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Modeling X-ray Emission due to Charge Exchange[1] P.C. STANCIL, J.L. NOLTE, R.L. PORTER, R.L. SHELTON, Y. WU, University of Georgia, D.R. SCHULTZ, University of North Texas, Y. HUI, Oak Ridge National Laboratory, M.J. RAKOVIC, Grand Valley State University, G.J. FERLAND, University of Kentucky, H.P. LIEBERMANN, R.J. BUENKER, Bergische Universitat Wuppertal
— Since the advent of Cravens' [1] proposal that the observed X-ray emission from comet Hyakutake was due to charge exchange (CX) of highly-charged solar wind ions with cometary neutrals, the CX-mechanism has been identified as a possible dominant contributor to the X-ray emission observed in the heliosphere, planetary exospheres, the geocorona, supernova remnants, starburst galaxies, and molecular cooling flows in galaxy clusters. To provide reliable CX-induced X-ray spectra models to simulate these and other astrophysical environments, we have undertaken a project to compute quantum-state-resolved CX cross sections of highly-charged ions colliding with H and He. Here we summarize current results for $C^{(5-6)+}$, N^{6+}, and $O^{(6-8)+}$ obtained with the molecular-orbital close-coupling (CC), atomic-orbital CC, and classical trajectory Monte Carlo methods. Utilizing the theoretical CX cross sections, cascade models are computed to generate X-ray spectra and compared to available measurements and observations. Comparison is also made to models assuming excitation by thermal electrons to identify diagnostics to distinguish CX-induced and electron-impact-induced X-ray emission.

[1] T. E. Cravens, *Geophys. Res. Lett.* **25**, 105 (1997).

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