

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

THE IRON PROJECT & THE RMAX PROJECT: Highly excited Core resonances in photoionization of Fe XVII and impact on plasma opacities, oscillator strengths of Fe XIV, and nebular abundance of O II¹

ANIL PRADHAN, Ohio State U, SULTANA NAHAR, Ohio State U., ETHAN PALAY, Ohio State U, WERNER EISSNER, Stuttgart U — The aims of the Iron Project and the Rmax Project are detailed study of radiative and collisional processes of astrophysically abundant atoms and ions, mainly iron and iron-peak elements, over a wide energy range, from infra-red to X-rays. We will illustrate the dominance of high energy photoexcitation-of-core (PEC) resonances in photoionization of Fe XVII due to strong coupling effects on dipole transition arrays $2p^5 \rightarrow 2p^4 (3s, 3d)$ in the core and examine PEC and non-PEC resonance strengths for their expanded role to incorporate inner-shell excitations for improved opacities. Comparisons show that the currently available cross sections from the Opacity Project are considerably underestimated. For Fe XIV, we present preliminary results from a large scale computation where 747 fine structure levels with $n \leq 10$, $l \leq 9$, and $0.5 \leq J \leq 9.5$, and 71,407 electric dipole allowed fine structure transitions have been obtained. We will also demonstrate the fine structure effects on the collision strengths and in very low energy photoionization for in nebular oxygen abundance.

¹Partial Supports: NSF, DOE

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Date submitted: 01 Feb 2011

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