Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Effect of atomic motion on Rydberg blockade in a hot atomic beam[1] S. YOSHIDA, J. BURGDÖRFER, Vienna University of Technology, X. ZHANG, F. B. DUNNING, Rice University — The dipole blockade of very-high-n ($n \sim 300$) strontium $5snf\ ^1F_3$ Rydberg atoms in a hot atomic beam is studied. For such high n, the blockade radius (~ 0.1mm) can exceed the linear dimensions of the excitation volume. Rydberg atoms formed inside the excitation volume can, upon leaving the region, continue to suppress excitation until they have moved further away than the blockade radius. Moreover, the high density of states near the F-states originating from strong coupling to nearby high-L states results in a small but finite probability for excitation of $n\ ^1F_3$ atom pairs at small internuclear separations below the blockade radius. We suggest a theoretical model to study the time evolution of the average Rydberg number and the Mandel Q parameter revealing the correlation in many-body excitation in a time resolved manner. The results will be compared with measured data.

[1]Research supported by the NSF, the Robert A. Welch Foundation, and the FWF (Austria).

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Date submitted: 26 Jan 2017 Electronic form version 1.4