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STARK BROADENING OF S VI LINES

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1. INTRODUCTION

The aim of this paper is to investigate Stark broadening of S VI line and to provide the corresponding Stark broadening data needed in astrophysics. By using the semiclassical-perturbation formalism (Sahal-Bréchot 1969ab), we have calculated electron-, proton-, and He III -impact line widths and shifts for 21 S VI multiplets . A summary of the formalism is given in Dimitrijević et al (1991). The complete results will be published elsewhere (Dimitrijević and Sahal-Bréchot 1993). Here, we present a sample of obtained results and discuss the results for S VI multiplets of interest for stellar plasma research. Moore (1950) e.g., gives a list of first five S VI multiplets in far UV to be of interest for astrophysics, and Seaton (1987) discuss the interest of Stark broadening data of spectral lines of multicharged ions for stellar opacities research.

2. RESULTS AND DISCUSSION

Energy levels for S VI lines have been taken from Joelsson, Zetterberg and Magnusson (1979). Oscillator strengths have been calculated by using the method of Bates and Damgaard (1949) and the tables of Oertel and Shomo (1968). For higher levels, the method described by Van Regemorter et al. (1979) has been used.

In addition to electron-impact full halfwidths and shifts, Stark-broadening parameters due to proton-, and He III- impacts have been calculated. A sample of our results for Stark broadening parameters of S VI multiplets are shown in Table 1, for perturber densities 10^{17} cm^{-3} and temperatures T = 100,000 - 800,000 K. We also specify a parameter c (Dimitrijević and Sahal-Bréchot 1984), which gives an estimate for the maximum perturber density for which the line may be treated as isolated when it is divided by the corresponding electron-impact full width at half maximum. For each value given in Table 1, the collision volume (V) multiplied by the perturber density (N) is much less than one and the impact approximation is valid (Sahal-Bréchot, 1969ab). The accuracy of the results obtained decreases when broadening by ion interact ions becomes important.

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Table 1. Stark broadening widths (FWHM) and shifts for S VI. The parameter c devided with the corresponding electron-impact width(FWHM), gives an estimate for the highest density for which the line may be treated as isolated and tabulated data may be used.

PERTURBER DENSITY = 0.1E+18 cm-3

PERTURBERS ARE:		ELECTRONS		PROTONS	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
S VI 3S-3P	100000.	0.276E-02	-0.431E-04	0.434E-04	-0.212E-04
937.1 A	200000.	0.199E-02	-0.316E-04	0.868E-04	-0.391E-04
C=0.94E+20	400000.	0.149E-02	-0.462E-04	0.134E-03	-0.615E-04
	800000.	0.115E-02	-0.411E-04	0.176E-03	-0.845E-04
S VI 3S-4P	100000.	0.506E-03	0.747E-05	0.299E-04	0.451E-05
249.1 A	200000.	0.379E-03	0.727E-05	0.428E-04	0.758E-05
C=0.24E+19	400000.	0.295E-03	0.761E-05	0.511E-04	0.107E-04
	800000.	0.239E-03	0.716E-05	0.578E-04	0.135E-04
S VI 3S-5P	100000.	0.662E-03	0.178E-04	0.704E-04	0.155E-04
191.5 A	200000.	0.523E-03	0.236E-04	0.844E-04	0.215E-04
C=0.66E+18	400000.	0.427E-03	0.208E-04	0.956E-04	0.268E-04
	800000.	0.358E-03	0.200E-04	0.104E-03	0.324E-04
S VI 4S-4P	100000.	0.707E-01	-0.152E-02	0.341E-02	-0.164E-02
2598.4 A	200000.	0.539E-01	-0.218E-02	0.494E-02	-0.240E-02
C=0.26E+21	400000.	0.427E-01	-0.196E-02	0.606E-02	-0.315E-02
	800000.	0.349E-01	-0.188E-02	0.702E-02	-0.380E-02
S VI 4S-5P	100000.	0.800E-02	0.526E-04	0.752E-03	0.636E-04
628.2 A	200000.	0.634E-02	0.794E-04	0.898E-03	0.967E-04
C=0.71E+19	400000.	0.520E-02	0.598E-04	0.101E-02	0.133E-03
	800000.	0.437E-02	0.596E-04	0.111E-02	0.159E-03
S VI 5S-5P	100000.	0.812	-0.355E-01	0.631E-01	-0.331E-01
5536.1 A	200000.	0.649	-0.334E-01	0.780E-01	-0.429E-01
C=0.55E+21	400000.	0.535	-0.328E-01	0.908E-01	-0.516E-01
	800000.	0.451	-0.304E-01	0.103	-0.620E-01
S VI 3P-4S	100000.	0.856E-03	0.613E-04	0.243E-04	0.483E-04
390.2 A	200000.	0.644E-03	0.731E-04	0.499E-04	0.688E-04
C=0.59E+19	400000.	0.503E-03	0.712E-04	0.823E-04	0.872E-04
	800000.	0.404E-03	0.672E-04	0.108E-03	0.106E-03
S VI 3P-5S	100000.	0.789E-03	0.111E-03	0.572E-04	0.854E-04
251.6 A	200000.	0.614E-03	0.114E-03	0.962E-04	0.107E-03
C=0.11E+19	400000.	0.492E-03	0.108E-03	0.128E-03	0.130E-03
	800000.	0.403E-03	0.101E-03	0.161E-03	0.153E-03

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