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Decoherence of high-ℓ Rydberg wave packets by collisions and electrical noise B. WYKER, S. YE, F.B. DUNNING, Rice University, T.J. MCKINNEY, University of California, Berkeley, C.O. REINHOLD, Oak Ridge National Laboratory, S. YOSHIDA, J. BURGDÖRFER, Vienna University of Technology — Quantum revivals in very-high-n (n 300) high-ℓ Rydberg wave packets generated from parent np states are used to examine decoherence induced by collisions and by the application of "colored" noise from a random pulse generator. The origin of the decoherence is analyzed by looking at two broadening mechanisms: inhomogeneous broadening determined by the strength of the perturbation and energy diffusion whose rate is controlled by the spectral characteristics of the noise. Use of artificially synthesized noise allows the two broadening mechanisms to be tuned separately and the resulting decoherence can be systematically studied. These mechanisms also provide a key to understanding the evolution of wave packets in the presence of CO_2 target gas. Research supported by the NSF, the Robert A. Welch Foundation, the OBES US DoE to ORNL, and by the FWF (Austria)

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