Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Rovibrationally-resolved photodissociation of NH and application to the solar UV opacity[1] G. SHEN, A. KURI, University of Georgia, J.M. FONTENLA, University of Colorado, Boulder, P.C. STANCIL, University of Georgia, J.G. WANG, Institute of Applied Physics and Computational Mathematics —
Rovibrationally-resolved photodissociation cross sections of NH have been evaluated using a combination of ab initio and experimentally derived potential curves and dipole transition moments. Here we present results for the three electronic transitions: $2\ ^3\Sigma^- \leftarrow X\ ^3\Sigma^-$, $2\ ^3\Pi \leftarrow X\ ^3\Sigma^-$, $A\ ^3\Pi \leftarrow X\ ^3\Sigma^-$. Partial cross sections for transitions from all 577 rovibrational levels obtained theoretically for the ground electronic state $X\ ^3\Sigma^-$, were computed for a wavelength range that extends from 500Å to the dissociation threshold for each particular rovibrational level. Assuming a thermal Boltzmann distribution of the rovibrational levels in $X\ ^3\Sigma^-$, LTE cross sections are presented for gas temperatures between 500 and 10000 K. For applications to cold interstellar gas, cross sections for $X\ ^3\Sigma^-(v = 0, J = 0)$ to $2\ ^3\Sigma^-$ and $2\ ^3\Pi$ dominate, but for the high density and temperature conditions in stellar atmospheres, the LTE cross section to the $A\ ^3\Pi$ becomes competitive. Explicit application of the cross sections to the solar UV opacity will be presented. In particular, the NH photodissociation opacity is found to affect the non-LTE behavior of some species such as Cr I and V I.

[1]The work at UGA was partially supported by NASA grant HST-AR-11776.01-A. The work of JMF was supported by NASA LWS grant NNX09AJ22G. GS acknowledges travel support by the International Cooperation and Exchange Foundation of CAEP.

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Date submitted: 30 Jan 2014 Electronic form version 1.4