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Noise Induced Decoherence of Rydberg Atoms in a DC Field[1] S. YOSHIDA, Vienna University of Technology, J. BURGDÖRFER, Vienna University of Technology, University of Tennessee, C.O. REINHOLD, Oak Ridge National Laboratory, University of Tennessee, W. ZHAO, J.J. MESTAYER, J.C. LANCASTER, F.B. DUNNING, Rice University — Application of a sudden field step to a Rydberg atom leads to creation of a Stark wavepacket whose evolution can be monitored using a half-cycle probe pulse applied after a variable time delay. We analyze the effects of noise on such wavepackets that is generated by quasi-randomly modulating the amplitude of the dc field. This noise induces decoherence which is manifested as a damping of the Stark quantum beats. We discuss the effects of different types of noise and present calculations and measurements for K(350p) atoms and "colored" noise, i.e., noise with a non-uniform power spectrum that possesses a characteristic frequency. We show that damping is most rapid when this frequency matches the orbital frequency of the Rydberg electron.

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J. Burgdorfer
Vienna University of Technology

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