Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Precise manipulation of Rydberg wave packets B. WYKER, F.B. DUNNING, Rice University, C.O. REINHOLD, Oak Ridge National Laboratory, S. YOSHIDA, J. BURGDÖRFER, Vienna University of Technology — The creation and control of mesoscopic, very-high-n ($n \sim 300$) near-circular Rydberg wave packets, whose quantum coherence can be maintained over hundreds of classical orbital periods, is described. We show that the n distributions in such wave packets can be controlled during production by the size and shape of the generating field and further tailored through the application, after production, of precisely timed half-cycle pulses. The remarkable level of precision that can be achieved is demonstrated using time domain spectroscopy. The protocols employed are described with the aid of "quantized" classical trajectory Monte Carlo simulations. Research supported by the NSF, the Robert A. Welch Foundation, the OBES, U.S. DoE to ORNL, and by the FWF (Austria).

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Date submitted: 15 Jan 2010 Electronic form version 1.4