

DAMOP16-2016-000273

Abstract for an Invited Paper  
for the DAMOP16 Meeting of  
the American Physical Society

### **Astrophysics with Laboratory X-ray and EUV spectroscopy<sup>1</sup>**

PETER BEIERSDORFER, Lawrence Livermore National Laboratory

Improvements in the spectral resolution of x-ray observatories have necessitated increasing accuracies in the spectral models used in the analysis of astrophysical data. In response, we have been carrying out laboratory measurements to assess the fidelity of the atomic data used in the models and to calibrate specific spectral diagnostics. The goal is to meet the current need for spectroscopic models to be able to predict line intensities on the order of a few percent for the strongest transitions and to represent line positions with spectroscopic accuracy. Our spectroscopy measurements are performed in the extreme ultraviolet and x-ray regimes and are mostly carried out at the electron beam ion trap facility at Livermore, which produces the relevant ions in a density and temperature environment similar to those of astrophysical plasmas. Examples discussed in this talk fall into four categories. (1) The identification of lines seen in astrophysical spectra but missing in the models; (2) the establishment of benchmark wavelengths for K-shell transitions in M-shell ions and for L-shell transitions in L-shell ions needed for the interpretation of absorption line features; (3) the calibration of the line emission of key spectroscopic diagnostics, such as the L-shell lines of Fe XVII; (4) the disentanglement of line excitation processes, especially those associated with charge exchange, that produce x-ray emission from comets, planets, and the interstellar medium.

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by LLNL under Contract DE-AC52-07NA27344 and supported by NASA's Astrophysics Research and Analysis Program under contracts NNG14WF24I and NNG13WF99I.