

Abstract Submitted  
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**Ascertaining HED Plasma Temperatures using Generalized Boltzmann Plots**<sup>1</sup> PAWEL KOZLOWSKI, HEATHER JOHNS, SUZANNAH WOOD, ANDY LIAO, Los Alamos National Laboratory, JOHN MORTON, COLIN BROWN, Atomic Weapons Establishment, CHRISTOPHER FRYER, CHRISTOPHER FONTES, JAMES COLGAN, HARRY ROBEY, DEREK SCHMIDT, THEODORE PERRY, TODD URBATSCH, Los Alamos National Laboratory — Assessing plasma state through temperature and density measurements is a standard problem in HED science, yet inferring temperature from spectroscopic diagnostics often relies on complex simulations coarsely fitted to experimental data. These forward analyses fold in assumptions that are difficult to disentangle when puzzling inconsistencies arise. To date, inverse analysis of HED spectra has been limited to the line ratio method, which can only analyze a pair of spectral lines. We demonstrate a generalization of Boltzmann plots to the HED regime to provide an alternative inverse analysis method for obtaining temperature from spectral measurements. Boltzmann plots analyze multiple lines simultaneously to statistically constrain temperature, and provide additional points of comparison for checking assumptions in simulations. We demonstrate this technique on x-ray absorption spectra of titanium measured on the COAX platform on Omega-60. LA-UR-20-24580.

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