Laboratory measurements of the line emission from mid-Z L-shell ions in the EUV

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Abstract

We are continuing measurements of line lists in the extreme ultraviolet spectral region for use in astrophysical diagnostics. We recently completed line lists of sulfur S VII - S XIV, and are close to completing the analysis of laboratory spectra of silicon Si V - Si XII. These measurements were done at the Lawrence LIvermore National Laboratory's electron beam ion traps, in which a monoenergetic electron beam excites the transitions of interest, and were used to determine wavelengths and intensities of these transitions. We have also obtained data for the same transitions in collisional plasmas produced in the Princeton NSTX tokamak. We present here L-shell EUV transitions of argon in the 20 – 50 Å band and show density-sensitive line ratios for the 2p-3d lines of Ar XIV and the 2p-3s lines of Ar IX, comparing them to calculations from the Flexible Atomic Code. The tokamak plasmas are at 100 times higher density than the EBIT plasmas, allowing us to calibrate these diagnostic ratios at the high density limits. This work was supported by NASA Astronomy and Physics Research and Analysis program work order NNH04AA751, and was performed under the auspices of the Department of Energy by the University of California Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48.

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