Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Electronic excitation of Na due to low-energy He collisions[1] C. Y. LIN, B. H. YANG, P. C. STANCIL, University of Georgia, H. P. LIEBERMANN, P. FUNKE, R. J. BUENKER, Bergishe Universitat Wuppertal — In warm astrophysical environments electron collisions are the primary mechanism for thermalizing the internal energy of ambient atoms and molecules. However, in cool stellar and planetary atmospheres, the electron abundance is extremely low so that thermalization is only possible through collisions of the dominant neutral species, H_2, He, and H. Typically, the neutral cross sections are much smaller than those due to electrons, so that the level populations of the atmospheric constituents may display departures from equilibrium. Unfortunately, these cross sections are generally not available for collision energies typical of stellar/planetary environments. In this work, we investigate the electronic excitation of Na due to collisions with He for energies near and just above threshold. The calculations are performed with the quantum-mechanical molecular-orbital close-coupling method utilizing ab initio adiabatic potential curves and nonadiabatic radial and rotational coupling matrix elements obtained from multireference single- and double- excitation configuration interaction approach. State-to-state cross sections and rate coefficients will be presented and compared with other theoretical and experimental data where available.

[1]The work of CYL, BHY, and PCS was supported by NASA grant NNG04GG515.

Phillip C. Stancil
University of Georgia

Date submitted: 28 Jan 2005 Electronic form version 1.4