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Modeling Launched Cold Atoms in Distinguishable Quantum States Traversing a Cylindrically-Symmetric Electric Field ANNE GOODSELL, DA THI HOANG, BING IBRAHIM, SASHA CLARICK[1], Middlebury College — We continue to model the trajectories of launched laser-cooled Rydberg atoms as we prepare to steer atoms in the electric field of a charged wire. Our iterative calculations account for acceleration derived from the spatially-dependent Stark shift for slow-moving rubidium atoms in Rydberg states. We model atoms with $n = 35$ and $|m_j| = 7/2$, identifying paths for each of 63 individual quantum sublevels that are distinguishable in an external electric field. Our model of a launched cold-atom cloud is seeded from a distribution with vertical (launch) velocity $v_y = 4.0 \pm 0.4$ m/s, horizontal velocity $v_x = 0.0 \pm 0.2$ m/s, and a spatial spread of 100 μm in the vertical direction. These conditions correspond to our experiments using the two-photon pathway $5S \rightarrow 5P \rightarrow 5D$ to excite atoms in flight and prepare us for three-photon excitation to selected sublevels of the Rydberg state with $n = 35$.

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