorter than those associated with revivals allowing measurement of decoherence times even in the presence of very strong dephasing.

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