THE GENERATION AND PROPAGATION OF UNCERTAINTIES ON ATOMIC DATA

C.P. Ballance[a], M.C. Witthoeft[b], S.D. Loch[a], and M.S. Pindzola[a]

[a] Auburn University, Auburn, AL 36849, USA

[b] ADNET Systems, Inc., Rockville, MD.

NASA/GSFC, Greenbelt, MD 20771

ballance@physics.auburn.edu

The need for meaningful uncertainties on atomic data has been identified as a critical issue for fusion plasma modeling. It would allow one to determine the range of values on photon emissivities, plasma transport coefficients and impurity abundances due to uncertainties on the atomic data.

We propose two objective methods to quantify meaningful uncertainties on electron-impact excitation, ionization and recombination rate coefficients. The first we refer to as *baseline uncertainty* which provides an estimate of the range of likely rate coefficients to be found in the literature, leading to a generous estimate of the uncertainties on observable quantities. The second method we call *method sensitivity* which is more involved, but provides a systematic calculation of the likely uncertainties within the state-of-the-art method of each data type (e.g. electron excitation). This method includes effects such as correlation between the various atomic processes in the collisional-radiative modeling, and an appropriate distribution function for the range of atomic rate coefficients.

As a preliminary study, illustrating the use of baseline uncertainty data, we show results for O6+. Uncertainties on O6+ diagnostic line ratios are generated from a Monte-Carlo set of collisional-radiative calculations.