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X-ray Absorption of Atomic Si at the K-edge and Atomic Fe at the L-edge[1] TOM GORCZYCA, Western Michigan University, M. FATIH HASOGLU, Hasan Kalyoncu University — Large-scale R-matrix calculations are performed in order to compute the photoabsorption cross sections for the complicated third-row atomic Si and Fe systems. Calculations are carried out first for atomic Si near the 1.85 K-edge threshold. An atomic photoabsorption cross section is needed for Si to better understand the observed near-threshold Chandra x-ray spectrum absorption in the interstellar medium (ISM). Predominantly condensed-matter Si absorption is observed, but the abundance of atomic silicon and its absorption effect is unknown. Calculations are also carried out for atomic Fe photoabsorption near the fine-structure split 2p-vacancy L-edge thresholds (707 eV and 720 eV). Reliable cross sections for this region therefore require a semi-relativistic Breit-Pauli R-matrix calculation, although non-relativistic calculations, plus a LS-JK frame transformation, yield meaningful results as well. The Si and Fe abundances in the ISM are usually assumed to be in the condensed matter state (ice, dust, etc.), and only condensed-matter absorption experiments have been carried out for either of these elements, necessitating a theoretical approach, such as the present R-matrix method, to investigate atomic absorption in the ISM.

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