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Program and Abstracts

Short talk

ELECTRON IMPACT BROADENING OF MULTICHARGED NEON SPECTRAL LINES

HAYKEL ELABIDI[1], NÉBIL BEN NESSIB[1] and MILAN S. DIMITRIJEVIĆ[2]

[1] *Groupe de Recherche en Physique Atomique et Astrophysique, Faculté des Sciences de Bizerte, 7021 Zarzouna, Tunisia*

[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*

E–mail: haykel.elabidi@edunet.tn

E–mail: haykel_e@yahoo.fr

Stellar and laboratory plasma diagnostic, atomic abundances, opacity calculations, all have led to a need for knowledge about Stark broadening of multicharged ion spectral lines. Sophisticated quantum-mechanical and semiclassical methods (Griem 1974) exist, but they often require a considerable labor even for the evaluation of a single line width. Moreover, when quick estimate is needed, the approximate approaches may be very useful.

One such approximate method is the modified (Dimitrijević and Konjević 1980, 1981) semi-empirical (Griem 1968) formula suitable for singly as well as for multiply charged ion lines, based on the Gaunt factor approximation for inelastic cross sections (Griem 1968). Since the Gaunt factor is proportional to the collision strength, it is of interest to use the collision strength data in the modified semi-empirical formula (Dimitrijević and Konjević 1980) in order to obtain more accurate results.

In this work, instead of the semi-empirical Gaunt factor used in Dimitrijević and Konjević (1980, 1981), more accurate electron impact excitation collision strengths, obtained in the distorted wave approximation in LS coupling, were used. We note also that we take into account the elastic collision contribution to the width by calculating the collision strengths at the threshold energy and extrapolating them below the threshold as in Griem (1968) and, Dimitrijević and Konjević (1980). It has been shown that the elastic contribution to the line width becomes less important with the increase in temperature (Ralchenko et al. 1999).

We have applied this method to the calculation of Stark line widths of two ions, Ne VII and Ne VIII. The comparison with experiments and other theoretical approaches indicates that this method can be used successfully for Stark line width calculations.

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