

Abstract Submitted  
for the DAMOP08 Meeting of  
The American Physical Society

**Electron-Rydberg collisions at ultra-low temperatures** DANIEL VRINCEANU, Los Alamos National Laboratory, THOMAS POHL, HOSSEIN SADEGHPOUR, ITAMP, Harvard-Smithsonian Center for Astrophysics — Precise knowledge of collisional transition rates between excited atomic states is essential for understanding the dynamics of various terrestrial and astrophysical plasmas. Here we present extensive Monte-Carlo calculations of electron-impact induced transitions between highly excited Rydberg states, and provide accurate rate coefficients. For moderate energy changes, our calculations confirm widely applied, previously obtained expressions, but reveal strong deviations at small energy transfer, which become increasingly important for highly excited Rydberg states, as formed in ultracold neutral plasmas or dilute astrophysical plasmas. Our plasma simulations demonstrate that these corrections have significant impact on the short-time dynamics of Rydberg atom formation, and yield good agreement with recent ultracold plasma experiments.

Thomas Pohl  
ITAMP, Harvard-Smithsonian Center for Astrophysics

Date submitted: 01 Feb 2008

Electronic form version 1.4