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High Energy and Temperature Features in Photoionization and Electron-Ion Recombination of Fe XVII[1] SULTANA NAHAR, The Ohio State University, A. PRADHAN, The Ohio State U, W. EISSNER, Stuttgart U — A comprehensive study of high-accuracy photoionization cross sections is carried out using the relativistic Breit-Pauli R-matrix method for (hν + Fe XVII $\rightarrow$ Fe XVIII + e). Owing to its importance in high-temperature plasmas, the calculations cover a large energy range to include core excitations of $n = 2$ and $n = 3$ complexes. This allows opening up the myriad of photoexciation-of-core (PEC) resonances belonging to the $n = 3$ levels not heretofore considered. The cross sections reveal extended PEC resonances enhancing their effective values by orders of magnitude above the background. The close coupling wave function expansion of 60 core levels correspond to a wide energy separation of $\sim$65 Ry between the $n = 2$ and $n = 3$ complexes. Yet, the high-lying $n = 3$ levels introduce resonant structures extending from much lower to higher energies, and are far larger than those due to n=2 excitations. Comparisons with the Opacity Project data, and other calculations, show that the currently available cross sections severely underestimated. The total electron-ion recombination rate coefficients obtained using these cross sections reveal a dominant broad peak at high temperature.

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