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Efficient three-photon excitation of quasi-1D $n \sim 300$ strontium Rydberg atoms[1] XINYUE ZHANG, SHUZHEN YE, F. BARRY DUNNING, Department of Physics and Astronomy, Rice University, SHUHEI YOSHIDA, MORITZ HILLER[2], JOACHIM BURGDÖRFER, Institute for Theoretical Physics, Vienna University of Technology — The production of high n, $n \sim 300$, quasi-one-dimensional (quasi-1D) strontium Rydberg atoms via three-photon excitation of extreme Stark states in the presence of a weak dc field is explored. The experimental data are analyzed with the aid of classical trajectory Monte Carlo simulations and quantum calculations using a two-active-electron model. The results demonstrate that strongly-polarized quasi-1D states can be generated with much higher production rates than achieved using two-photon excitation. Furthermore, the data suggest that densities approaching those at which blockade effects become important might be realized opening up the opportunity to examine the behavior of strongly-coupled Rydberg atom pairs.

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