A138a Study of X-ray Photoionized N plasma and comparisons with theoretical model

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Since intense lasers could be used to create experimental test beds where astronomical observations and models can be quantitatively compared with laboratory data, Laboratory Astrophysics is booming. This area includes strong shock phenomena, high Mach-number jets, fundamental properties such as opacities and equations of state, etc. Among these topics, photoionized plasma draws attention for being related to the accreting compact object, one of the most intriguing objects in the universe. An example is Cygnus X-3, an accreting x-ray binary system. Its x-ray emission spectrum is consistent with a plasma in photoionization equilibrium. To check or calibrate the models used to interpret these spectra, experimental data of photoionized plasmas are required.

Recently, the laser-produced photoionization experiments have been undertaken on the Gekko-XII at the Institute of Laser Engineering under near steady-state conditions. For analyzing the experimental measurements, we use a straightforward, rapid model to calculate the distribution of ionization and population in a photoionization-dominated plasma. By comparison with experimental spectra, the electron and radiation temperatures are determined.