P02

Precise relativistic calculation of atomic data for helium-like Iron (Fe^{24+}): atomic structure and collision by electron impact

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We present a theoretical contribution to the study of the atomic structure and the collisional excitation process by electron impact (EIE) of the Fe^{+24} ion. This ion is selected regarding its capital interest in nuclear fusion. Our relativistic radiative and collisional properties have been calculted using Dirac-Fock-Slater (DFS) and Distreded waves (DW) both implemented in the FAC code. We started our study by calculating the lowest 71 energy levels belonging to the configuration $1s^2$ and $1snl$ with n varies from 1 up to 6. Breit and QED type corrections have been considered in our calculations. Our findings have been compared with NIST data and found to be in good agreement. Collisions strength values, for the first transitions between the ground level $^1S_0$ and excited levels $^3S_1$, $^1S_0$, $^3P_{0,1,2}$ and $^1P_1$, have been calculated and this for a series of incident energy between 0 and 20000 eV. We also carried out calculations of effective collision strengths and excitation rate for the same selected transitions, with chosen electronic temperature covering: 107.72, 268.86, 605.8, 1077.2, 1361.5, 2688.6 and 3033.3 eV. Our funding have been compared against those calculated by are made with other references and gives compatibility between the values compiled by Aggrawal et al [1] and Honglin Zhang et al [2].

[1] A.Kanti M Aggarwal a, B. Francis P Keenan. , Physica Scripta. **87(5):055302**, 1357 (app2013).

[2] A. Honglin Zhang , B. Douglas H. Sampson, Astrophysical Journal Supplement Series. **487–514**, 7531 (1987).