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Multiphoton population transfer in a kicked Rydberg atom: adiabatic rapid passage by separatrix crossing TURKER TOPCU, FRANCIS ROBICHEAUX, Auburn University — Following an experimental observation [1], a recent simulation [2] has showed that efficient population transfer can be achieved through adiabatic chirping of a microwave pulse through a 10-photon resonance connecting two Rydberg states with $n = 72$, $\ell = 1$ and $n{\sim}82$. These simulations have revealed that this population transfer is essentially a classical transition caused by separatrix crossing in the classical phase space. Here we present results of our fully three dimensional quantum and classical simulations of coherent multiphoton population transfer in *kicked* Li atom in a Rydberg state. We were able to achieve $\sim$76% population transfer from 40p to 46p state in Li through a 6-photon resonance condition and contrast our results with those when the transition is driven by microwaves. We further discuss the case when the atom starts out from a Stark state in conjunction with the l-distribution of the transferred population. We use a one-dimensional classical model to investigate the classical processes taking place in the phase space and find that the same separatrix crossing mechanism observed in microwave transitions is also responsible for the transition when the atom is kicked.

[1] H. Maeda *et al.*, Phys. Rev. Lett. **96**, 073002 (2006).
[2] T. Topcu and F. Robicheaux, J. Phys. B **42**, 044014 (2009).

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