VIII SERBIAN CONFERENCE ON SPECTRAL LINE SHAPES IN ASTROPHYSICS
6-10 June 2011, Divčibare, Serbia
Book of Abstracts, Eds. L. Č. Popović, D. Jevremović and D. Ilić
Astronomical Observatory Belgrade, 2011

Progress report

AB INITIO DETERMINATION OF ATOMIC STRUCTURE AND STARK BROADENING PARAMETERS: Pb IV AND RECENT RESULTS

R. Hamdi[1], N. Ben Nessib[1], M. S. Dimitrijević[2,3] and S. Sahal-Bréchot[3]

[1] *Groupe de Recherche en Physique Atomique et Astrophysique, Institut National des Sciences Appliquées et de Technologie, Centre Urbain Nord B. P. No. 676, 1080 Tunis Cedex, Tunisia*
[2] *Astronomical observatory, Volgina 7, 11160 Belgrade, Serbia*
[3] *Laboratoire d'Étude du Rayonnement et de la Matière en Astrophysique, UMR CNRS 8112, Observatoire de Paris-Meudon, 92195 Meudon, France*

E-mail: hamdi.rafik@gmail.com

In this work, we present a review of our previous ab initio calculations of Stark broadening parameters. Those results are determined using semi-classical perturbation method for Stark width and shift calculations and SUPERSTRUCURE (SST) code for determination of atomic structure. SST code takes into account configuration interaction and relativistic effects are introduced as perturbation of the non-relativistic Hamiltonian.

Triply ionized lead (Pb IV) is characterized by a strong resonance lines and it is a candidate for spectroscopic detection in hot DA white dwarfs. Pb IV resonance lines are also detected in photospheres of subdwarfs stars.

New results are also presented for some spectral lines of Pb IV of the type $5d^{10}nl$ - $5d^{10}n'l'$. Energy levels and oscillator strengths are calculated using Hartree-Fock Relativistic approach (HFR) and Stark broadening parameters are determined using semi-classical perturbation approach. Stark widths and shifts are presented as a function of temperature for perturber density of 10^{17} cm^{-3}. Such data are important for laboratory and technological plasmas and also for modelling and spectral diagnostics of stellar atmospheres.