Abstract Submitted
for the FWS17 Meeting of
The American Physical Society

Density Diagnostics for Solar Physics Using an Electron Beam Ion Trap[1] THUSITHA ARTHANAYAKA, Columbia Astrophysics Laboratory, New York, NY, PETER BEIERSDORFER, GREGORY BROWN, Lawrence Livermore National Laboratory, Livermore, CA., MICHAEL HAHN, DANIEL SAVIN, Columbia Astrophysics Laboratory, New York, NY — Our understanding of the physical conditions in the solar atmosphere hinges, in part, on an accurate determination of the electron density in the observed structures. For example, the electron density is needed to determine the energy flux in various solar regions and to understand the nature of these structures. Spectroscopic diagnostics can be used to infer the electron density, which is commonly measured by taking the intensity ratio of two spectral lines with different density sensitivities. However, spectroscopic density diagnostics can have large uncertainties. They depend sensitively on atomic collisional excitation, de-excitation, and radiative transition rates for multiple atomic levels. Essentially all of these data come from theory and little of the data have been experimentally validated. We are conducting laboratory experiments using the electron beam ion trap (EBIT) at Lawrence Livermore National Laboratory that will provide accurate empirical calibrations for commonly used spectroscopic density diagnostics and will help guide theoretical calculations.

[1]This work is supported by the NASA Heliophysics Technology and Instrument Development Program. Work at LLNL is performed under the auspices of the U.S. DoE under contract No. DE-AC52-07NA27344.

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Date submitted: 30 Sep 2017 Electronic form version 1.4