Abstract Submitted
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Exploring dipole blockade using high-n strontium Rydberg atoms[1] XINYUE ZHANG, SHUZHEN YE, F. BARRY DUNNING, Department of Physics and Astronomy, Rice University, MORITZ HILLER[2], SHUHEI YOSHIDA, JOACHIM BURGDÖRFER, Institute for Theoretical Physics, Vienna University of Technology — Studies of the production of strongly-polarized quasi-1D high-n, $n \sim 300$, strontium "nF" Rydberg states in an atomic beam by three-photon excitation in a weak dc field suggest that (in the absence of blockade effects) densities of $\sim 10^6\ cm^{-3}$ might be achieved. At such densities the interparticle separation, ~ 100 μm, becomes comparable to that at which dipole blockade effects are expected to become important. Apparatus modifications are underway to allow the exploration of blockade at very high-n and the effects of the high energy level density. Blockade is also being examined through calculations of the energy spectrum for two interaction atoms. Access to the blockade regime promises creation of Rydberg atoms at well-defined separations whose interactions can be coherently controlled using electric field pulses thereby enabling study of the dynamics of strongly-coupled Rydberg systems.

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[2]also affiliated with Physikalisches Institut, Albert-Ludwigs-Universität Freiberg

Xinyue Zhang
Rice Univ

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