Abstract Submitted
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Electron-impact excitation cross sections for Fe I.[1] KEDONG WANG, Henan Normal University, OLEG ZATSARINNY, KLAUS BARTSCHAT, Drake University — Calculations are reported for electron collision strengths, rate coefficients, and transitions probabilities for a wide range of transitions in Fe I. The collision strengths were calculated using the B-spline Breit-Pauli R-matrix approach [1]. The MCHF method in connection with adjustable configuration expansions and a semi-empirical fine-tuning procedure was employed to accurately represent the target wavefunctions. The close-coupling expansion contained 221 LS states of Fe I, including all levels of the $3d^6 4s^2$, $3d^7 4s$, $3d^8$, $3d^6 4s 4p$, and $3d^7 4p$ configurations. Effective collision strengths were obtained by averaging the electron collision strengths over Maxwellian speed distributions at electron temperatures from 10^2 to 10^5 K. The tabulated results for 24,531 transitions between all the above LS terms considerably expand the few existing, sparse datasets for Fe I. They allow a more detailed analysis of the measured spectra from various space observatories and the nonlocal thermodynamic equilibrium modeling of late-type stars [2], for which large amounts of collisional data for the atomic species of interest are required. [1] O. Zatsarinny, Comp. Phys. Commun. **174** (2006) 273. [2] P. S. Barklem, A&A **24** (2016) 9.

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