Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

$n\ell \rightarrow n'\ell'$ transition rates in electron and proton - Rydberg atom collision[1] DANIEL VRINCEANU, Texas Southern University — Electrons and protons drive the recombination dynamics of highly excited Rydberg atoms in cold rarefied plasmas found in astrophysical conditions such as primordial recombination or star formation in H-II clouds. It has been recognized that collisions induce both energy and angular momentum transitions in Rydberg atoms, although in different proportions, depending on the initial state, temperature and the given species considered in the collision (electron or proton). Most studies focused on one collision type at a time, under the assumption that collision types are independent or their effects are not competing. The classical Monte-Carlo trajectory simulations presented in this work calculate the rates for both energy and angular momentum transfers and show their interdependence. For example, energy transfer with small angular momentum change are more efficient for target states with initial large angular momentum.

[1]The author acknowledges support received from the National Science Foundation through a grant for the Center for Research on Complex Networks (HRD-1137732)

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Date submitted: 29 Jan 2017 Electronic form version 1.4