Serb. Astron. J. № 158 (l998), 93 – 101 **UDC 52−355.3**
Preliminary report

STARK BROADENING PARAMETER TABLES FOR F VI AND Cl VII

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(Received: June 1, 1998)

SUMMARY: Using a semiclassical approach, we have calculated electron−, proton−, and He III−impact line widths and shifts for 2 F VI and 10 Cl VII multiplets as a function of temperature and perturber density.

1. INTRODUCTION

Spectral lines of chlorine and fluorine are present in Solar (Moore *et al.* 1966), as well as in stellar spectra (Merrill, 1956). Trimble (1991) reports, that chlorine and fluorine have been found in the ejecta of SN 1987 A supernova. Fluorine is a product of hydrogen burning in stellar interiors and envelopes, and chlorine a product of alpha processes - neutron capture on slow time scale. In accordance with this, the corresponding data on the spectral line broadening parameters of fluorine and chlorine in various ionization stages are of significance for the investigation and modelling of stellar plasma, particularly for subphotospheric layers research (Seaton, 1987) and radiative transfer in stellar interiors. For the investigation and developing of soft X-ray lasers, such data may be useful as well (see e.g. Griem and Moreno, 1990; Fill and Schöning, 1994). Line broadening data for multiply charged ions are as well of importance for the investigation of Stark broadening parameter systematic trends along isoelectronic sequences.

In order to continue our project to provide an as much as possible large set of reliable Stark broadening data needed for the consideration and modeling of astrophysical, laboratory, laser produced and fusion plasmas, we have calculated within the semiclassical-perturbation formalism (Sahal−Bréchot 1969ab, see also Sahal−Bréchot, 1974, Fleurier *et al.* 1977, Dimitrijević and Sahal−Bréchot, 1984, Dimitrijević *et al.* 1991, Dimitrijević and Sahal−Bréchot, 1995) electron-, proton-, and He III-impact line widths and shifts for 2 F VI and 10 Cl VII multiplets. The used formalism has been reviewed briefly in Dimitrijević and Sahal−Bréchot, 1995.

Table 1. This table shows electron-, proton-, and He III-impact broadening parameters for F VI for perturber densities of 10^{18} − 10^{22} cm^{-3} and temperatures from 100,000 up to 2,000,000 K. Stark broadening parameters for densities lower than tabulated, are linear with perturber density. Transitions and averaged wavelengths for the multiplet (in Å) are also given in the Table. By dividing C by the corresponding full width at half maximum (Dimitrijević *et al.* 1991), we obtain an estimate for the maximum perturber density for which the line may be treated as isolated and tabulated data may be used. The asterisk identifies cases for which the collision volume multiplied by the perturber density (the condition for validity of the impact approximation) lies between 0.1 and 0.5.

PERTURBER DENSITY = 1.E+18cm^{-3}							
PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
F VI 2S 2P	100000.	0.322E-02	-0.307E-04	0.117E-04	-0.187E-04	0.219E-04	-0.362E-04
535.2 Å	200000.	0.229E-02	-0.545E-04	0.322E-04	-0.376E-04	0.610E-04	-0.747E-04
C = 0.54E+21	500000.	0.149E-02	-0.600E-04	0.899E-04	-0.781E-04	0.174E-03	-0.157E-03
	1000000,	0.111E-02	-0.608E-04	0.142E-03	-0.112E-03	0.280E-03	-0.227E-03
	1500000,	0.953E-03	-0.574E-04	0.175E-03	-0.133E-03	0.349E-03	-0.271E-03
	2000000,	0.859E-03	-0.568E-04	0.190E-03	-0.142E-03	0.379E-03	-0.291E-03
F VI 2P 3S	100000.	0.927E-03	0.662E-04	0.280E-04	0.715E-04	0.550E-04	0.138E-03
173.1 Å	200000.	0.699E-03	0.840E-04	0.667E-04	0.107E-03	0.135E-03	0.213E-03
C = 0.70E+19	500000.	0.500E-03	0.786E-04	0.136E-03	0.149E-03	0.274E-03	0.304E-03
	1000000,	0.397E-03	0.749E-04	0.185E-03	0.180E-03	0.360E-03	0.366E-03
	1500000,	0.349E-03	0.671E-04	0.218E-03	0.199E-03	0.412E-03	0.405E-03
	2000000,	0.319E-03	0.619E-04	0.238E-03	0.210E-03	0.460E-03	0.427E-03
PERTURBER DENSITY = 1.E+19cm^{-3}							
F VI 2S 2P	100000.	0.322E-01	-0.329E-03	0.117E-03	-0.174E-03	0.216E-03	-0.318E-03
535.2 Å	200000.	0.229E-01	-0.549E-03	0.322E-03	-0.366E-03	0.608E-03	-0.705E-03
C = 0.54E+22	500000.	0.149E-01	-0.586E-03	0.899E-03	-0.780E-03	0.174E-02	-0.156E-02
	1000000,	0.111E-01	-0.608E-03	0.142E-02	-0.112E-02	0.280E-02	-0.226E-02
	1500000,	0.953E-02	-0.574E-03	0.175E-02	-0.133E-02	0.349E-02	-0.270E-02
	2000000,	0.859E-02	-0.567E-03	0.190E-02	-0.142E-02	0.379E-02	-0.291E-02
F VI 2P 3S	100000.	0.928E-02	0.613E-03	0.279E-03	0.655E-03	0.551E-03	0.118E-02
173.1 Å	200000.	0.699E-02	0.795E-03	0.667E-03	0.102E-02	0.134E-02	0.195E-02
C = 0.70E+20	500000.	0.500E-02	0.760E-03	0.136E-02	0.149E-02	0.274E-02	0.297E-02
	1000000,	0.397E-02	0.736E-03	0.185E-02	0.180E-02	0.360E-02	0.364E-02
	1500000,	0.349E-02	0.670E-03	0.218E-02	0.199E-02	0.412E-02	0.404E-02
	2000000,	0.319E-02	0.617E-03	0.238E-02	0.210E-02	0.460E-02	0.427E-02
PERTURBER DENSITY = 1.E+20cm^{-3}							
F VI 2S 2P	100000.	0.322	-0.319E-02	0.113E-02	-0.141E-02	0.184E-02	-0.200E-02
535.2 Å	200000.	0.229	-0.516E-02	0.320E-02	-0.337E-02	0.598E-02	-0.606E-02
C = 0.54E+23	500000.	0.149	-0.571E-02	0.899E-02	-0.768E-02	0.174E-01	-0.148E-01
	1000000,	0.111	-0.596E-02	0.142E-01	-0.112E-01	0.280E-01	-0.223E-01
	1500000,	0.953E-01	-0.567E-02	0.175E-01	-0.133E-01	0.349E-01	-0.270E-01
	2000000,	0.859E-01	-0.562E-02	0.190E-01	-0.142E-01	0.379E-01	-0.290E-01
F VI 2P 3S	100000.	0.927E-01	0.408E-02	0.278E-02	0.504E-02		
173.1 Å	200000.	0.699E-01	0.652E-02	0.667E-02	0.891E-02		
C = 0.70E+21	500000.	0.500E-01	0.666E-02	0.136E-01	0.143E-01		
	1000000,	0.397E-01	0.678E-02	0.185E-01	0.179E-01	*0.359E-01	*0.349E-01
	1500000,	0.349E-01	0.636E-02	0.218E-01	0.198E-01	*0.412E-01	*0.401E-01
	2000000,	0.319E-01	0.588E-02	0.238E-01	0.209E-01	*0.460E-01	*0.424E-01
PERTURBER DENSITY = 1.E+21cm^{-3}							
F VI 2S 2P	100000.	3.22	-0.162E-01	0.867E-02	-0.713E-02	*0.831E-02	-0.495E-02
535.2 Å	200000.	2.29	-0.416E-01	0.307E-01	-0.264E-01	*0.500E-01	-0.362E-01
C = 0.54E+24	500000.	1.49	-0.510E-01	0.894E-01	-0.703E-01	*0.171	-0.127
	1000000,	1.11	-0.551E-01	0.141	-0.107	*0.279	-0.204
	1500000,	0.953	-0.525E-01	0.175	-0.130	*0.348	-0.255
	2000000,	0.859	-0.533E-01	0.190	-0.142	*0.379	-0.283
F VI 2P 3S	100000.	*0.882	-0.410E-01				
173.1 Å	200000.	0.677	0.148E-01				
C = 0.70E+22	500000.	0.488	0.369E-01				
	1000000,	0.389	0.460E-01				
	1500000,	0.342	0.443E-01				
	2000000,	0.313	0.445E-01				

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
PERTURBER DENSITY = 1.E+22cm^{-3}							
F VI 2S 2P	100000.						
535.2 Å	200000.	*22.9	-0.124E-01	*0.219	-0.117		
C = 0.54E+25	500000.	14.9	-0.302	*0.861	-0.552		
	1000000,	11.1	-0.410	*1.40	-0.941		
	1500000,	9.53	-0.414	*1.74	-1.20		
	2000000,	8.59	-0.428	1.89	-1.31		
F VI 2P 3S	100000.						
173.1 Å	200000.	*4.68	-0.664				
C = 0.70E+23	500000.	*3.84	-0.165				
	1000000,	3.21	0.770E-01				
	1500000,	2.88	0.125				
	2000000,	2.67	0.148				

Table 2. Same as in the Table 1 but for Cl VII.

PERTURBER DENSITY = 1.E+18cm^{-3}

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Cl VII 3S 3P	100000.	0.183E-01	-0.168E-03	0.150E-03	-0.936E-04	0.290E-03	-0.180E-03
804.8 AA	200000.	0.131E-01	-0.217E-03	0.351E-03	-0.185E-03	0.683E-03	-0.368E-03
C = 0.80E+21	500000.	0.879E-02	-0.265E-03	0.711E-03	-0.367E-03	0.141E-02	-0.739E-03
	1000000.	0.674E-02	-0.237E-03	0.997E-03	-0.510E-03	0.198E-02	-0.103E-02
	1500000.	0.586E-02	-0.234E-03	0.110E-02	-0.585E-03	0.218E-02	-0.119E-02
	2000000.	0.534E-02	-0.227E-03	0.117E-02	-0.633E-03	0.234E-02	-0.128E-02
Cl VII 3S 4P	100000.	0.277E-02	0.273E-04	0.103E-03	0.141E-04	0.200E-03	0.271E-04
196.2 AA	200000.	0.204E-02	0.218E-04	0.165E-03	0.264E-04	0.326E-03	0.527E-04
C = 0.18E+20	500000.	0.143E-02	0.302E-04	0.235E-03	0.456E-04	0.468E-03	0.918E-04
	1000000.	0.114E-02	0.283E-04	0.267E-03	0.609E-04	0.531E-03	0.123E-03
	1500000.	0.102E-02	0.268E-04	0.286E-03	0.678E-04	0.567E-03	0.137E-03
	2000000.	0.942E-03	0.272E-04	0.299E-03	0.727E-04	0.589E-03	0.147E-03
Cl VII 4S 4P	100000.	0.435	-0.900E-02	0.133E-01	-0.706E-02	0.261E-01	-0.136E-01
2190.4 AA	200000.	0.324	-0.103E-01	0.217E-01	-0.116E-01	0.430E-01	-0.232E-01
C = 0.22E+22	500000.	0.233	-0.995E-02	0.320E-01	-0.176E-01	0.639E-01	-0.356E-01
	1000000.	0.188	-0.962E-02	0.377E-01	-0.212E-01	0.750E-01	-0.428E-01
	1500000.	0.168	-0.940E-02	0.413E-01	-0.234E-01	0.820E-01	-0.474E-01
	2000000.	0.156	-0.863E-02	0.441E-01	-0.251E-01	0.862E-01	-0.507E-01
Cl VII 3P 4S	100000.	0.416E-02	0.250E-03	0.638E-04	0.164E-03	0.125E-03	0.316E-03
294.3 AA	200000.	0.308E-02	0.265E-03	0.170E-03	0.262E-03	0.338E-03	0.524E-03
C = 0.40E+20	500000.	0.218E-02	0.284E-03	0.352E-03	0.388E-03	0.706E-03	0.785E-03
	1000000.	0.174E-02	0.269E-03	0.466E-03	0.464E-03	0.942E-03	0.939E-03
	1500000.	0.154E-02	0.262E-03	0.536E-03	0.515E-03	0.108E-02	0.104E-02
	2000000.	0.141E-02	0.248E-03	0.598E-03	0.549E-03	0.119E-02	0.112E-02
Cl VII 3P 3D	100000.	0.114E-01	-0.446E-04	0.172E-03	-0.160E-04	0.333E-03	-0.308E-04
602.6 AA	200000.	0.814E-02	-0.453E-04	0.359E-03	-0.326E-04	0.703E-03	-0.649E-04
C = 0.45E+21	500000.	0.543E-02	-0.484E-04	0.641E-03	-0.732E-04	0.126E-02	-0.147E-03
	1000000.	0.416E-02	-0.383E-04	0.807E-03	-0.112E-03	0.161E-02	-0.225E-03
	1500000.	0.363E-02	-0.405E-04	0.872E-03	-0.136E-03	0.174E-02	-0.274E-03
	2000000.	0.332E-02	-0.396E-04	0.915E-03	-0.153E-03	0.182E-02	-0.310E-03
Cl VII 3P 4D	100000.	0.403E-02	0.807E-04	0.159E-03	0.124E-03	0.312E-03	0.237E-03
224.8 AA	200000.	0.302E-02	0.962E-04	0.263E-03	0.190E-03	0.519E-03	0.381E-03
C = 0.75E+19	500000.	0.214E-02	0.858E-04	0.402E-03	0.276E-03	0.791E-03	0.558E-03
	1000000.	0.172E-02	0.775E-04	0.499E-03	0.333E-03	0.960E-03	0.673E-03
	1500000.	0.153E-02	0.664E-04	0.564E-03	0.369E-03	0.105E-02	0.742E-03
	2000000.	0.141E-02	0.581E-04	0.620E-03	0.395E-03	0.112E-02	0.797E-03
Cl VII 4P 4D	100000.	0.311	0.178E-02	0.145E-01	0.579E-02	0.283E-01	0.111E-01
1680.4 AA	200000.	0.234	0.283E-02	0.217E-01	0.912E-02	0.428E-01	0.182E-01
C = 0.42E+21	500000.	0.169	0.143E-02	0.293E-01	0.134E-01	0.576E-01	0.272E-01
	1000000.	0.137	0.122E-02	0.345E-01	0.162E-01	0.665E-01	0.326E-01
	1500000.	0.123	0.723E-03	0.379E-01	0.179E-01	0.715E-01	0.363E-01
	2000000.	0.114	0.262E-03	0.404E-01	0.192E-01	0.743E-01	0.387E-01
Cl VII 3D 4P	100000.	0.149E-01	0.228E-03	0.610E-03	0.114E-03	0.119E-02	0.218E-03
455.7 AA	200000.	0.110E-01	0.214E-03	0.966E-03	0.205E-03	0.191E-02	0.408E-03
C = 0.95E+20	500000.	0.772E-02	0.276E-03	0.136E-02	0.344E-03	0.271E-02	0.693E-03
	1000000.	0.617E-02	0.251E-03	0.155E-02	0.436E-03	0.309E-02	0.881E-03
	1500000.	0.550E-02	0.243E-03	0.166E-02	0.487E-03	0.330E-02	0.988E-03
	2000000.	0.510E-02	0.242E-03	0.173E-02	0.526E-03	0.342E-02	0.106E-02
Cl VII 3D 4F	100000.	0.717E-02	-0.893E-04	0.243E-03	-0.203E-03	0.476E-03	-0.389E-03
340.3 AA	200000.	0.529E-02	-0.813E-04	0.429E-03	-0.327E-03	0.851E-03	-0.653E-03
C = 0.17E+20	500000.	0.371E-02	-0.504E-04	0.696E-03	-0.487E-03	0.137E-02	-0.985E-03
	1000000.	0.295E-02	-0.496E-04	0.876E-03	-0.584E-03	0.165E-02	-0.118E-02
	1500000.	0.262E-02	-0.305E-04	0.997E-03	-0.646E-03	0.183E-02	-0.131E-02
	2000000.	0.242E-02	-0.189E-04	0.111E-02	-0.700E-03	0.196E-02	-0.140E-02
Cl VII 4D 4F	100000.	4.61	-0.112	0.213	-0.175	0.418	-0.334
6699.3 AA	200000.	3.47	-0.123	0.339	-0.259	0.670	-0.516
C = 0.67E+22	500000.	2.50	-0.102	0.499	-0.359	0.978	-0.725
	1000000.	2.03	-0.928E-01	0.621	-0.429	1.17	-0.864
	1500000.	1.81	-0.758E-01	0.714	-0.476	1.29	-0.957
	2000000.	1.68	-0.638E-01	0.771	-0.501	1.37	-1.01

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
PERTURBER DENSITY = 1.E+19m^{-3}							
Cl VII 3S 3P	100000.	0.183	-0.160E-02	0.149E-02	-0.859E-03	0.284E-02	-0.153E-02
804.8 AA	200000.	0.131	-0.211E-02	0.350E-02	-0.180E-02	0.680E-02	-0.343E-02
C = 0.80E+22	500000.	0.879E-01	-0.262E-02	0.711E-02	-0.366E-02	0.141E-01	-0.729E-02
	1000000.	0.674E-01	-0.236E-02	0.997E-02	-0.510E-02	0.198E-01	-0.103E-01
	1500000.	0.586E-01	-0.234E-02	0.110E-01	-0.585E-02	0.218E-01	-0.118E-01
	2000000.	0.534E-01	-0.227E-02	0.117E-01	-0.633E-02	0.234E-01	-0.128E-01
Cl VII 3S 4P	100000.	0.277E-01	0.264E-03	0.102E-02	0.129E-03	0.195E-02	0.231E-03
196.2 AA	200000.	0.204E-01	0.211E-03	0.165E-02	0.256E-03	0.323E-02	0.489E-03
C = 0.18E+21	500000.	0.143E-01	0.297E-03	0.235E-02	0.455E-03	0.468E-02	0.904E-03
	1000000.	0.114E-01	0.280E-03	0.267E-02	0.608E-03	0.531E-02	0.123E-02
	1500000.	0.102E-01	0.268E-03	0.286E-02	0.678E-03	0.567E-02	0.137E-02
	2000000.	0.942E-02	0.271E-03	0.299E-02	0.727E-03	0.589E-02	0.147E-02
Cl VII 4S 4P	100000.	4.35	-0.842E-01	0.132	-0.643E-01	*0.254	-0.114
2190.4 AA	200000.	3.24	-0.983E-01	0.217	-0.112	0.427	-0.212
C = 0.22E+23	500000.	2.33	-0.966E-01	0.320	-0.176	0.639	-0.349
	1000000.	1.88	-0.949E-01	0.377	-0.211	0.750	-0.427
	1500000.	1.68	-0.938E-01	0.413	-0.234	0.820	-0.473
	2000000.	1.56	-0.861E-01	0.441	-0.251	0.862	-0.506
Cl VII 3P 4S	100000.	0.416E-01	0.236E-02	0.637E-03	0.149E-02	0.125E-02	0.264E-02
294.3 AA	200000.	0.308E-01	0.255E-02	0.170E-02	0.252E-02	0.338E-02	0.476E-02
C = 0.40E+21	500000.	0.218E-01	0.277E-02	0.352E-02	0.387E-02	0.705E-02	0.766E-02
	1000000.	0.174E-01	0.266E-02	0.466E-02	0.463E-02	0.942E-02	0.937E-02
	1500000.	0.154E-01	0.261E-02	0.536E-02	0.515E-02	0.108E-01	0.104E-01
	2000000.	0.141E-01	0.247E-02	0.598E-02	0.549E-02	0.119E-01	0.112E-01
Cl VII 3P 3D	100000.	0.114	-0.447E-03	0.171E-02	-0.147E-03	0.326E-02	-0.263E-03
602.6 AA	200000.	0.814E-01	-0.418E-03	0.359E-02	-0.317E-03	0.699E-02	-0.606E-03
C = 0.45E+22	500000.	0.543E-01	-0.484E-03	0.641E-02	-0.731E-03	0.126E-01	-0.145E-02
	1000000.	0.416E-01	-0.380E-03	0.807E-02	-0.111E-02	0.161E-01	-0.225E-02
	1500000.	0.363E-01	-0.405E-03	0.872E-02	-0.136E-02	0.174E-01	-0.273E-02
	2000000.	0.332E-01	-0.395E-03	0.915E-02	-0.153E-02	0.182E-01	-0.309E-02
Cl VII 3P 4D	100000.	0.403E-01	0.685E-03	0.158E-02	0.112E-02	*0.304E-02	*0.197E-02
224.8 AA	200000.	0.302E-01	0.870E-03	0.262E-02	0.182E-02	*0.515E-02	*0.343E-02
C = 0.75E+20	500000.	0.214E-01	0.809E-03	0.402E-02	0.275E-02	*0.790E-02	*0.544E-02
	1000000.	0.172E-01	0.750E-03	0.499E-02	0.332E-02	*0.960E-02	*0.672E-02
	1500000.	0.153E-01	0.660E-03	0.564E-02	0.369E-02	0.105E-01	0.740E-02
	2000000.	0.141E-01	0.576E-03	0.620E-02	0.395E-02	0.112E-01	0.795E-02
Cl VII 4P 4D	100000.	3.11	0.119E-01	0.143	0.525E-01	*0.274	*0.928E-01
1680.4 AA	200000.	2.34	0.239E-01	0.217	0.875E-01	*0.423	*0.165
C = 0.42E+22	500000.	1.69	0.120E-01	0.293	0.134	*0.575	*0.265
	1000000.	1.37	0.111E-01	0.345	0.161	*0.665	*0.326
	1500000.	1.23	0.706E-02	0.379	0.179	*0.715	*0.362
	2000000.	1.14	0.239E-02	0.404	0.192	0.743	0.386
Cl VII 3D 4P	100000.	0.149	0.221E-02	0.604E-02	0.104E-02	*0.116E-01	*0.186E-02
455.7 AA	200000.	0.110	0.206E-02	0.964E-02	0.198E-02	0.189E-01	0.377E-02
C = 0.95E+21	500000.	0.772E-01	0.272E-02	0.136E-01	0.344E-02	0.271E-01	0.682E-02
	1000000.	0.617E-01	0.248E-02	0.155E-01	0.435E-02	0.309E-01	0.879E-02
	1500000.	0.550E-01	0.243E-02	0.166E-01	0.487E-02	0.330E-01	0.987E-02
	2000000.	0.510E-01	0.242E-02	0.173E-01	0.526E-02	0.342E-01	0.106E-01
Cl VII 3D 4F	100000.	0.717E-01	-0.693E-03	0.241E-02	-0.184E-02	0.465E-02	-0.326E-02
340.3 AA	200000.	0.529E-01	-0.688E-03	0.429E-02	-0.314E-02	0.846E-02	-0.594E-02
C = 0.17E+21	500000.	0.371E-01	-0.423E-03	0.696E-02	-0.486E-02	0.136E-01	-0.962E-02
	1000000.	0.295E-01	-0.456E-03	0.876E-02	-0.583E-02	0.165E-01	-0.117E-01
	1500000.	0.262E-01	-0.299E-03	0.997E-02	-0.646E-02	0.183E-01	-0.130E-01
	2000000.	0.242E-01	-0.181E-03	0.111E-01	-0.700E-02	0.196E- 01	-0.140E-01
PERTURBER DENSITY = 1.E+20cm^{-3}							
Cl VII 3S 3P	100000.	1.83	-0.130E-01	0.142E-01	-0.665E-02	0.232E-01	-0.901E-02
804.8 AA	200000.	1.31	-0.192E-01	0.347E-01	-0.163E-01	0.661E-01	-0.285E-01
C = 0.80E+23	500000.	0.879	-0.249E-01	0.710E-01	-0.354E-01	0.140	-0.679E-01
	1000000.	0.674	-0.227E-01	0.997E-01	-0.504E-01	0.198	-0.100
	1500000.	0.586	-0.226E-01	0.110	-0.584E-01	0.218	-0.117
	2000000.	0.534	-0.224E-01	0.117	-0.632E-01	0.234	-0.127

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Cl VII 3S 4P	100000.	0.277	0.221E-02	*0.947E-02	*0.998E-03		
196.2 AA	200000.	0.204	0.183E-02	*0.161E-01	*0.230E-02		
C = 0.18E+22	500000.	0.143	0.278E-02	*0.234E-01	*0.436E-02		
	1000000.	0.114	0.267E-02	0.267E-01	0.600E-02		
	1500000.	0.102	0.257E-02	0.286E-01	0.676E-02		
	2000000.	0.942E-01	0.265E-02	0.299E-01	0.726E-02	*0.589E-01	*0.147E-01
Cl VII 3P 4S	100000.	0.416	0.182E-01	0.626E-02	0.111E-01	*0.115E-01	*0.141E-01
294.3 AA	200000.	0.308	0.219E-01	0.169E-01	0.218E-01	*0.335E-01	*0.362E-01
C = 0.40E+22	500000.	0.218	0.253E-01	0.352E-01	0.363E-01	*0.705E-01	*0.667E-01
	1000000.	0.174	0.249E-01	0.466E-01	0.453E-01	*0.942E-01	*0.896E-01
	1500000.	0.154	0.247E-01	0.536E-01	0.513E-01	*0.107	*0.100
	2000000.	0.141	0.240E-01	0.598E-01	0.547E-01	*0.119	*0.111
Cl VII 3P 3D	100000.	1.14	-0.379E-02	0.162E-01	-0.114E-02	*0.263E-01	-0.155E-02
602.6 AA	200000.	0.814	-0.385E-02	0.355E-01	-0.288E-02	*0.675E-01	-0.507E-02
C = 0.45E+23	500000.	0.543	-0.462E-02	0.640E-01	-0.710E-02	*0.125	-0.137E-01
	1000000.	0.416	-0.366E-02	0.807E-01	-0.111E-01	0.161	-0.221E-01
	1500000.	0.363	-0.393E-02	0.872E-01	-0.135E-01	0.174	-0.270E-01
	2000000.	0.332	-0.391E-02	0.915E-01	-0.153E-01	0.182	-0.309E-01
Cl VII 3P 4D	100000.	0.403	0.230E-02	*0.148E-01	*0.823E-02		
224.8 AA	200000.	0.301	0.573E-02	*0.257E-01	*0.156E-01		
C = 0.75E+21	500000.	0.214	0.614E-02	*0.401E-01	*0.256E-01		
	1000000.	0.171	0.603E-02	*0.498E-01	*0.324E-01		
	1500000.	0.153	0.544E-02	*0.564E-01	*0.367E-01		
	2000000.	0.141	0.517E-02	*0.620E-01	*0.394E-01		
Cl VII 4P 4D	100000.						
1680.4 AA	200000.	23.4	0.103	*2.11	*0.757		
C = 0.42E+23	500000.	16.9	0.304E-01	*2.91	*1.25		
	1000000.	13.7	0.427E-01	*3.44	*1.58		
	1500000.	12.3	0.167E-01	*3.79	*1.79		
	2000000.	11.4	-0.327E-02	*4.04	*1.91		
Cl VII 3D 4P	100000.	1.49	0.184E-01	*0.561E-01	*0.800E-02		
455.7 AA	200000.	1.10	0.183E-01	*0.944E-01	*0.177E-01		
C = 0.95E+22	500000.	0.772	0.256E-01	*0.136	*0.328E-01		
	1000000.	0.617	0.238E-01	0.155	0.429E-01		
	1500000.	0.550	0.234E-01	0.166	0.486E-01		
	2000000.	0.510	0.237E-01	0.173	0.525E-01	*0.342	*0.105
Cl VII 3D 4F	100000.	0.716	-0.452E-04	*0.227E-01	-0.138E-01		
340.3 AA	200000.	0.528	-0.228E-02	*0.422E-01	-0.274E-01		
C = 0.17E+22	500000.	0.370	-0.118E-02	*0.695E-01	-0.457E-01		
	1000000.	0.295	-0.226E-02	0.876E-01	-0.570E-01		
	1500000.	0.262	-0.114E-02	0.997E-01	-0.643E-01		
	2000000.	0.242	-0.828E-03	0.111	-0.698E-01		
PERTURBER DENSITY = 1.E+21cm^{-3}							
Cl VII 3S 3P	100000.	*18.3	-0.278E-01	*0.951E-01	-0.284E-01		
804.8 AA	200000.	13.1	-0.130	*0.321	-0.120		
C = 0.80E+24	500000.	8.79	-0.212	*0.700	-0.319		
	1000000.	6.74	-0.202	0.994	-0.480		
	1500000.	5.86	-0.204	1.10	-0.571		
	2000000.	5.34	-0.203	1.17	-0.621	*2.33	-1.23
Cl VII 3S 4P	100000.						
196.2 AA	200000.	*2.03	*0.883E-02				
C = 0.18E+23	500000.	1.43	0.219E-01				
	1000000.	1.14	0.226E-01				
	1500000.	1.02	0.225E-01				
	2000000.	0.941	0.234E-01				
Cl VII 3P 4S	100000.	*4.13	-0.416E-01				
294.3 AA	200000.	*3.06	*0.887E-01				
C = 0.40E+23	500000.	2.17	0.179				
	1000000.	1.73	0.195				
	1500000.	1.53	0.203				
	2000000.	1.41	0.198	*0.602	*0.525		

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Cl VII 3P 3D	100000.	*11.4	-0.197E-01	*0.105	-0.488E-02		
602.6 AA	200000.	8.14	-0.283E-01	*0.322	-0.215E-01		
C = 0.45E+24	500000.	5.42	-0.402E-01	*0.628	-0.650E-01		
	1000000.	4.16	-0.323E-01	*0.804	-0.107		
	1500000.	3.63	-0.355E-01	*0.871	-0.133		
	2000000.	3.32	-0.355E-01	*0.914	-0.151		
Cl VII 3P 4D	100000.						
224.8 AA	200000.	*2.91	-0.327E-01				
C = 0.75E+22	500000.	2.09	0.905E-02				
	1000000.	1.68	0.237E-01				
	1500000.	1.50	0.227E-01				
	2000000.	1.38	0.204E-01				
Cl VII 3D 4P	100000.						
455.7 AA	200000.	*11.0	*0.106				
C = 0.95E+23	500000.	7.71	0.210				
	1000000.	6.17	0.205				
	1500000.	5.50	0.207				
	2000000.	5.10	0.212				
Cl VII 3D 4F	100000.	*6.81	*0.213				
340.3 AA	200000.	*5.11	*0.120				
C = 0.17E+23	500000.	3.61	0.706E-01				
	1000000.	2.89	0.358E-01				
	1500000.	2.57	0.381E-01				
	2000000.	2.38	0.408E-01				
PERTURBER DENSITY = 1.E+22cm^{-3}							
Cl VII 3S 4P	100000.						
196.2 AA	200000.						
C = 0.18E+24	500000.						
	1000000.	*10.9	*0.790E-01				
	1500000.	*9.79	*0.110				
	2000000.	*9.09	*0.134				
Cl VII 3P 4S	100000.						
294.3 AA	200000.						
C = 0.40E+24	500000.	*19.6	-0.493				
	1000000.	*16.0	*0.445				
	1500000.	14.3	0.818				
	2000000.	13.2	0.920				
Cl VII 3P 4D	100000.						
224.8 AA	200000.						
C = 0.75E+23	500000.						
	1000000.	*15.0	-0.871E-01				
	1500000.	*13.6	-0.494E-01				
	2000000.	*12.6	-0.346E-01				

2. RESULTS AND DISCUSSION

All relevant details concerning the obtained results and the calculation procedure will be published in Dimitrijević and Sahal−Bréchot (1998). Here, we present only tables of Stark broadening parameters.

Atomic energy levels needed for calculations have been taken from Bashkin and Stoner (1978). Our results for 2 F VI and 10 Cl VII multiplets are shown in Tables 1 and 2, for perturber densities $10^{18} - 10^{22}$ cm^{-3}. Data for perturber density of 10^{17} cm^{-3} will be published in Dimitrijević and Sahal−Bréchot (1998). Stark broadening parameters for densities lower than tabulated, are linear with perturber density. 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 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). Values for NV $>$ 0.5 are not given and values for $0.1 <$ NV ≤ 0.5 are denoted by an asterisk. Stark broadening parameters for densities lower than tabulated, are linear with perturber density. When the impact approximation is not valid, the ion broadening contribution may be estimated by using quasistatic approach (Sahal−Bréchot 1991 or Griem 1974). In the region between where neither of these two approximations is valid, a unified type theory should be used. For example in Barnard et al. (1974), a simple analytical formulas for such a case are given. The accuracy of the results obtained decreases when broadening by ion interactions becomes important.

The discussion of obtained results will be published in Dimitrijević and Sahal−Bréchot (1998). There is not experimental results concerning F VI and Cl VII. However, predictions on the basis of systematic trends along isoelectronic sequences exist for F VI $3s^1S$ - $3p^1P^o$, 2464.8 Å line for T = 45000 K and the electron density of 10^{17}cm^{-3} and for Cl VII $4s^2S$ - $4p^2P^o$, 2178.8 Å line for T = 60000 K and the electron density of 10^{17}cm^{-3} (Purić *et al.* 1988). Electron temperatures in this paper are too low for the comparison with our data.

We hope that the presented results will be of significance for astrophysical and laboratory plasma research, as well as for the theoretical considerations of systematic trends along isoelectronic sequences.

Acknowledgements – This work is a part of the project "Astrometrical, Astrodynamical and Astrophysical Investigations", supported by Ministry of Science and Technology of Serbia.

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ТАБЕЛЕ ПАРАМЕТАРА ШТАРКОВОГ ШИРЕЊА СПЕКТРАЛНИХ ЛИНИЈА F VI И Cl VII

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УДК 52–355.3
Претходно саопштење

Користећи семикласичан прилаз, израчунате су ширине и помераји спектралних линија, проузроковани сударима са електронима, протонима и двоструко наелектрисаним јонима хелијума, за 2 мултиплета F VI и 10 мултиплета Cl VII. Резултати су дати у функцији температуре и концентрације пертурбера.