Recent Progress in the Determination of Radiative Data for Lowly Charged Tungsten Ions (W I – W VI) of Interest in Fusion Research

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Abstract. A large amount of new radiative decay rates have recently been obtained for allowed (E1) and forbidden (M1, E2) transitions in tungsten ions from W I to W VI. Our calculations, motivated by strong interest for low-density plasmas and fusion research, illustrate in a convincing way the importance of core-valence correlation effects which substantially increase the lifetimes and, accordingly, decrease the transition probabilities of these heavy ions. The reliability of the theoretical *A*-values has been tested by comparison of numerical results obtained with independent methods such as the relativistic Hartree-Fock (HFR) approach including core-polarization corrections (HFR+CPOL), multiconfiguration Dirac-Fock (MCDF) method and the Flexible Atomic Code (FAC) well suited for investigationg the atomic structure of heavy ions. For W I, W II and W III, our theoretical results have also been compared with available experimental lifetimes measured by laser spectroscopy. From detailed comparisons between these different approaches, it has been shown that some line strengths are particularly sensitive to level mixings which are expected to be better estimated when using semi-empirical methods. The new sets of radiative data obtained in the present work are stored in the DESIRE atomic database (http://w3.umons.ac.be/astro/desire.shtml).