Abstract Submitted
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The Iron Project & The Opacity Project: 1. Photoionization of Fe ions for Opacities, 2. P II in exoplanetary environments[1] W. EISSNER[2], Stuttgart University, L. ZHAO, S. NAHAR, A. PRADHAN, The Ohio State University — 1. At the radiative and convection boundary in the Sun iron opacity depends on Fe XVII-Fe XIX. With the aim of resolving the outstanding discrepancy in theoretical solar iron opacity and measurements at the Sandia Z-pinch ICF device, large-scale calculations for photoionization cross sections and transition probabilities have been carried out using the Breit-Pauli R-Matrix (BPRM) method, including the heretofore neglected autoionization resonance features and resulting opacity enhancement. Fe XVII BPRM calculations include 218 coupled fine structure levels in the Fe XVIII target wavefunction expansion, and Fe XVIII calculations include 276 levels of Fe XIX. It is found that huge Seaton resonances due to photoexcitation-of-core (PEC) make the dominant contribution to bound-free opacity. Hitherto, these are among the most complex R-Matrix calculations. Convergence and completeness of coupled channel calculations is also addressed. 2. Phosphorus is one of the elements of DNA-based lifeforms. Its abundance in exoplanetary environments may indicate spectral biosignatures. We will report new BPRM calculations for collisional data for P II and predicted spectrum of P II in the wavelength region of interest.

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