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Collisional decoherence of Rydberg wavepackets[1] C.O. REINHOLD, Oak Ridge National Laboratory, J. BURGDORFER, Vienna University of Technology, F.B. DUNNING, Department of Physics and Astronomy, Rice University — Collisional interactions represent a major source of decoherence for a gas of Rydberg atoms. We investigate the irreversible dephasing of coherently excited Rydberg wavepackets due to decoherence in collisions with ambient rare gas atoms. We show that the rate of decoherence provides a sensitive tool for measuring quasi-elastic electron-atom (or molecule) collisions at energies extending down to micro electron volts. We present proof of principle calculations for $n \simeq 388$ potassium Rydberg wavepackets in an ambient gas of xenon atoms. We propose a scheme centered on the collisional decoherence of Stark Rydberg wavepackets induced by sudden application of a DC field.

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C.O. Reinhold
Oak Ridge National Laboratory

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