Laboratory Survey of Fe L-shell X-ray Emission Lines between 7 and 11 Å

Ming Feng Gu* Hui Chen† Peter Beiersdorfer†
Greg V. Brown† Daniel B. Thorn† Steven M. Kahn*

February 3, 2006

Abstract

We present a comprehensive survey of Fe L-shell X-ray lines between 7 and 11 Å using the electron beam ion trap at the Lawrence Livermore National Laboratory. A set of flat crystal spectrometers are used to measure the wavelengths of all significant Fe emission lines in the 7–11 Å range, most of them being transitions from high n (up to $n = 10$) configurations to the $n = 2$ shell. The identification and assignment of transitions are made with the help of detailed theoretical modeling using the Flexible Atomic Code. The present work is an extension of Brown et al. (2002, ApJ 140, 589) where Fe lines above 10.6 Å are measured and identified. The combination of the previous and the present work provides the most extensive and accurate laboratory X-ray line list for Fe L-shell ions to date.

The work at Lawrence Livermore National Laboratory was performed under the auspices of the Department of Energy under Contract No. W-7405-Eng-48 and was supported by the National Aeronautics and Space Administration under work order W19,878 issued by the Space Astrophysics Research and Analysis Program. M.F.G and S.M.K acknowledge the support by the NASA grant NAG5-5419.

*Kavli Institute for Particle Astrophysics and Cosmology, and Department of Physics, Stanford University, CA 94305, USA

†High Temperature and Astrophysics Division, Lawrence Livermore National Laboratory, Livermore, CA 94550-9234, USA