Semi-empirical studies of atomic transition probabilities, oscillator strengths and radiative lifetimes in Hf II

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Over the past few years, laser induced fluorescence and Fourier Transform techniques have been applied to measure radiative lifetimes and branching fractions in Hf II in order to derive oscillator strengths and transition probabilities [1,2]. In the present work, we propose to compare for the first time these experimental data to computed values obtained by two different semi-empirical approaches, respectively based on a parametrization of the oscillator strengths [3] and on a pseudo-relativistic Hartree-Fock model [4] including core-polarization effects [5]. The overall agreement between all sets of data is found to be good. We furthermore give radial integrals of the main atomic transitions in this study : $< 5d6s6p|r^1|5d^26s >$ = 0.1504 (0.0064), $< 6s^26p|r^1|5d6s^2 >$ = 1.299 (0.012), $< 5d^26p|r^1|5d^26s >$ = -0.298 (0.013), $< 5d^26p|r^1|5d^3 >$ = 2.025 (0.027). Finally a new set of oscillator strengths and transition probabilities is reported for many transitions in Hf II.

References

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