

ALLOWED AND FORBIDDEN TRANSITIONS IN FE XIX

Sultana N. Nahar

Dept of Astronomy, The Ohio State University, Columbus, OH 43210

Email: nahar@astronomy.ohio-state.edu

Oscillator strengths (f), line strengths (S) and radiative decay rates (A) for the allowed and forbidden transitions in Fe XIX are presented. They correspond to 1627 fine structure levels of total angular momenta J from 0 - 7 even and 0 to 8 of odd parities with $2 \leq n \leq 10$, $0 \leq l \leq 9$, orbital angular momenta, $0 \leq L \leq 10$, and spin multiplicities 1, 3, 5. A total of 337,501 transitions are considered, of which 288,684 are electric dipole ones and 48,807 are forbidden ones. The allowed electric dipole (E1) transitions are obtained in the close coupling (CC) approximation using relativistic Breit-Pauli R-matrix (BPRM) method. The wavefunction expansion consists of 15 levels of configurations $2s^2 2p^3$, $2s 2p^4$, and $2p^5$ of core Fe XX. All fine structure levels have been identified spectroscopically. Comparison of the present energies with the available observed energies shows very good agreement.

The forbidden electric quadrupole (E2), octupole (E3), and magnetic dipole (M1), quadrupole (M2) transitions are among the 281 levels of configurations $2s^2 2p^4$, $2s 2p^5$, $2p^6$, $2s^2 2p^3 3s$, $2s^2 2p^3 3p$, $2s^2 2p^3 3d$, $2s^2 2p^3 4s$, $2s^2 2p^3 4p$, $2s^2 2p^3 4d$, $2s 2p^4 3s$, $2s 2p^4 3p$, $2s 2p^4 3d$, and $2s^2 2p^2 3s^2$ of Fe XIX. The radiative decay rates of the forbidden transitions are obtained from relativistic Breit-Pauli atomic structure calculations using SUPERSTRUCTURE. All results are being analysed.