

Abstract Submitted
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THE IRON PROJECT: High-Energy-Density (HED) Plasma Opacities and Diagnostics¹ YASIN GOKCE, Karamanoglu M University, T. BOSTELMANN, S. NAHAR, A. PRADHAN, Ohio State Univ - Columbus, J. BAILEY, Sandia Natl Lab — The composition of the Sun, the benchmark for astronomical objects, has been a longstanding problem for the last few decades. The abundances of common elements in the Sun, such as, carbon, nitrogen, oxygen, supported by helioseismology are at discrepant by up to 50% higher from those derived from state-of-the-art spectroscopy and elaborate 3-D radiative transfer models. The uncertainty is compounded by recent experiments at the Sandia National Laboratory on the Z-pinch inertial confinement fusion device which is able to re-create the HED plasma conditions existing at the solar radiative-convection zone boundary. Measured monochromatic iron opacities disagree with all known theoretical opacities models. The abundance problem and potential solution are related to radiative opacities. Our continued investigation of the problem will be presented. We will also present collision strengths of carbon-like silicon which shows new resonances in the low energy region introduced by relativistic effects in the Breit-Pauli R-matrix method. Line intensity ratios of this ion, obtained for optically allowed transitions as seen in astronomical spectra, are the diagnostics for the density and temperature of the plasmas will be reported.

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