Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

New Calculations for Plasma Opacities: Atomic Processes, Equation-of-State, and Astrophysical Models[1] ANIL PRADHAN, SULTANA NAHAR, LIANSHUI ZHAO, CHRIS ORBAN, Ohio State Univ - Columbus, WERNER EISSNER, Stuttgart U., REGNER TRAMPEDACH, Space Science Institute — Existing plasma opacities have been brought into question by recent experimental results from the Sandia Z-pinch facility and theoretical works [1,2]. Opacities calculations are complex and entail a nexus of fundamental issues in atomic physics, plasma physics and astrophysics. We report new calculations for iron ions, including ab initio treatment of autoionizing resonances and electron impact broadening for the first time, that result in significant opacity enhancements, as measured experimentally and required to reconcile solar abundances with helioseismic models. We discuss related issues of the equation-of-state in the "chemical picture" with realistic atomic description, perturbed by the plasma environment and dissolution of excited levels. We also note important astrophysical applications in stellar interior models and observable parameters.

1. J. Bailey, et al., Nature Lett. 517, 56 (2015)
2. S.N. Nahar and A.K. Pradhan, Phys. Rev. Lett. 116, 235003 (2016)

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Date submitted: 11 Apr 2017 Electronic form version 1.4