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Preliminary report

STARK BROADENING PARAMETER TABLES FOR Sc X, Sc XI, Ti XI AND Ti XII

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SUMMARY: By using the semiclassical-perturbation formalism, we have calculated electron-, proton-, and He III-impact line widths and shifts for 4 Sc X, 10 Sc XI, 4 Ti XI and 27 Ti XII multiplets, significant for investigation and modeling of different plasmas in astrophysics and physics. For Sc X calculations have been performed within the temperature range from 200,000 K to 5,000,000 K, and for perturber densities 10^{19}cm^{-3} - 10^{22}cm^{-3}. Stark broadening data for Sc XI are tabulated for temperatures from 500,000 K to 5,000,000 K, and perturber densities 10^{18}cm^{-3} - 10^{22}cm^{-3}. For Ti XI calculations were performed within the temperature range from 500,000 K to 5,000,000 K, and perturber densities 10^{18}cm^{-3} - 10^{22}cm^{-3}, while for Ti XII results are given for temperatures from 500,000 K to 6,000,000 K, and perturber densities 10^{18}cm^{-3} - 10^{23}cm^{-3}.

1. INTRODUCTION

Data on Stark broadening of spectral lines for scandium and titanium ions in various ionisation stages are of interest for the analysis, investigation and modeling of various plasmas in solar and stellar physics, plasma physics and technology. For example Rogerson and Ewell (1985) have found 7 Ti IV lines in the τ Sco spectrum. Such data for higher ionization stages are also of interest for the consideration of subphotospheric layers (Seaton 1987). Stark broadening parameters for 10 scandium III and 10 Titanium IV multiplets, have been calculated recently within the semiclassical perturbation approach by Dimitrijević and Sahal-Bréchot (1992).

Within our project (Dimitrijević 1996) to provide a comprehensive set of reliable Stark broadening data needed for the consideration and modeling of plasmas in astrophysics, physics and technology, 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, 1996) electron-, proton-, and He III-impact line widths and shifts for 4 Sc X, 10 Sc XI, 4 Ti XI and 27 Ti XII multiplets. The theoretical formalism has been reviewed several times, as, e.g., briefly in Dimitrijević and Sahal-Bréchot, 1995, 1996.

Table 1. This table shows electron-, proton-, and He III-impact broadening parameters for Sc X for perturber densities of 10^{19}− 10^{22} cm^{-3} and temperatures from 200,000 to 5,000,000 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+19cm-3							
PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Sc X 3S-3P	200000.	0.257E-01	-0.164E-03	0.146E-03	-0.876E-04	0.281E-03	-0.164E-03
422.9 Å	500000.	0.165E-01	-0.196E-03	0.473E-03	-0.225E-03	0.925E-03	-0.442E-03
C=0.42E+22	1000000.	0.121E-01	-0.259E-03	0.871E-03	-0.393E-03	0.172E-02	-0.789E-03
	2000000.	0.916E-02	-0.244E-03	0.127E-02	-0.579E-03	0.252E-02	-0.116E-02
	3000000.	0.787E-02	-0.238E-03	0.146E-02	-0.706E-03	0.292E-02	-0.142E-02
	5000000.	0.661E-02	-0.231E-03	0.165E-02	-0.815E-03	0.327E-02	-0.165E-02
Sc X 3P-4S	200000.	0.499E-02	0.227E-03	0.606E-04	0.201E-03	0.119E-03	0.377E-03
147.3 Å	500000.	0.337E-02	0.299E-03	0.251E-03	0.390E-03	0.501E-03	0.765E-03
C=0.14E+21	1000000.	0.258E-02	0.284E-03	0.440E-03	0.542E-03	0.877E-03	0.109E-02
	2000000.	0.203E-02	0.270E-03	0.643E-03	0.652E-03	0.128E-02	0.131E-02
	3000000.	0.178E-02	0.258E-03	0.756E-03	0.722E-03	0.149E-02	0.146E-02
	5000000.	0.151E-02	0.223E-03	0.915E-03	0.821E-03	0.173E-02	0.165E-02
Sc X 3P-5S	200000.	0.399E-02	0.376E-03	0.193E-03	0.380E-03	0.383E-03	0.704E-03
96.3 Å	500000.	0.283E-02	0.427E-03	0.478E-03	0.622E-03	0.959E-03	0.121E-02
C=0.32E+20	1000000.	0.225E-02	0.425E-03	0.720E-03	0.760E-03	0.145E-02	0.153E-02
	2000000.	0.182E-02	0.401E-03	0.933E-03	0.910E-03	0.185E-02	0.183E-02
	3000000.	0.161E-02	0.358E-03	0.110E-02	0.101E-02	0.210E-02	0.204E-02
	5000000.	0.139E-02	0.301E-03	0.133E-02	0.111E-02	0.244E-02	0.225E-02
Sc X 3P-3D	200000.	0.206E-01	-0.669E-04	0.204E-03	-0.321E-04	0.394E-03	-0.602E-04
357.5 Å	500000.	0.133E-01	-0.681E-04	0.591E-03	-0.835E-04	0.116E-02	-0.164E-03
C=0.30E+22	1000000.	0.970E-02	-0.969E-04	0.971E-03	-0.156E-03	0.192E-02	-0.312E-03
	2000000.	0.731E-02	-0.794E-04	0.134E-02	-0.247E-03	0.266E-02	-0.496E-03
	3000000.	0.629E-02	-0.788E-04	0.146E-02	-0.299E-03	0.290E-02	-0.601E-03
	5000000.	0.530E-02	-0.730E-04	0.160E-02	-0.367E-03	0.319E-02	-0.740E-03
PERTURBER DENSITY = 1.E+20cm-3							
Sc X 3S-3P	200000.	0.257	-0.152E-02	0.144E-02	-0.768E-03	0.266E-02	-0.125E-02
422.9 Å	500000.	0.165	-0.187E-02	0.472E-02	-0.217E-02	0.920E-02	-0.410E-02
C=0.42E+23	1000000.	0.121	-0.252E-02	0.871E-02	-0.390E-02	0.172E-01	-0.764E-02
	2000000.	0.916E-01	-0.240E-02	0.127E-01	-0.578E-02	0.252E-01	-0.115E-01
	3000000.	0.787E-01	-0.236E-02	0.146E-01	-0.705E-02	0.292E-01	-0.142E-01
	5000000.	0.661E-01	-0.230E-02	0.165E-01	-0.815E-02	0.327E-01	-0.164E-01
Sc X 3P-4S	200000.	0.499E-01	0.192E-02	0.603E-03	0.175E-02	*0.117E-02	*0.280E-02
147.3 Å	500000.	0.337E-01	0.279E-02	0.250E-02	0.371E-02	*0.500E-02	*0.686E-02
C=0.14E+22	1000000.	0.258E-01	0.268E-02	0.440E-02	0.532E-02	0.878E-02	0.103E-01
	2000000.	0.203E-01	0.258E-02	0.643E-02	0.650E-02	0.127E-01	0.129E-01
	3000000.	0.178E-01	0.253E-02	0.756E-02	0.721E-02	0.149E-01	0.146E-01
	5000000.	0.151E-01	0.222E-02	0.915E-02	0.821E-02	0.173E-01	0.165E-01
Sc X 3P-5S	200000.	0.399E-01	0.299E-02	0.193E-02	0.319E-02		
96.3 Å	500000.	0.283E-01	0.382E-02	0.479E-02	0.579E-02		
C=0.32E+21	1000000.	0.225E-01	0.387E-02	0.720E-02	0.738E-02		
	2000000.	0.182E-01	0.375E-02	0.933E-02	0.906E-02		
	3000000.	0.161E-01	0.345E-02	0.110E-01	0.101E-01		
	5000000.	0.139E-01	0.300E-02	0.133E-01	0.111E-01	*0.244E-01	*0.224E-01
Sc X 3P-3D	200000.	0.206	-0.565E-03	0.201E-02	-0.281E-03	0.372E-02	-0.458E-03
357.5 Å	500000.	0.133	-0.667E-03	0.590E-02	-0.808E-03	0.115E-01	-0.153E-02
C=0.30E+23	1000000.	0.970E-01	-0.946E-03	0.971E-02	-0.154E-02	0.192E-01	-0.303E-02
	2000000.	0.731E-01	-0.777E-03	0.134E-01	-0.246E-02	0.266E-01	-0.492E-02
	3000000.	0.629E-01	-0.781E-03	0.146E-01	-0.299E-02	0.290E-01	-0.600E-02
	5000000.	0.530E-01	-0.729E-03	0.160E-01	-0.367E-02	0.319E-01	-0.740E-02

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+21cm-3							
Sc X 3S-3P	200000.	2.57	-0.108E-01	0.121E-01	-0.482E-02	*0.171E-01	-0.499E-02
422.9 Å	500000.	1.65	-0.161E-01	0.467E-01	-0.193E-01	*0.883E-01	-0.329E-01
C=0.42E+24	1000000.	1.21	-0.234E-01	0.869E-01	-0.370E-01	*0.170	-0.693E-01
	2000000.	0.916	-0.226E-01	0.127	-0.570E-01	0.251	-0.110
	3000000.	0.787	-0.226E-01	0.146	-0.704E-01	0.291	-0.139
	5000000.	0.661	-0.225E-01	0.165	-0.814E-01	0.327	-0.164
Sc X 3P-4S	200000.	0.498	0.732E-02	*0.567E-02	*0.104E-01		
147.3 Å	500000.	0.337	0.212E-01	*0.250E-01	*0.312E-01		
C=0.14E+23	1000000.	0.258	0.221E-01	*0.442E-01	*0.484E-01		
	2000000.	0.203	0.225E-01	*0.642E-01	*0.630E-01		
	3000000.	0.178	0.228E-01	0.756E-01	0.718E-01		
	5000000.	0.151	0.209E-01	0.915E-01	0.818E-01		
Sc X 3P-5S	200000.	*0.393	*0.471E-03				
96.3 Å	500000.	0.280	0.219E-01				
C=0.32E+22	1000000.	0.223	0.272E-01				
	2000000.	0.180	0.293E-01				
	3000000.	0.160	0.284E-01				
	5000000.	0.138	0.267E-01				
Sc X 3P-3D	200000.	2.06	-0.437E-02	0.169E-01	-0.176E-02	*0.234E-01	-0.183E-02
357.5 Å	500000.	1.33	-0.571E-02	0.582E-01	-0.720E-02	*0.110	-0.123E-01
C=0.30E+24	1000000.	0.970	-0.889E-02	0.967E-01	-0.147E-01	*0.189	-0.277E-01
	2000000.	0.731	-0.727E-02	0.134	-0.243E-01	*0.265	-0.475E-01
	3000000.	0.629	-0.742E-02	0.146	-0.298E-01	*0.290	-0.590E-01
	5000000.	0.530	-0.709E-02	0.160	-0.366E-01	*0.319	-0.738E-01

Table 2. This table shows electron-, proton-, and He III-impact broadening parameters for Sc XI for perturber densities of 10^{18}− 10^{22} cm^{-3} and temperatures from 500,000 to 5,000,000 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)
Sc XI 3S-3P	500000.	0.247E-02	-0.341E-04	0.526E-04	-0.409E-04	0.103E-03	-0.819E-04
510.9 Å	750000.	0.205E-02	-0.420E-04	0.816E-04	-0.580E-04	0.160E-03	-0.116E-03
C=0.51E+21	1000000.	0.181E-02	-0.442E-04	0.106E-03	-0.712E-04	0.209E-03	-0.143E-03
	2000000.	0.136E-02	-0.414E-04	0.165E-03	-0.105E-03	0.327E-03	-0.210E-03
	3000000.	0.116E-02	-0.401E-04	0.202E-03	-0.128E-03	0.401E-03	-0.257E-03
	5000000.	0.966E-03	-0.390E-04	0.237E-03	-0.147E-03	0.463E-03	-0.297E-03
Sc XI 3S-4P	500000.	0.215E-03	0.177E-05	0.150E-04	0.217E-05	0.296E-04	0.435E-05
95.0 Å	750000.	0.181E-03	0.208E-05	0.185E-04	0.299E-05	0.367E-04	0.601E-05
C=0.68E+19	1000000.	0.161E-03	0.176E-05	0.215E-04	0.368E-05	0.426E-04	0.737E-05
	2000000.	0.125E-03	0.176E-05	0.259E-04	0.523E-05	0.513E-04	0.105E-04
	3000000.	0.109E-03	0.166E-05	0.282E-04	0.617E-05	0.554E-04	0.124E-04
	5000000.	0.930E-04	0.156E-05	0.315E-04	0.707E-05	0.603E-04	0.143E-04
Sc XI 4S-4P	500000.	0.511E-01	-0.145E-02	0.321E-02	-0.209E-02	0.636E-02	-0.420E-02
1327.8 Å	750000.	0.435E-01	-0.139E-02	0.404E-02	-0.256E-02	0.799E-02	-0.516E-02
C=0.13E+22	1000000.	0.390E-01	-0.136E-02	0.475E-02	-0.297E-02	0.943E-02	-0.597E-02
	2000000.	0.306E-01	-0.129E-02	0.601E-02	-0.374E-02	0.119E-01	-0.756E-02
	3000000.	0.268E-01	-0.126E-02	0.674E-02	-0.419E-02	0.131E-01	-0.845E-02
	5000000.	0.230E-01	-0.107E-02	0.790E-02	-0.476E-02	0.147E-01	-0.961E-02
Sc XI 3P-4S	500000.	0.240E-03	0.188E-04	0.130E-04	0.239E-04	0.258E-04	0.480E-04
127.9 Å	750000.	0.204E-03	0.193E-04	0.192E-04	0.288E-04	0.386E-04	0.580E-04
C=0.12E+20	1000000.	0.183E-03	0.185E-04	0.246E-04	0.332E-04	0.492E-04	0.669E-04
	2000000.	0.142E-03	0.177E-04	0.391E-04	0.415E-04	0.780E-04	0.835E-04
	3000000.	0.124E-03	0.172E-04	0.470E-04	0.461E-04	0.926E-04	0.932E-04
	5000000.	0.105E-03	0.152E-04	0.575E-04	0.523E-04	0.110E-03	0.106E-03
Sc XI 3P-3D	500000.	0.146E-02	-0.731E-05	0.477E-04	-0.735E-05	0.933E-04	-0.147E-04
378.7 Å	750000.	0.121E-02	-0.610E-05	0.692E-04	-0.108E-04	0.136E-03	-0.217E-04
C=0.28E+21	1000000.	0.107E-02	-0.895E-05	0.861E-04	-0.140E-04	0.170E-03	-0.280E-04
	2000000.	0.795E-03	-0.832E-05	0.123E-03	-0.233E-04	0.244E-03	-0.469E-04
	3000000.	0.679E-03	-0.751E-05	0.140E-03	-0.283E-04	0.279E-03	-0.569E-04
	5000000.	0.566E-03	-0.726E-05	0.155E-03	-0.361E-04	0.308E-03	-0.727E-04
Sc XI 3P-4D	500000.	0.261E-03	0.393E-05	0.186E-04	0.117E-04	0.366E-04	0.234E-04
104.9 Å	750000.	0.220E-03	0.329E-05	0.234E-04	0.145E-04	0.461E-04	0.292E-04
C=0.37E+19	1000000.	0.196E-03	0.349E-05	0.279E-04	0.168E-04	0.545E-04	0.337E-04
	2000000.	0.152E-03	0.346E-05	0.365E-04	0.214E-04	0.691E-04	0.431E-04
	3000000.	0.133E-03	0.283E-05	0.419E-04	0.239E-04	0.765E-04	0.481E-04
	5000000.	0.113E-03	0.225E-05	0.498E-04	0.272E-04	0.869E-04	0.552E-04
Sc XI 3P-5D	500000.	0.335E-03	0.950E-05	0.430E-04	0.324E-04	0.848E-04	0.652E-04
78.8 Å	750000.	0.288E-03	0.996E-05	0.521E-04	0.380E-04	0.102E-03	0.766E-04
C=0.11E+19	1000000.	0.260E-03	0.999E-05	0.574E-04	0.407E-04	0.111E-03	0.820E-04
	2000000.	0.207E-03	0.792E-05	0.720E-04	0.489E-04	0.134E-03	0.987E-04
	3000000.	0.183E-03	0.673E-05	0.830E-04	0.541E-04	0.148E-03	0.109E-03
	5000000.	0.159E-03	0.578E-05	0.968E-04	0.603E-04	0.163E-03	0.121E-03
Sc XI 4P-4D	500000.	0.364E-01	0.323E-04	0.297E-02	0.820E-03	0.586E-02	0.165E-02
1042.3 Å	750000.	0.310E-01	-0.101E-03	0.368E-02	0.107E-02	0.724E-02	0.214E-02
C=0.37E+21	1000000.	0.278E-01	-0.510E-04	0.415E-02	0.121E-02	0.815E-02	0.243E-02
	2000000.	0.218E-01	-0.425E-04	0.495E-02	0.162E-02	0.947E-02	0.328E-02
	3000000.	0.192E-01	-0.871E-04	0.550E-02	0.181E-02	0.102E-01	0.365E-02
	5000000.	0.165E-01	-0.128E-03	0.636E-02	0.205E-02	0.111E-01	0.416E-02
Sc XI 4P-5D	500000.	0.361E-02	0.709E-04	0.445E-03	0.297E-03	0.878E-03	0.598E-03
242.7 Å	750000.	0.311E-02	0.715E-04	0.525E-03	0.349E-03	0.103E-02	0.705E-03
C=0.10E+20	1000000.	0.281E-02	0.734E-04	0.577E-03	0.374E-03	0.112E-02	0.753E-03
	2000000.	0.225E-02	0.543E-04	0.717E-03	0.449E-03	0.133E-02	0.905E-03
	3000000.	0.200E-02	0.440E-04	0.818E-03	0.498E-03	0.147E-02	0.101E-02
	5000000.	0.174E-02	0.359E-04	0.946E-03	0.549E-03	0.160E-02	0.110E-02

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Sc XI 3D-4P	500000.	0.672E-03	0.107E-04	0.512E-04	0.121E-04	0.101E-03	0.243E-04
168.6 Å	750000.	0.566E-03	0.123E-04	0.631E-04	0.162E-04	0.125E-03	0.324E-04
C=0.21E+20	1000000.	0.504E-03	0.121E-04	0.731E-04	0.192E-04	0.145E-03	0.386E-04
	2000000.	0.389E-03	0.117E-04	0.875E-04	0.264E-04	0.174E-03	0.533E-04
	3000000.	0.340E-03	0.111E-04	0.954E-04	0.297E-04	0.188E-03	0.600E-04
	5000000.	0.291E-03	0.106E-04	0.106E-03	0.341E-04	0.205E-03	0.688E-04
PERTURBER DENSITY = 1.E+19cm-3							
Sc XI 3S-3P	500000.	0.247E-01	-0.340E-03	0.526E-03	-0.406E-03	0.103E-02	-0.796E-03
510.9 Å	750000.	0.205E-01	-0.413E-03	0.816E-03	-0.579E-03	0.160E-02	-0.115E-02
C=0.51E+22	1000000.	0.181E-01	-0.439E-03	0.106E-02	-0.711E-03	0.209E-02	-0.142E-02
	2000000.	0.136E-01	-0.413E-03	0.165E-02	-0.105E-02	0.327E-02	-0.210E-02
	3000000.	0.116E-01	-0.400E-03	0.202E-02	-0.128E-02	0.401E-02	-0.257E-02
	5000000.	0.966E-02	-0.389E-03	0.237E-02	-0.147E-02	0.463E-02	-0.297E-02
Sc XI 3S-4P	500000.	0.215E-02	0.174E-04	0.150E-03	0.216E-04	0.296E-03	0.423E-04
95.0 Å	750000.	0.181E-02	0.205E-04	0.185E-03	0.299E-04	0.367E-03	0.595E-04
C=0.68E+20	1000000.	0.161E-02	0.173E-04	0.215E-03	0.367E-04	0.426E-03	0.732E-04
	2000000.	0.125E-02	0.176E-04	0.259E-03	0.523E-04	0.513E-03	0.105E-03
	3000000.	0.109E-02	0.166E-04	0.282E-03	0.617E-04	0.554E-03	0.124E-03
	5000000.	0.930E-03	0.156E-04	0.315E-03	0.707E-04	0.603E-03	0.143E-03
Sc XI 4S-4P	500000.	0.511	-0.142E-01	0.321E-01	-0.207E-01	0.635E-01	-0.406E-01
1327.8 Å	750000.	0.435	-0.137E-01	0.404E-01	-0.256E-01	0.799E-01	-0.509E-01
C=0.13E+23	1000000.	0.390	-0.133E-01	0.475E-01	-0.296E-01	0.943E-01	-0.591E-01
	2000000.	0.306	-0.129E-01	0.601E-01	-0.374E-01	0.119	-0.754E-01
	3000000.	0.268	-0.126E-01	0.674E-01	-0.419E-01	0.131	-0.845E-01
	5000000.	0.230	-0.107E-01	0.790E-01	-0.476E-01	0.147	-0.961E-01
Sc XI 3P-4S	500000.	0.240E-02	0.184E-03	0.130E-03	0.236E-03	0.258E-03	0.463E-03
127.9 Å	750000.	0.204E-02	0.190E-03	0.192E-03	0.288E-03	0.386E-03	0.572E-03
C=0.12E+21	1000000.	0.183E-02	0.182E-03	0.246E-03	0.332E-03	0.492E-03	0.662E-03
	2000000.	0.142E-02	0.177E-03	0.391E-03	0.415E-03	0.780E-03	0.834E-03
	3000000.	0.124E-02	0.172E-03	0.470E-03	0.461E-03	0.926E-03	0.931E-03
	5000000.	0.105E-02	0.152E-03	0.575E-03	0.523E-03	0.110E-02	0.106E-02
Sc XI 3P-3D	500000.	0.146E-01	-0.714E-04	0.477E-03	-0.729E-04	0.933E-03	-0.143E-03
378.7 Å	750000.	0.121E-01	-0.609E-04	0.692E-03	-0.108E-03	0.136E-02	-0.215E-03
C=0.28E+22	1000000.	0.107E-01	-0.870E-04	0.861E-03	-0.140E-03	0.170E-02	-0.278E-03
	2000000.	0.795E-02	-0.831E-04	0.123E-02	-0.233E-03	0.244E-02	-0.469E-03
	3000000.	0.679E-02	-0.750E-04	0.140E-02	-0.283E-03	0.279E-02	-0.569E-03
	5000000.	0.566E-02	-0.726E-04	0.155E-02	-0.361E-03	0.308E-02	-0.727E-03
Sc XI 3P-4D	500000.	0.261E-02	0.374E-04	0.186E-03	0.116E-03	0.366E-03	0.226E-03
104.9 Å	750000.	0.220E-02	0.315E-04	0.234E-03	0.145E-03	0.460E-03	0.288E-03
C=0.37E+20	1000000.	0.196E-02	0.333E-04	0.279E-03	0.167E-03	0.545E-03	0.334E-03
	2000000.	0.152E-02	0.345E-04	0.365E-03	0.214E-03	0.691E-03	0.431E-03
	3000000.	0.133E-02	0.282E-04	0.419E-03	0.239E-03	0.765E-03	0.481E-03
	5000000.	0.113E-02	0.224E-04	0.498E-03	0.272E-03	0.869E-03	0.552E-03
Sc XI 3P-5D	500000.	0.335E-02	0.867E-04	0.430E-03	0.319E-03	*0.847E-03	*0.619E-03
78.8 Å	750000.	0.288E-02	0.935E-04	0.521E-03	0.379E-03	*0.102E-02	*0.750E-03
C=0.11E+20	1000000.	0.260E-02	0.941E-04	0.574E-03	0.406E-03	0.111E-02	0.807E-03
	2000000.	0.207E-02	0.787E-04	0.720E-03	0.489E-03	0.134E-02	0.985E-03
	3000000.	0.183E-02	0.668E-04	0.830E-03	0.541E-03	0.148E-02	0.109E-02
	5000000.	0.159E-02	0.574E-04	0.968E-03	0.603E-03	0.163E-02	0.121E-02
Sc XI 4P-4D	500000.	0.364	0.190E-03	0.296E-01	0.813E-02	0.586E-01	0.159E-01
1042.3 Å	750000.	0.310	-0.108E-02	0.367E-01	0.106E-01	0.724E-01	0.212E-01
C=0.37E+22	1000000.	0.278	-0.620E-03	0.415E-01	0.121E-01	0.815E-01	0.241E-01
	2000000.	0.218	-0.432E-03	0.495E-01	0.162E-01	0.947E-01	0.327E-01
	3000000.	0.192	-0.880E-03	0.550E-01	0.181E-01	0.102	0.364E-01
	5000000.	0.165	-0.129E-02	0.636E-01	0.205E-01	0.111	0.416E-01
Sc XI 4P-5D	500000.	0.361E-01	0.633E-03	0.445E-02	0.293E-02	*0.877E-02	*0.568E-02
242.7 Å	750000.	0.311E-01	0.660E-03	0.525E-02	0.349E-02	*0.103E-01	*0.690E-02
C=0.10E+21	1000000.	0.281E-01	0.681E-03	0.577E-02	0.373E-02	*0.112E-01	*0.741E-02
	2000000.	0.225E-01	0.539E-03	0.717E-02	0.449E-02	0.133E-01	0.903E-02
	3000000.	0.200E-01	0.435E-03	0.818E-02	0.498E-02	0.147E-01	0.100E-01
	5000000.	0.174E-01	0.355E-03	0.946E-02	0.549E-02	0.160E-01	0.110E-01

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Sc XI 3D-4P	500000.	0.672E-02	0.106E-03	0.512E-03	0.120E-03	0.101E-02	0.236E-03
168.6 Å	750000.	0.566E-02	0.122E-03	0.631E-03	0.162E-03	0.125E-02	0.321E-03
C=0.21E+21	1000000.	0.504E-02	0.120E-03	0.731E-03	0.192E-03	0.145E-02	0.383E-03
	2000000.	0.389E-02	0.117E-03	0.875E-03	0.264E-03	0.174E-02	0.532E-03
	3000000.	0.340E-02	0.111E-03	0.954E-03	0.297E-03	0.188E-02	0.599E-03
	5000000.	0.291E-02	0.106E-03	0.106E-02	0.341E-03	0.205E-02	0.688E-03
PERTURBER DENSITY = 1.E+20cm-3							
Sc XI 3S-3P	500000.	0.247	-0.323E-02	0.526E-02	-0.388E-02	0.102E-01	-0.732E-02
510.9 Å	750000.	0.205	-0.401E-02	0.816E-02	-0.565E-02	0.160E-01	-0.109E-01
C=0.51E+23	1000000.	0.181	-0.428E-02	0.106E-01	-0.704E-02	0.209E-01	-0.138E-01
	2000000.	0.136	-0.405E-02	0.165E-01	-0.104E-01	0.327E-01	-0.208E-01
	3000000.	0.116	-0.396E-02	0.202E-01	-0.127E-01	0.401E-01	-0.257E-01
	5000000.	0.966E-01	-0.389E-02	0.237E-01	-0.147E-01	0.463E-01	-0.297E-01
Sc XI 3S-4P	500000.	0.215E-01	0.168E-03	0.150E-02	0.206E-03	*0.292E-02	*0.388E-03
95.0 Å	750000.	0.181E-01	0.195E-03	0.185E-02	0.291E-03	*0.365E-02	*0.562E-03
C=0.68E+21	1000000.	0.161E-01	0.166E-03	0.215E-02	0.363E-03	*0.425E-02	*0.709E-03
	2000000.	0.125E-01	0.171E-03	0.259E-02	0.522E-03	0.513E-02	0.104E-02
	3000000.	0.109E-01	0.163E-03	0.282E-02	0.616E-03	0.554E-02	0.124E-02
	5000000.	0.930E-02	0.156E-03	0.315E-02	0.707E-03	0.603E-02	0.142E-02
Sc XI 4S-4P	500000.	5.11	-0.131	0.320	-0.196	*0.629	-0.366
1327.8 Å	750000.	4.35	-0.128	0.404	-0.247	*0.796	-0.472
C=0.13E+24	1000000.	3.90	-0.126	0.475	-0.292	*0.941	-0.565
	2000000.	3.06	-0.123	0.601	-0.373	*1.19	-0.741
	3000000.	2.68	-0.123	0.674	-0.418	*1.31	-0.842
	5000000.	2.30	-0.107	0.790	-0.476	1.47	-0.958
Sc XI 3P-4S	500000.	0.240E-01	0.173E-02	0.130E-02	0.223E-02	0.257E-02	0.416E-02
127.9 Å	750000.	0.204E-01	0.180E-02	0.192E-02	0.277E-02	0.386E-02	0.528E-02
C=0.12E+22	1000000.	0.183E-01	0.174E-02	0.246E-02	0.326E-02	0.492E-02	0.630E-02
	2000000.	0.142E-01	0.171E-02	0.391E-02	0.414E-02	0.781E-02	0.819E-02
	3000000.	0.124E-01	0.168E-02	0.470E-02	0.460E-02	0.926E-02	0.928E-02
	5000000.	0.105E-01	0.151E-02	0.575E-02	0.523E-02	0.110E-01	0.106E-01
Sc XI 3P-3D	500000.	0.146	-0.703E-03	0.476E-02	-0.698E-03	0.925E-02	-0.132E-02
378.7 Å	750000.	0.121	-0.569E-03	0.692E-02	-0.106E-02	0.136E-01	-0.204E-02
C=0.28E+23	1000000.	0.107	-0.864E-03	0.861E-02	-0.138E-02	0.170E-01	-0.271E-02
	2000000.	0.795E-01	-0.821E-03	0.123E-01	-0.233E-02	0.244E-01	-0.465E-02
	3000000.	0.679E-01	-0.739E-03	0.140E-01	-0.283E-02	0.279E-01	-0.569E-02
	5000000.	0.566E-01	-0.724E-03	0.155E-01	-0.361E-02	0.308E-01	-0.726E-02
Sc XI 3P-4D	500000.	0.261E-01	0.315E-03	0.185E-02	0.109E-02	*0.362E-02	*0.204E-02
104.9 Å	750000.	0.220E-01	0.270E-03	0.234E-02	0.140E-02	*0.458E-02	*0.268E-02
C=0.37E+21	1000000.	0.196E-01	0.289E-03	0.279E-02	0.165E-02	*0.544E-02	*0.319E-02
	2000000.	0.152E-01	0.313E-03	0.365E-02	0.213E-02	*0.691E-02	*0.423E-02
	3000000.	0.133E-01	0.267E-03	0.419E-02	0.239E-02	0.765E-02	0.480E-02
	5000000.	0.113E-01	0.222E-03	0.498E-02	0.272E-02	0.869E-02	0.551E-02
Sc XI 3P-5D	500000.	0.335E-01	0.629E-03	*0.427E-02	*0.294E-02		
78.8 Å	750000.	0.288E-01	0.724E-03	*0.520E-02	*0.358E-02		
C=0.11E+21	1000000.	0.260E-01	0.770E-03	*0.574E-02	*0.395E-02		
	2000000.	0.207E-01	0.653E-03	*0.720E-02	*0.486E-02		
	3000000.	0.183E-01	0.602E-03	0.830E-02	0.539E-02		
	5000000.	0.159E-01	0.565E-03	0.968E-02	0.603E-02	*0.163E-01	*0.120E-01
Sc XI 4P-4D	500000.	3.64	-0.266E-02	0.295	0.771E-01	*0.577	*0.145
1042.3 Å	750000.	3.10	-0.135E-01	0.367	0.103	*0.720	*0.198
C=0.37E+23	1000000.	2.78	-0.935E-02	0.414	0.119	*0.813	*0.231
	2000000.	2.18	-0.654E-02	0.495	0.162	*0.946	*0.322
	3000000.	1.92	-0.980E-02	0.550	0.180	*1.02	*0.364
	5000000.	1.65	-0.130E-01	0.636	0.205	*1.11	*0.415
Sc XI 4P-5D	500000.	0.361	0.414E-02	*0.443E-01	*0.270E-01		
242.7 Å	750000.	0.311	0.469E-02	*0.524E-01	*0.330E-01		
C=0.10E+22	1000000.	0.281	0.525E-02	*0.577E-01	*0.363E-01		
	2000000.	0.225	0.417E-02	*0.717E-01	*0.447E-01		
	3000000.	0.200	0.376E-02	*0.818E-01	*0.496E-01		
	5000000.	0.174	0.347E-02	0.946E-01	0.549E-01		

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Sc XI 3D-4P	500000.	0.672E-01	0.102E-02	0.510E-02	0.114E-02	*0.997E-02	*0.215E-02
168.6 Å	750000.	0.566E-01	0.116E-02	0.630E-02	0.157E-02	*0.124E-01	*0.302E-02
C=0.21E+22	1000000.	0.504E-01	0.116E-02	0.730E-02	0.189E-02	*0.145E-01	*0.369E-02
	2000000.	0.389E-01	0.114E-02	0.875E-02	0.264E-02	*0.174E-01	*0.526E-02
	3000000.	0.340E-01	0.109E-02	0.954E-02	0.296E-02	0.188E-01	0.598E-02
	5000000.	0.291E-01	0.106E-02	0.106E-01	0.341E-02	0.205E-01	0.687E-02
PERTURBER DENSITY = 1.E+21cm-3							
Sc XI 3S-3P	500000.	2.47	-0.272E-01	0.519E-01	-0.343E-01	*0.975E-01	-0.572E-01
510.9 Å	750000.	2.05	-0.360E-01	0.811E-01	-0.523E-01	*0.157	-0.948E-01
C=0.51E+24	1000000.	1.81	-0.391E-01	0.106	-0.663E-01	0.207	-0.124
	2000000.	1.36	-0.377E-01	0.165	-0.103	0.327	-0.199
	3000000.	1.16	-0.372E-01	0.202	-0.126	0.401	-0.251
	5000000.	0.966	-0.378E-01	0.237	-0.147	0.463	-0.296
Sc XI 3S-4P	500000.	0.215	0.139E-02	*0.146E-01	*0.182E-02		
95.0 Å	750000.	0.181	0.173E-02	*0.183E-01	*0.269E-02		
C=0.68E+22	1000000.	0.161	0.147E-02	*0.214E-01	*0.341E-02		
	2000000.	0.125	0.155E-02	*0.258E-01	*0.513E-02		
	3000000.	0.109	0.150E-02	*0.282E-01	*0.608E-02		
	5000000.	0.930E-01	0.150E-02	0.315E-01	0.705E-02		
Sc XI 3P-4S	500000.	0.240	0.133E-01	0.130E-01	0.190E-01		
127.9 Å	750000.	0.204	0.147E-01	0.192E-01	0.246E-01		
C=0.12E+23	1000000.	0.183	0.146E-01	0.245E-01	0.296E-01		
	2000000.	0.142	0.150E-01	0.392E-01	0.402E-01		
	3000000.	0.124	0.150E-01	0.469E-01	0.450E-01		
	5000000.	0.105	0.143E-01	0.575E-01	0.521E-01		
Sc XI 3P-3D	500000.	1.46	-0.604E-02	0.469E-01	-0.620E-02	*0.878E-01	-0.104E-01
378.7 Å	750000.	1.21	-0.505E-02	0.687E-01	-0.984E-02	*0.133	-0.179E-01
C=0.28E+24	1000000.	1.07	-0.794E-02	0.858E-01	-0.131E-01	*0.167	-0.246E-01
	2000000.	0.795	-0.766E-02	0.123	-0.230E-01	*0.244	-0.448E-01
	3000000.	0.679	-0.700E-02	0.140	-0.280E-01	*0.279	-0.559E-01
	5000000.	0.566	-0.708E-02	0.155	-0.360E-01	0.308	-0.725E-01
Sc XI 3P-4D	500000.	0.260	0.109E-02	*0.181E-01	*0.942E-02		
104.9 Å	750000.	0.220	0.106E-02	*0.231E-01	*0.126E-01		
C=0.37E+22	1000000.	0.196	0.150E-02	*0.277E-01	*0.151E-01		
	2000000.	0.152	0.213E-02	*0.364E-01	*0.207E-01		
	3000000.	0.133	0.176E-02	*0.419E-01	*0.234E-01		
	5000000.	0.113	0.182E-02	*0.498E-01	*0.271E-01		
Sc XI 3P-5D	500000.	*0.327	-0.116E-02				
78.8 Å	750000.	0.282	0.125E-02				
C=0.11E+22	1000000.	0.255	0.259E-02				
	2000000.	0.204	0.274E-02				
	3000000.	0.180	0.251E-02				
	5000000.	0.157	0.395E-02				
Sc XI 4P-5D	500000.	*3.54	-0.262E-01				
242.7 Å	750000.	3.05	-0.756E-02				
C=0.10E+23	1000000.	2.77	0.615E-02				
	2000000.	2.22	0.738E-02				
	3000000.	1.97	0.559E-02				
	5000000.	1.72	0.192E-01				
Sc XI 3D-4P	500000.	0.672	0.853E-02	*0.498E-01	*0.100E-01		
168.6 Å	750000.	0.566	0.104E-01	*0.621E-01	*0.144E-01		
C=0.21E+23	1000000.	0.504	0.104E-01	*0.725E-01	*0.177E-01		
	2000000.	0.389	0.105E-01	*0.874E-01	*0.258E-01		
	3000000.	0.340	0.102E-01	*0.953E-01	*0.292E-01		
	5000000.	0.291	0.102E-01	0.106	0.340E-01		
PERTURBER DENSITY = 1.E+22cm-3							
Sc XI 3S-4P	500000.	*2.12	*0.219E-02				
95.0 Å	750000.	*1.79	*0.854E-02				
C=0.68E+23	1000000.	*1.60	*0.697E-02				
	2000000.	1.24	0.103E-01				
	3000000.	1.08	0.110E-01				
	5000000.	0.924	0.114E-01				

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Sc XI 3P-4S	500000.	*2.33	-0.177E-01				
127.9 Å	750000.	1.99	0.323E-01				
C=0.12E+24	1000000.	1.79	0.502E-01				
	2000000.	1.40	0.845E-01				
	3000000.	1.22	0.973E-01				
	5000000.	1.04	0.962E-01				
Sc XI 3P-3D	500000.	14.6	-0.285E-01	*0.395	-0.408E-01		
378.7 Å	750000.	12.1	-0.255E-01	*0.653	-0.798E-01		
C=0.28E+25	1000000.	10.7	-0.584E-01	*0.834	-0.114		
	2000000.	7.95	-0.626E-01	*1.22	-0.214		
	3000000.	6.79	-0.587E-01	*1.40	-0.269		
	5000000.	5.66	-0.601E-01	*1.55	-0.354		
Sc XI 3P-4D	500000.	*2.49	-0.296E-01				
104.9 Å	750000.	*2.12	-0.224E-01				
C=0.37E+23	1000000.	*1.89	-0.129E-01				
	2000000.	1.47	0.178E-02				
	3000000.	1.29	0.126E-02				
	5000000.	1.10	0.171E-02				
Sc XI 3P-5D	500000.						
78.8 Å	750000.						
C=0.11E+23	1000000.	*2.24	-0.178E-01				
	2000000.	*1.83	-0.600E-02				
	3000000.	1.64	-0.198E-02				
	5000000.	1.44	0.406E-02				
Sc XI 3D-4P	500000.	*6.63	*0.199E-01				
168.6 Å	750000.	*5.60	*0.546E-01				
C=0.21E+24	1000000.	*4.99	*0.625E-01				
	2000000.	3.86	0.767E-01				
	3000000.	3.37	0.790E-01				
	5000000.	2.89	0.823E-01				

Table 3. This table shows electron-, proton-, and He III-impact broadening parameters for Ti XI for perturber densities of 10^{18}— 10^{22} cm^{-3} and temperatures from 500,000 to 5,000,000 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)
Ti XI 3S 3P	500000.	0.129E-02	-0.146E-04	0.258E-04	-0.141E-04	0.504E-04	-0.282E-04
386.1 Å	750000.	0.107E-02	-0.155E-04	0.401E-04	-0.204E-04	0.789E-04	-0.409E-04
C=0.39E+21	1000000.	0.943E-03	-0.181E-04	0.518E-04	-0.258E-04	0.102E-03	-0.517E-04
	2000000.	0.704E-03	-0.174E-04	0.802E-04	-0.400E-04	0.159E-03	-0.807E-04
	3000000.	0.601E-03	-0.171E-04	0.986E-04	-0.486E-04	0.196E-03	-0.980E-04
	5000000.	0.500E-03	-0.163E-04	0.113E-03	-0.589E-04	0.223E-03	-0.119E-03
Ti XI 3P 4S	500000.	0.213E-03	0.164E-04	0.113E-04	0.213E-04	0.223E-04	0.429E-04
123.9 Å	750000.	0.181E-03	0.168E-04	0.171E-04	0.258E-04	0.343E-04	0.518E-04
C=0.11E+20	1000000.	0.162E-03	0.162E-04	0.218E-04	0.298E-04	0.437E-04	0.599E-04
	2000000.	0.126E-03	0.154E-04	0.352E-04	0.373E-04	0.697E-04	0.752E-04
	3000000.	0.110E-03	0.149E-04	0.423E-04	0.416E-04	0.826E-04	0.839E-04
	5000000.	0.932E-04	0.132E-04	0.515E-04	0.473E-04	0.981E-04	0.951E-04
Ti XI 3P 5S	500000.	0.176E-03	0.255E-04	0.245E-04	0.357E-04	0.492E-04	0.719E-04
81.1 Å	750000.	0.153E-03	0.248E-04	0.351E-04	0.417E-04	0.703E-04	0.842E-04
C=0.25E+19	1000000.	0.139E-03	0.245E-04	0.405E-04	0.448E-04	0.809E-04	0.901E-04
	2000000.	0.111E-03	0.231E-04	0.541E-04	0.540E-04	0.106E-03	0.108E-03
	3000000.	0.985E-04	0.209E-04	0.633E-04	0.600E-04	0.121E-03	0.120E-03
	5000000.	0.843E-04	0.177E-04	0.776E-04	0.667E-04	0.141E-03	0.134E-03
Ti XI 3P 3D	500000.	0.104E-02	-0.549E-05	0.325E-04	-0.513E-05	0.637E-04	-0.103E-04
327.2 Å	750000.	0.858E-03	-0.460E-05	0.476E-04	-0.758E-05	0.936E-04	-0.152E-04
C=0.28E+21	1000000.	0.753E-03	-0.590E-05	0.595E-04	-0.979E-05	0.117E-03	-0.196E-04
	2000000.	0.560E-03	-0.614E-05	0.859E-04	-0.164E-04	0.170E-03	-0.330E-04
	3000000.	0.478E-03	-0.532E-05	0.985E-04	-0.200E-04	0.196E-03	-0.404E-04
	5000000.	0.398E-03	-0.532E-05	0.109E-03	-0.256E-04	0.216E-03	-0.516E-04
PERTURBER DENSITY = 1.E+19cm-3							
Ti XI 3S 3P	500000.	0.129E-01	-0.142E-03	0.258E-03	-0.140E-03	0.503E-03	-0.275E-03
386.1 Å	750000.	0.107E-01	-0.155E-03	0.401E-03	-0.204E-03	0.788E-03	-0.405E-03
C=0.39E+22	1000000.	0.943E-02	-0.179E-03	0.518E-03	-0.258E-03	0.102E-02	-0.514E-03
	2000000.	0.704E-02	-0.174E-03	0.802E-03	-0.400E-03	0.159E-02	-0.806E-03
	3000000.	0.601E-02	-0.171E-03	0.986E-03	-0.486E-03	0.196E-02	-0.979E-03
	5000000.	0.500E-02	-0.162E-03	0.113E-02	-0.589E-03	0.223E-02	-0.119E-02
Ti XI 3P 4S	500000.	0.213E-02	0.161E-03	0.113E-03	0.211E-03	0.224E-03	0.414E-03
123.9 Å	750000.	0.181E-02	0.165E-03	0.171E-03	0.258E-03	0.343E-03	0.511E-03
C=0.11E+21	1000000.	0.162E-02	0.159E-03	0.218E-03	0.297E-03	0.437E-03	0.593E-03
	2000000.	0.126E-02	0.154E-03	0.352E-03	0.373E-03	0.697E-03	0.750E-03
	3000000.	0.110E-02	0.149E-03	0.423E-03	0.416E-03	0.826E-03	0.838E-03
	5000000.	0.932E-03	0.131E-03	0.515E-03	0.473E-03	0.981E-03	0.951E-03
Ti XI 3P 5S	500000.	0.177E-02	0.245E-03	0.245E-03	0.352E-03	0.490E-03	0.682E-03
81.1 Å	750000.	0.153E-02	0.243E-03	0.351E-03	0.417E-03	0.703E-03	0.824E-03
C=0.25E+20	1000000.	0.139E-02	0.239E-03	0.405E-03	0.447E-03	0.809E-03	0.887E-03
	2000000.	0.111E-02	0.230E-03	0.541E-03	0.540E-03	0.106E-02	0.108E-02
	3000000.	0.985E-03	0.208E-03	0.633E-03	0.600E-03	0.121E-02	0.120E-02
	5000000.	0.843E-03	0.177E-03	0.776E-03	0.667E-03	0.141E-02	0.134E-02
Ti XI 3P 3D	500000.	0.104E-01	-0.560E-04	0.325E-03	-0.509E-04	0.637E-03	-0.999E-04
327.2 Å	750000.	0.858E-02	-0.450E-04	0.476E-03	-0.757E-04	0.936E-03	-0.150E-03
C=0.28E+22	1000000.	0.753E-02	-0.568E-04	0.595E-03	-0.978E-04	0.117E-02	-0.195E-03
	2000000.	0.560E-02	-0.614E-04	0.859E-03	-0.164E-03	0.170E-02	-0.330E-03
	3000000.	0.478E-02	-0.531E-04	0.985E-03	-0.200E-03	0.196E-02	-0.403E-03
	5000000.	0.398E-02	-0.532E-04	0.109E-02	-0.256E-03	0.216E-02	-0.516E-03

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+20cm-3							
Ti XI 3S 3P	500000.	0.129	-0.138E-02	0.257E-02	-0.134E-02	0.500E-02	-0.253E-02
386.1 Å	750000.	0.107	-0.149E-02	0.401E-02	-0.199E-02	0.787E-02	-0.385E-02
C=0.39E+23	1000000.	0.943E-01	-0.176E-02	0.518E-02	-0.255E-02	0.102E-01	-0.499E-02
	2000000.	0.704E-01	-0.171E-02	0.802E-02	-0.400E-02	0.159E-01	-0.799E-02
	3000000.	0.601E-01	-0.169E-02	0.985E-02	-0.486E-02	0.196E-01	-0.978E-02
	5000000.	0.500E-01	-0.162E-02	0.113E-01	-0.589E-02	0.223E-01	-0.119E-01
Ti XI 3P 4S	500000.	0.213E-01	0.150E-02	0.113E-02	0.199E-02	0.223E-02	0.372E-02
123.9 Å	750000.	0.181E-01	0.156E-02	0.171E-02	0.248E-02	0.343E-02	0.473E-02
C=0.11E+22	1000000.	0.162E-01	0.151E-02	0.218E-02	0.292E-02	0.437E-02	0.565E-02
	2000000.	0.126E-01	0.148E-02	0.352E-02	0.372E-02	0.697E-02	0.737E-02
	3000000.	0.110E-01	0.146E-02	0.423E-02	0.415E-02	0.826E-02	0.836E-02
	5000000.	0.932E-02	0.131E-02	0.515E-02	0.473E-02	0.981E-02	0.948E-02
Ti XI 3P 5S	500000.	0.177E-01	0.219E-02	0.244E-02	0.323E-02		
81.1 Å	750000.	0.153E-01	0.221E-02	0.351E-02	0.393E-02		
C=0.25E+21	1000000.	0.139E-01	0.219E-02	0.405E-02	0.436E-02		
	2000000.	0.111E-01	0.215E-02	0.541E-02	0.538E-02	*0.106E-01	*0.105E-01
	3000000.	0.985E-02	0.201E-02	0.634E-02	0.598E-02	*0.121E-01	*0.119E-01
	5000000.	0.843E-02	0.176E-02	0.776E-02	0.667E-02	*0.141E-01	*0.134E-01
Ti XI 3P 3D	500000.	0.104	-0.548E-03	0.325E-02	-0.488E-03	0.632E-02	-0.919E-03
327.2 Å	750000.	0.858E-01	-0.425E-03	0.475E-02	-0.739E-03	0.933E-02	-0.143E-02
C=0.28E+23	1000000.	0.753E-01	-0.564E-03	0.595E-02	-0.969E-03	0.117E-01	-0.190E-02
	2000000.	0.560E-01	-0.609E-03	0.859E-02	-0.164E-02	0.170E-01	-0.328E-02
	3000000.	0.478E-01	-0.523E-03	0.985E-02	-0.200E-02	0.196E-01	-0.403E-02
	5000000.	0.398E-01	-0.531E-03	0.109E-01	-0.256E-02	0.216E-01	-0.515E-02
PERTURBER DENSITY = 1.E+21cm-3							
Ti XI 3S 3P	500000.	1.29	-0.120E-01	0.254E-01	-0.119E-01	0.477E-01	-0.198E-01
386.1 Å	750000.	1.07	-0.136E-01	0.399E-01	-0.185E-01	0.773E-01	-0.336E-01
C=0.39E+24	1000000.	0.943	-0.164E-01	0.517E-01	-0.241E-01	0.101	-0.451E-01
	2000000.	0.704	-0.162E-01	0.801E-01	-0.394E-01	0.158	-0.766E-01
	3000000.	0.601	-0.161E-01	0.985E-01	-0.481E-01	0.196	-0.959E-01
	5000000.	0.500	-0.159E-01	0.113	-0.588E-01	0.223	-0.118
Ti XI 3P 4S	500000.	0.213	0.115E-01	0.112E-01	0.170E-01		
123.9 Å	750000.	0.181	0.127E-01	0.170E-01	0.221E-01		
C=0.11E+23	1000000.	0.162	0.127E-01	0.218E-01	0.266E-01		
	2000000.	0.126	0.130E-01	0.352E-01	0.361E-01		
	3000000.	0.110	0.130E-01	0.423E-01	0.406E-01		
	5000000.	0.932E-01	0.124E-01	0.515E-01	0.471E-01		
Ti XI 3P 5S	500000.	0.175	0.128E-01				
81.1 Å	750000.	0.152	0.149E-01				
C=0.25E+22	1000000.	0.138	0.158E-01				
	2000000.	0.111	0.170E-01				
	3000000.	0.979E-01	0.161E-01				
	5000000.	0.839E-01	0.158E-01				
Ti XI 3P 3D	500000.	1.04	-0.482E-02	0.320E-01	-0.433E-02	*0.600E-01	-0.723E-02
327.2 Å	750000.	0.858	-0.376E-02	0.472E-01	-0.688E-02	*0.914E-01	-0.125E-01
C=0.28E+24	1000000.	0.753	-0.517E-02	0.593E-01	-0.919E-02	*0.116	-0.172E-01
	2000000.	0.560	-0.569E-02	0.858E-01	-0.162E-01	*0.170	-0.316E-01
	3000000.	0.478	-0.496E-02	0.984E-01	-0.199E-01	*0.196	-0.396E-01
	5000000.	0.398	-0.519E-02	0.109	-0.256E-01	0.216	-0.514E-01
PERTURBER DENSITY = 1.E+22cm-3							
Ti XI 3S 3P	500000.	12.9	-0.553E-01	*0.218	-0.778E-01		
386.1 Å	750000.	10.7	-0.862E-01	*0.383	-0.149		
C=0.39E+25	1000000.	9.43	-0.122	0.505	-0.208		
	2000000.	7.04	-0.134	0.797	-0.363		
	3000000.	6.01	-0.138	0.983	-0.460		
	5000000.	5.00	-0.138	1.13	-0.576		

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XI 3P 4S	500000.	*2.07	-0.177E-01				
123.9 Å	750000.	1.77	0.255E-01				
C=0.11E+24	1000000.	1.58	0.423E-01				
	2000000.	1.24	0.720E-01				
	3000000.	1.08	0.834E-01				
	5000000.	0.917	0.822E-01				
Ti XI 3P 5S	500000.	*1.44	-0.114				
81.1 Å	750000.	*1.29	-0.434E-01				
C=0.25E+23	1000000.	*1.19	-0.409E-02				
	2000000.	0.985	0.597E-01				
	3000000.	0.880	0.699E-01				
	5000000.	0.763	0.719E-01				
Ti XI 3P 3D	500000.	10.4	-0.244E-01	*0.270	-0.285E-01		
327.2 Å	750000.	8.57	-0.200E-01	*0.449	-0.559E-01		
C=0.28E+25	1000000.	7.53	-0.367E-01	*0.577	-0.800E-01		
	2000000.	5.60	-0.468E-01	*0.851	-0.151		
	3000000.	4.78	-0.416E-01	*0.981	-0.191		
	5000000.	3.98	-0.442E-01	1.09	-0.251		

Table 4. This table shows electron-, proton-, and He III-impact broadening parameters for Ti XII for perturber densities of 10^{18}− 10^{23} cm^{-3} and temperatures from 500,000 to 5,000,000 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)
Ti XII 3S 3P	500000.	0.193E-02	-0.234E-04	0.289E-04	-0.254E-04	0.564E-04	-0.507E-04
466.9 Å	750000.	0.160E-02	-0.267E-04	0.473E-04	-0.368E-04	0.929E-04	-0.736E-04
C=0.47E+21	1000000.	0.141E-02	-0.308E-04	0.630E-04	-0.464E-04	0.124E-03	-0.930E-04
	2000000.	0.105E-02	-0.285E-04	0.105E-03	-0.718E-04	0.208E-03	-0.145E-03
	4000000.	0.798E-03	-0.276E-04	0.152E-03	-0.988E-04	0.301E-03	-0.199E-03
	6000000.	0.689E-03	-0.272E-04	0.173E-03	-0.110E-03	0.336E-03	-0.221E-03
Ti XII 3S 4P	500000.	0.149E-03	0.874E-06	0.810E-05	0.112E-05	0.159E-04	0.223E-05
82.2 Å	750000.	0.125E-03	0.111E-05	0.106E-04	0.160E-05	0.211E-04	0.320E-05
C=0.56E+19	1000000.	0.111E-03	0.108E-05	0.123E-04	0.197E-05	0.243E-04	0.396E-05
	2000000.	0.848E-04	0.102E-05	0.159E-04	0.293E-05	0.317E-04	0.590E-05
	4000000.	0.668E-04	0.958E-06	0.185E-04	0.398E-05	0.359E-04	0.804E-05
	6000000.	0.588E-04	0.858E-06	0.203E-04	0.442E-05	0.384E-04	0.894E-05
Ti XII 3S 5P	500000.	0.174E-03	0.379E-05	0.177E-04	0.496E-05	0.350E-04	0.989E-05
60.7 Å	750000.	0.149E-03	0.352E-05	0.215E-04	0.612E-05	0.427E-04	0.123E-04
C=0.15E+19	1000000.	0.133E-03	0.351E-05	0.234E-04	0.709E-05	0.465E-04	0.142E-04
	2000000.	0.105E-03	0.330E-05	0.270E-04	0.898E-05	0.532E-04	0.181E-04
	4000000.	0.852E-04	0.300E-05	0.314E-04	0.108E-04	0.599E-04	0.218E-04
	6000000.	0.763E-04	0.265E-05	0.339E-04	0.120E-04	0.624E-04	0.243E-04
Ti XII 4S 4P	500000.	0.386E-01	-0.963E-03	0.191E-02	-0.131E-02	0.376E-02	-0.261E-02
1204.5 Å	750000.	0.326E-01	-0.101E-02	0.252E-02	-0.170E-02	0.501E-02	-0.342E-02
C=0.12E+22	1000000.	0.291E-01	-0.911E-03	0.299E-02	-0.193E-02	0.592E-02	-0.388E-02
	2000000.	0.226E-01	-0.883E-03	0.401E-02	-0.259E-02	0.795E-02	-0.524E-02
	4000000.	0.179E-01	-0.816E-03	0.499E-02	-0.310E-02	0.955E-02	-0.627E-02
	6000000.	0.158E-01	-0.714E-03	0.573E-02	-0.344E-02	0.105E-01	-0.693E-02
Ti XII 4S 5P	500000.	0.197E-02	0.890E-05	0.180E-03	0.154E-04	0.356E-03	0.306E-04
194.8 Å	750000.	0.168E-02	0.366E-05	0.218E-03	0.207E-04	0.433E-03	0.415E-04
C=0.15E+20	1000000.	0.151E-02	0.624E-05	0.236E-03	0.251E-04	0.470E-03	0.504E-04
	2000000.	0.119E-02	0.518E-05	0.271E-03	0.349E-04	0.532E-03	0.701E-04
	4000000.	0.970E-03	0.410E-05	0.316E-03	0.433E-04	0.592E-03	0.873E-04
	6000000.	0.869E-03	0.375E-05	0.343E-03	0.481E-04	0.614E-03	0.969E-04
Ti XII 5S 5P	500000.	0.379	-0.133E-01	0.326E-01	-0.216E-01	0.647E-01	-0.431E-01
2455.8 Å	750000.	0.327	-0.129E-01	0.405E-01	-0.265E-01	0.807E-01	-0.532E-01
C=0.25E+22	1000000.	0.295	-0.126E-01	0.443E-01	-0.293E-01	0.883E-01	-0.590E-01
	2000000.	0.236	-0.120E-01	0.543E-01	-0.350E-01	0.106	-0.706E-01
	4000000.	0.192	-0.977E-02	0.673E-01	-0.416E-01	0.124	-0.839E-01
	6000000.	0.172	-0.838E-02	0.768E-01	-0.456E-01	0.135	-0.923E-01
Ti XII 3P 4S	500000.	0.159E-03	0.107E-04	0.586E-05	0.132E-04	0.116E-04	0.263E-04
108.8 Å	750000.	0.134E-03	0.116E-04	0.105E-04	0.167E-04	0.210E-04	0.337E-04
C=0.98E+19	1000000.	0.120E-03	0.110E-04	0.129E-04	0.192E-04	0.258E-04	0.385E-04
	2000000.	0.923E-04	0.105E-04	0.230E-04	0.250E-04	0.459E-04	0.504E-04
	4000000.	0.726E-04	0.983E-05	0.311E-04	0.299E-04	0.607E-04	0.604E-04
	6000000.	0.636E-04	0.880E-05	0.365E-04	0.331E-04	0.691E-04	0.667E-04
Ti XII 3P 5S	500000.	0.127E-03	0.172E-04	0.144E-04	0.231E-04	0.289E-04	0.461E-04
71.8 Å	750000.	0.110E-03	0.166E-04	0.210E-04	0.278E-04	0.420E-04	0.560E-04
C=0.21E+19	1000000.	0.999E-04	0.164E-04	0.266E-04	0.303E-04	0.532E-04	0.610E-04
	2000000.	0.797E-04	0.156E-04	0.362E-04	0.363E-04	0.714E-04	0.735E-04
	4000000.	0.642E-04	0.132E-04	0.477E-04	0.432E-04	0.898E-04	0.875E-04
	6000000.	0.567E-04	0.115E-04	0.543E-04	0.471E-04	0.994E-04	0.946E-04
Ti XII 3P 6S	500000.	0.182E-03	0.317E-04	0.394E-04	0.484E-04	0.787E-04	0.963E-04
61.2 Å	750000.	0.159E-03	0.313E-04	0.489E-04	0.538E-04	0.975E-04	0.108E-03
C=0.84E+18	1000000.	0.146E-03	0.307E-04	0.559E-04	0.581E-04	0.111E-03	0.117E-03
	2000000.	0.118E-03	0.279E-04	0.722E-04	0.692E-04	0.140E-03	0.139E-03
	4000000.	0.962E-04	0.224E-04	0.946E-04	0.799E-04	0.174E-03	0.162E-03
	6000000.	0.851E-04	0.194E-04	0.105E-03	0.864E-04	0.189E-03	0.173E-03

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3P 7S	500000.	0.288E-03	0.583E-04	0.807E-04	0.885E-04	0.162E-03	0.175E-03
56.3 Å	750000.	0.254E-03	0.568E-04	0.960E-04	0.978E-04	0.193E-03	0.198E-03
C=0.46E+18	1000000.	0.233E-03	0.565E-04	0.107E-03	0.106E-03	0.211E-03	0.214E-03
	2000000.	0.190E-03	0.479E-04	0.138E-03	0.124E-03	0.262E-03	0.251E-03
	4000000.	0.155E-03	0.377E-04	0.171E-03	0.140E-03	0.318E-03	0.285E-03
	6000000.	0.137E-03	0.331E-04	0.185E-03	0.152E-03	0.334E-03	0.305E-03
Ti XII 4P 5S	500000.	0.249E-02	0.204E-03	0.206E-03	0.286E-03	0.412E-03	0.569E-03
256.7 Å	750000.	0.214E-02	0.193E-03	0.291E-03	0.345E-03	0.582E-03	0.694E-03
C=0.27E+20	1000000.	0.193E-02	0.190E-03	0.357E-03	0.376E-03	0.715E-03	0.758E-03
	2000000.	0.153E-02	0.180E-03	0.476E-03	0.452E-03	0.935E-03	0.913E-03
	4000000.	0.123E-02	0.151E-03	0.618E-03	0.539E-03	0.116E-02	0.108E-02
	6000000.	0.109E-02	0.131E-03	0.703E-03	0.579E-03	0.129E-02	0.116E-02
Ti XII 4P 6S	500000.	0.154E-02	0.206E-03	0.266E-03	0.321E-03	0.532E-03	0.640E-03
158.2 Å	750000.	0.134E-02	0.202E-03	0.329E-03	0.357E-03	0.657E-03	0.719E-03
C=0.57E+19	1000000.	0.122E-02	0.197E-03	0.375E-03	0.386E-03	0.745E-03	0.777E-03
	2000000.	0.984E-03	0.180E-03	0.483E-03	0.458E-03	0.939E-03	0.923E-03
	4000000.	0.799E-03	0.143E-03	0.631E-03	0.532E-03	0.115E-02	0.107E-02
	6000000.	0.708E-03	0.123E-03	0.703E-03	0.574E-03	0.127E-02	0.115E-02
Ti XII 4P 7S	500000.	0.174E-02	0.304E-03	0.427E-03	0.466E-03	0.859E-03	0.923E-03
129.5 Å	750000.	0.152E-02	0.295E-03	0.508E-03	0.515E-03	0.102E-02	0.104E-02
C=0.24E+19	1000000.	0.140E-02	0.293E-03	0.567E-03	0.557E-03	0.111E-02	0.113E-02
	2000000.	0.113E-02	0.248E-03	0.726E-03	0.654E-03	0.138E-02	0.132E-02
	4000000.	0.924E-03	0.195E-03	0.901E-03	0.740E-03	0.168E-02	0.150E-02
	6000000.	0.817E-03	0.171E-03	0.982E-03	0.799E-03	0.176E-02	0.160E-02
Ti XII 5P 6S	500000.	0.213E-01	0.180E-02	0.284E-02	0.303E-02	0.567E-02	0.604E-02
495.6 Å	750000.	0.185E-01	0.179E-02	0.340E-02	0.337E-02	0.680E-02	0.679E-02
C=0.55E+20	1000000.	0.168E-01	0.174E-02	0.383E-02	0.364E-02	0.762E-02	0.733E-02
	2000000.	0.136E-01	0.158E-02	0.489E-02	0.431E-02	0.955E-02	0.870E-02
	4000000.	0.111E-01	0.124E-02	0.618E-02	0.501E-02	0.114E-01	0.101E-01
	6000000.	0.989E-02	0.107E-02	0.717E-02	0.539E-02	0.128E-01	0.109E-01
Ti XII 5P 7S	500000.	0.110E-01	0.147E-02	0.220E-02	0.234E-02	0.444E-02	0.465E-02
292.3 Å	750000.	0.961E-02	0.143E-02	0.262E-02	0.260E-02	0.521E-02	0.525E-02
C=0.12E+20	1000000.	0.878E-02	0.142E-02	0.290E-02	0.281E-02	0.567E-02	0.565E-02
	2000000.	0.714E-02	0.120E-02	0.370E-02	0.330E-02	0.711E-02	0.660E-02
	4000000.	0.583E-02	0.935E-03	0.464E-02	0.374E-02	0.851E-02	0.761E-02
	6000000.	0.519E-02	0.819E-03	0.505E-02	0.401E-02	0.900E-02	0.808E-02
Ti XII 3P 3D	500000.	0.115E-02	-0.654E-05	0.265E-04	-0.448E-05	0.519E-04	-0.891E-05
346.9 Å	750000.	0.950E-03	-0.432E-05	0.407E-04	-0.666E-05	0.800E-04	-0.133E-04
C=0.26E+21	1000000.	0.833E-03	-0.512E-05	0.521E-04	-0.871E-05	0.103E-03	-0.174E-04
	2000000.	0.616E-03	-0.660E-05	0.787E-04	-0.150E-04	0.156E-03	-0.302E-04
	4000000.	0.468E-03	-0.532E-05	0.102E-03	-0.220E-04	0.203E-03	-0.442E-04
	6000000.	0.404E-03	-0.502E-05	0.111E-03	-0.267E-04	0.219E-03	-0.537E-04
Ti XII 3P 4D	500000.	0.176E-03	0.234E-05	0.949E-05	0.596E-05	0.187E-04	0.119E-04
90.3 Å	750000.	0.148E-03	0.191E-05	0.128E-04	0.787E-05	0.253E-04	0.158E-04
C=0.32E+19	1000000.	0.131E-03	0.184E-05	0.151E-04	0.900E-05	0.295E-04	0.181E-04
	2000000.	0.100E-03	0.196E-05	0.212E-04	0.123E-04	0.404E-04	0.248E-04
	4000000.	0.791E-04	0.141E-05	0.268E-04	0.147E-04	0.480E-04	0.298E-04
	6000000.	0.696E-04	0.121E-05	0.310E-04	0.163E-04	0.531E-04	0.331E-04
Ti XII 3P 5D	500000.	0.219E-03	0.519E-05	0.227E-04	0.174E-04	0.448E-04	0.347E-04
67.4 Å	750000.	0.187E-03	0.544E-05	0.291E-04	0.212E-04	0.571E-04	0.427E-04
C=0.89E+18	1000000.	0.168E-03	0.541E-05	0.325E-04	0.234E-04	0.635E-04	0.471E-04
	2000000.	0.132E-03	0.468E-05	0.415E-04	0.279E-04	0.775E-04	0.564E-04
	4000000.	0.107E-03	0.353E-05	0.532E-04	0.332E-04	0.935E-04	0.675E-04
	6000000.	0.953E-04	0.316E-05	0.610E-04	0.362E-04	0.101E-03	0.731E-04
Ti XII 3P 6D	500000.	0.339E-03	0.122E-04	0.543E-04	0.422E-04	0.107E-03	0.840E-04
59.3 Å	750000.	0.294E-03	0.123E-04	0.626E-04	0.468E-04	0.122E-03	0.941E-04
C=0.39E+18	1000000.	0.267E-03	0.121E-04	0.689E-04	0.506E-04	0.133E-03	0.102E-03
	2000000.	0.215E-03	0.909E-05	0.871E-04	0.601E-04	0.161E-03	0.122E-03
	4000000.	0.176E-03	0.720E-05	0.108E-03	0.695E-04	0.186E-03	0.141E-03
	6000000.	0.158E-03	0.651E-05	0.124E-03	0.757E-04	0.200E-03	0.153E-03

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 4P 4D	500000.	0.276E-01	0.462E-04	0.184E-02	0.455E-03	0.364E-02	0.907E-03
951.5 Å	750000.	0.234E-01	-0.469E-04	0.229E-02	0.608E-03	0.451E-02	0.122E-02
C=0.35E+21	1000000.	0.209E-01	-0.686E-04	0.267E-02	0.723E-03	0.525E-02	0.145E-02
	2000000.	0.162E-01	-0.370E-04	0.330E-02	0.997E-03	0.635E-02	0.201E-02
	4000000.	0.129E-01	-0.860E-04	0.401E-02	0.122E-02	0.727E-02	0.246E-02
	6000000.	0.115E-01	-0.932E-04	0.452E-02	0.135E-02	0.779E-02	0.273E-02
Ti XII 4P 5D	500000.	0.237E-02	0.392E-04	0.239E-03	0.159E-03	0.472E-03	0.318E-03
208.1 Å	750000.	0.203E-02	0.394E-04	0.299E-03	0.195E-03	0.588E-03	0.392E-03
C=0.85E+19	1000000.	0.182E-02	0.385E-04	0.330E-03	0.215E-03	0.644E-03	0.433E-03
	2000000.	0.144E-02	0.323E-04	0.415E-03	0.257E-03	0.774E-03	0.518E-03
	4000000.	0.117E-02	0.220E-04	0.527E-03	0.308E-03	0.909E-03	0.617E-03
	6000000.	0.105E-02	0.192E-04	0.599E-03	0.334E-03	0.993E-03	0.676E-03
Ti XII 4P 6D	500000.	0.219E-02	0.692E-04	0.337E-03	0.255E-03	0.666E-03	0.507E-03
146.4 Å	750000.	0.189E-02	0.686E-04	0.387E-03	0.283E-03	0.754E-03	0.569E-03
C=0.24E+19	1000000.	0.172E-02	0.675E-04	0.426E-03	0.306E-03	0.821E-03	0.618E-03
	2000000.	0.139E-02	0.493E-04	0.537E-03	0.364E-03	0.994E-03	0.738E-03
	4000000.	0.114E-02	0.381E-04	0.662E-03	0.419E-03	0.114E-02	0.850E-03
	6000000.	0.102E-02	0.343E-04	0.763E-03	0.459E-03	0.122E-02	0.921E-03
Ti XII 5P 5D	500000.	0.290	0.228E-04	0.314E-01	0.116E-01	0.620E-01	0.231E-01
1985.9 Å	750000.	0.250	0.475E-03	0.364E-01	0.140E-01	0.719E-01	0.282E-01
C=0.77E+21	1000000.	0.226	0.378E-03	0.389E-01	0.159E-01	0.760E-01	0.320E-01
	2000000.	0.181	0.673E-05	0.468E-01	0.191E-01	0.879E-01	0.383E-01
	4000000.	0.148	-0.644E-03	0.567E-01	0.229E-01	0.992E-01	0.459E-01
	6000000.	0.133	-0.580E-03	0.633E-01	0.246E-01	0.103	0.497E-01
Ti XII 5P 6D	500000.	0.184E-01	0.365E-03	0.265E-02	0.178E-02	0.524E-02	0.356E-02
395.8 Å	750000.	0.160E-01	0.378E-03	0.301E-02	0.198E-02	0.588E-02	0.398E-02
C=0.17E+20	1000000.	0.145E-01	0.369E-03	0.329E-02	0.215E-02	0.631E-02	0.431E-02
	2000000.	0.118E-01	0.244E-03	0.412E-02	0.258E-02	0.750E-02	0.518E-02
	4000000.	0.972E-02	0.173E-03	0.501E-02	0.293E-02	0.849E-02	0.592E-02
	6000000.	0.875E-02	0.158E-03	0.572E-02	0.320E-02	0.903E-02	0.640E-02
Ti XII 3D 4P	500000.	0.430E-03	0.570E-05	0.256E-04	0.606E-05	0.503E-04	0.121E-04
140.0 Å	750000.	0.360E-03	0.632E-05	0.332E-04	0.831E-05	0.658E-04	0.167E-04
C=0.16E+20	1000000.	0.319E-03	0.674E-05	0.384E-04	0.102E-04	0.761E-04	0.204E-04
	2000000.	0.244E-03	0.659E-05	0.495E-04	0.144E-04	0.984E-04	0.290E-04
	4000000.	0.192E-03	0.613E-05	0.575E-04	0.181E-04	0.112E-03	0.365E-04
	6000000.	0.169E-03	0.575E-05	0.631E-04	0.203E-04	0.120E-03	0.410E-04
Ti XII 3D 5P	500000.	0.358E-03	0.909E-05	0.374E-04	0.111E-04	0.741E-04	0.222E-04
87.4 Å	750000.	0.305E-03	0.850E-05	0.455E-04	0.136E-04	0.904E-04	0.273E-04
C=0.31E+19	1000000.	0.274E-03	0.868E-05	0.493E-04	0.157E-04	0.982E-04	0.317E-04
	2000000.	0.216E-03	0.826E-05	0.570E-04	0.198E-04	0.112E-03	0.400E-04
	4000000.	0.175E-03	0.751E-05	0.662E-04	0.239E-04	0.126E-03	0.482E-04
	6000000.	0.157E-03	0.675E-05	0.715E-04	0.264E-04	0.132E-03	0.530E-04
Ti XII 4D 5P	500000.	0.508E-02	0.802E-04	0.509E-03	0.773E-04	0.101E-02	0.154E-03
307.5 Å	750000.	0.434E-02	0.797E-04	0.612E-03	0.101E-03	0.121E-02	0.203E-03
C=0.37E+20	1000000.	0.390E-02	0.821E-04	0.657E-03	0.115E-03	0.130E-02	0.231E-03
	2000000.	0.309E-02	0.743E-04	0.762E-03	0.156E-03	0.148E-02	0.315E-03
	4000000.	0.252E-02	0.724E-04	0.895E-03	0.187E-03	0.165E-02	0.378E-03
	6000000.	0.226E-02	0.656E-04	0.975E-03	0.208E-03	0.171E-02	0.417E-03
PERTURBER DENSITY = 1.E+19cm-3							
Ti XII 3S 3P	500000.	0.193E-01	-0.226E-03	0.289E-03	-0.252E-03	0.563E-03	-0.493E-03
466.9 Å	750000.	0.160E-01	-0.267E-03	0.473E-03	-0.367E-03	0.928E-03	-0.729E-03
C=0.47E+22	1000000.	0.141E-01	-0.306E-03	0.630E-03	-0.464E-03	0.124E-02	-0.924E-03
	2000000.	0.105E-01	-0.285E-03	0.105E-02	-0.718E-03	0.208E-02	-0.145E-02
	4000000.	0.798E-02	-0.275E-03	0.152E-02	-0.988E-03	0.301E-02	-0.199E-02
	6000000.	0.689E-02	-0.272E-03	0.173E-02	-0.110E-02	0.336E-02	-0.221E-02
Ti XII 3S 4P	500000.	0.149E-02	0.882E-05	0.810E-04	0.111E-04	0.159E-03	0.217E-04
82.2 Å	750000.	0.125E-02	0.108E-04	0.106E-03	0.160E-04	0.210E-03	0.317E-04
C=0.56E+20	1000000.	0.111E-02	0.107E-04	0.123E-03	0.197E-04	0.243E-03	0.393E-04
	2000000.	0.848E-03	0.102E-04	0.159E-03	0.293E-04	0.317E-03	0.590E-04
	4000000.	0.668E-03	0.957E-05	0.185E-03	0.398E-04	0.359E-03	0.804E-04
	6000000.	0.588E-03	0.857E-05	0.203E-03	0.442E-04	0.384E-03	0.894E-04

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3S 5P	500000.	0.174E-02	0.370E-04	0.177E-03	0.491E-04	0.350E-03	0.958E-04
60.7 Å	750000.	0.149E-02	0.345E-04	0.215E-03	0.612E-04	0.427E-03	0.122E-03
C=0.15E+20	1000000.	0.133E-02	0.345E-04	0.234E-03	0.708E-04	0.465E-03	0.141E-03
	2000000.	0.105E-02	0.327E-04	0.270E-03	0.897E-04	0.532E-03	0.181E-03
	4000000.	0.852E-03	0.299E-04	0.314E-03	0.108E-03	0.599E-03	0.218E-03
	6000000.	0.763E-03	0.264E-04	0.339E-03	0.120E-03	0.624E-03	0.243E-03
Ti XII 4S 4P	500000.	0.386	-0.950E-02	0.191E-01	-0.130E-01	0.376E-01	-0.253E-01
1204.5 Å	750000.	0.326	-0.993E-02	0.252E-01	-0.170E-01	0.501E-01	-0.338E-01
C=0.12E+23	1000000.	0.291	-0.894E-02	0.299E-01	-0.193E-01	0.592E-01	-0.384E-01
	2000000.	0.226	-0.875E-02	0.401E-01	-0.259E-01	0.795E-01	-0.523E-01
	4000000.	0.179	-0.815E-02	0.499E-01	-0.310E-01	0.955E-01	-0.627E-01
	6000000.	0.158	-0.713E-02	0.573E-01	-0.344E-01	0.105	-0.693E-01
Ti XII 4S 5P	500000.	0.197E-01	0.827E-04	0.180E-02	0.152E-03	0.356E-02	0.298E-03
194.8 Å	750000.	0.168E-01	0.351E-04	0.218E-02	0.207E-03	0.432E-02	0.411E-03
C=0.15E+21	1000000.	0.151E-01	0.607E-04	0.236E-02	0.251E-03	0.470E-02	0.500E-03
	2000000.	0.119E-01	0.506E-04	0.271E-02	0.348E-03	0.532E-02	0.700E-03
	4000000.	0.970E-02	0.408E-04	0.316E-02	0.433E-03	0.592E-02	0.873E-03
	6000000.	0.869E-02	0.374E-04	0.343E-02	0.481E-03	0.614E-02	0.969E-03
Ti XII 5S 5P	500000.	3.79	-0.128	0.326	-0.213	0.645	-0.414
2455.8 Å	750000.	3.27	-0.125	0.405	-0.264	0.807	-0.522
C=0.25E+23	1000000.	2.95	-0.122	0.443	-0.292	0.882	-0.581
	2000000.	2.36	-0.118	0.543	-0.349	1.06	-0.704
	4000000.	1.92	-0.974E-01	0.673	-0.416	1.24	-0.839
	6000000.	1.72	-0.836E-01	0.768	-0.456	1.35	-0.923
Ti XII 3P 4S	500000.	0.159E-02	0.105E-03	0.586E-04	0.131E-03	0.116E-03	0.255E-03
108.8 Å	750000.	0.134E-02	0.114E-03	0.105E-03	0.167E-03	0.210E-03	0.332E-03
C=0.98E+20	1000000.	0.120E-02	0.108E-03	0.129E-03	0.191E-03	0.258E-03	0.381E-03
	2000000.	0.923E-03	0.105E-03	0.230E-03	0.249E-03	0.459E-03	0.503E-03
	4000000.	0.726E-03	0.982E-04	0.311E-03	0.299E-03	0.607E-03	0.604E-03
	6000000.	0.636E-03	0.879E-04	0.365E-03	0.331E-03	0.691E-03	0.667E-03
Ti XII 3P 5S	500000.	0.128E-02	0.167E-03	0.144E-03	0.228E-03	0.289E-03	0.441E-03
71.8 Å	750000.	0.110E-02	0.162E-03	0.210E-03	0.278E-03	0.420E-03	0.549E-03
C=0.21E+20	1000000.	0.999E-03	0.160E-03	0.266E-03	0.302E-03	0.531E-03	0.600E-03
	2000000.	0.797E-03	0.154E-03	0.362E-03	0.362E-03	0.714E-03	0.733E-03
	4000000.	0.642E-03	0.132E-03	0.477E-03	0.432E-03	0.898E-03	0.875E-03
	6000000.	0.567E-03	0.115E-03	0.543E-03	0.471E-03	0.994E-03	0.946E-03
Ti XII 3P 6S	500000.	0.182E-02	0.302E-03	0.394E-03	0.474E-03	*0.787E-03	*0.907E-03
61.2 Å	750000.	0.160E-02	0.302E-03	0.489E-03	0.537E-03	*0.977E-03	*0.105E-02
C=0.84E+19	1000000.	0.146E-02	0.295E-03	0.559E-03	0.579E-03	*0.111E-02	*0.114E-02
	2000000.	0.118E-02	0.274E-03	0.722E-03	0.690E-03	*0.140E-02	*0.139E-02
	4000000.	0.962E-03	0.223E-03	0.946E-03	0.799E-03	*0.174E-02	*0.162E-02
	6000000.	0.851E-03	0.193E-03	0.105E-02	0.864E-03	*0.189E-02	*0.173E-02
Ti XII 3P 7S	500000.	0.288E-02	0.541E-03	0.808E-03	0.860E-03		
56.3 Å	750000.	0.254E-02	0.539E-03	0.960E-03	0.975E-03		
C=0.46E+19	1000000.	0.233E-02	0.535E-03	0.107E-02	0.105E-02		
	2000000.	0.190E-02	0.466E-03	0.138E-02	0.124E-02		
	4000000.	0.155E-02	0.375E-03	0.171E-02	0.140E-02	*0.318E-02	*0.285E-02
	6000000.	0.137E-02	0.329E-03	0.185E-02	0.152E-02	*0.334E-02	*0.305E-02
Ti XII 4P 5S	500000.	0.249E-01	0.198E-02	0.206E-02	0.281E-02	0.412E-02	0.545E-02
256.7 Å	750000.	0.214E-01	0.188E-02	0.291E-02	0.344E-02	0.583E-02	0.680E-02
C=0.27E+21	1000000.	0.193E-01	0.185E-02	0.357E-02	0.375E-02	0.714E-02	0.746E-02
	2000000.	0.153E-01	0.178E-02	0.476E-02	0.452E-02	0.935E-02	0.911E-02
	4000000.	0.123E-01	0.151E-02	0.618E-02	0.539E-02	0.116E-01	0.108E-01
	6000000.	0.109E-01	0.130E-02	0.703E-02	0.579E-02	0.129E-01	0.116E-01
Ti XII 4P 6S	500000.	0.154E-01	0.196E-02	0.266E-02	0.315E-02	*0.532E-02	*0.603E-02
158.2 Å	750000.	0.134E-01	0.195E-02	0.329E-02	0.356E-02	*0.657E-02	*0.698E-02
C=0.57E+20	1000000.	0.122E-01	0.190E-02	0.375E-02	0.384E-02	*0.746E-02	*0.758E-02
	2000000.	0.984E-02	0.176E-02	0.483E-02	0.458E-02	*0.939E-02	*0.920E-02
	4000000.	0.799E-02	0.143E-02	0.631E-02	0.532E-02	*0.115E-01	*0.107E-01
	6000000.	0.708E-02	0.123E-02	0.703E-02	0.574E-02	*0.127E-01	*0.115E-01

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 4P 7S	500000.	0.174E-01	0.282E-02	0.427E-02	0.453E-02		
129.5 Å	750000.	0.152E-01	0.280E-02	0.508E-02	0.513E-02		
C=0.24E+20	1000000.	0.140E-01	0.277E-02	0.567E-02	0.555E-02		
	2000000.	0.113E-01	0.241E-02	0.726E-02	0.652E-02		
	4000000.	0.924E-02	0.193E-02	0.901E-02	0.740E-02	*0.168E-01	*0.150E-01
	6000000.	0.817E-02	0.170E-02	0.982E-02	0.799E-02	*0.176E-01	*0.160E-01
Ti XII 5P 6S	500000.	0.213	0.170E-01	0.284E-01	0.297E-01	*0.567E-01	*0.570E-01
495.6 Å	750000.	0.185	0.172E-01	0.340E-01	0.336E-01	*0.680E-01	*0.660E-01
C=0.55E+21	1000000.	0.168	0.167E-01	0.383E-01	0.363E-01	*0.763E-01	*0.716E-01
	2000000.	0.136	0.155E-01	0.489E-01	0.430E-01	*0.955E-01	*0.867E-01
	4000000.	0.111	0.123E-01	0.618E-01	0.501E-01	*0.114	*0.101
	6000000.	0.989E-01	0.106E-01	0.717E-01	0.539E-01	*0.128	*0.109
Ti XII 5P 7S	500000.	0.110	0.136E-01	0.220E-01	0.228E-01		
292.3 Å	750000.	0.961E-01	0.136E-01	0.262E-01	0.259E-01		
C=0.12E+21	1000000.	0.878E-01	0.135E-01	0.290E-01	0.280E-01		
	2000000.	0.714E-01	0.117E-01	0.370E-01	0.329E-01		
	4000000.	0.583E-01	0.928E-02	0.464E-01	0.374E-01	*0.851E-01	*0.761E-01
	6000000.	0.519E-01	0.814E-02	0.505E-01	0.401E-01	*0.900E-01	*0.808E-01
Ti XII 3P 3D	500000.	0.115E-01	-0.679E-04	0.265E-03	-0.444E-04	0.519E-03	-0.868E-04
346.9 Å	750000.	0.951E-02	-0.428E-04	0.407E-03	-0.665E-04	0.800E-03	-0.132E-03
C=0.26E+22	1000000.	0.833E-02	-0.487E-04	0.521E-03	-0.870E-04	0.102E-02	-0.173E-03
	2000000.	0.616E-02	-0.668E-04	0.787E-03	-0.150E-03	0.156E-02	-0.302E-03
	4000000.	0.468E-02	-0.532E-04	0.102E-02	-0.220E-03	0.203E-02	-0.442E-03
	6000000.	0.404E-02	-0.501E-04	0.111E-02	-0.267E-03	0.219E-02	-0.537E-03
Ti XII 3P 4D	500000.	0.176E-02	0.223E-04	0.949E-04	0.590E-04	0.186E-03	0.115E-03
90.3 Å	750000.	0.148E-02	0.182E-04	0.128E-03	0.786E-04	0.253E-03	0.156E-03
C=0.32E+20	1000000.	0.131E-02	0.176E-04	0.151E-03	0.899E-04	0.295E-03	0.180E-03
	2000000.	0.100E-02	0.193E-04	0.212E-03	0.123E-03	0.404E-03	0.248E-03
	4000000.	0.791E-03	0.141E-04	0.268E-03	0.147E-03	0.480E-03	0.298E-03
	6000000.	0.696E-03	0.121E-04	0.310E-03	0.163E-03	0.531E-03	0.331E-03
Ti XII 3P 5D	500000.	0.219E-02	0.478E-04	0.227E-03	0.171E-03	0.447E-03	0.332E-03
67.4 Å	750000.	0.187E-02	0.517E-04	0.291E-03	0.212E-03	0.571E-03	0.419E-03
C=0.89E+19	1000000.	0.168E-02	0.511E-04	0.325E-03	0.233E-03	0.634E-03	0.463E-03
	2000000.	0.132E-02	0.456E-04	0.415E-03	0.279E-03	0.775E-03	0.562E-03
	4000000.	0.107E-02	0.350E-04	0.532E-03	0.332E-03	0.935E-03	0.675E-03
	6000000.	0.953E-03	0.314E-04	0.610E-03	0.362E-03	0.101E-02	0.731E-03
Ti XII 3P 6D	500000.	0.339E-02	0.108E-03	0.543E-03	0.413E-03	*0.107E-02	*0.793E-03
59.3 Å	750000.	0.294E-02	0.113E-03	0.626E-03	0.467E-03	*0.122E-02	*0.915E-03
C=0.39E+19	1000000.	0.267E-02	0.111E-03	0.689E-03	0.505E-03	*0.133E-02	*0.999E-03
	2000000.	0.215E-02	0.864E-04	0.871E-03	0.599E-03	*0.161E-02	*0.121E-02
	4000000.	0.176E-02	0.712E-04	0.108E-02	0.695E-03	*0.186E-02	*0.141E-02
	6000000.	0.158E-02	0.645E-04	0.124E-02	0.757E-03	*0.200E-02	*0.153E-02
Ti XII 4P	4500000.	0.276	0.360E-03	0.184E-01	0.450E-02	0.363E-01	0.881E-02
951.5 Å	750000.	0.234	-0.531E-03	0.229E-01	0.607E-02	0.451E-01	0.120E-01
C=0.35E+22	1000000.	0.209	-0.761E-03	0.267E-01	0.722E-02	0.525E-01	0.144E-01
	2000000.	0.162	-0.400E-03	0.330E-01	0.997E-02	0.635E-01	0.201E-01
	4000000.	0.129	-0.864E-03	0.401E-01	0.122E-01	0.727E-01	0.246E-01
	6000000.	0.115	-0.936E-03	0.452E-01	0.135E-01	0.779E-01	0.273E-01
Ti XII 4P 5D	500000.	0.237E-01	0.354E-03	0.239E-02	0.157E-02	0.471E-02	0.305E-02
208.1 Å	750000.	0.203E-01	0.370E-03	0.299E-02	0.194E-02	0.588E-02	0.385E-02
C=0.85E+20	1000000.	0.182E-01	0.357E-03	0.330E-02	0.215E-02	0.644E-02	0.427E-02
	2000000.	0.144E-01	0.312E-03	0.415E-02	0.257E-02	0.774E-02	0.517E-02
	4000000.	0.117E-01	0.217E-03	0.527E-02	0.308E-02	0.909E-02	0.617E-02
	6000000.	0.105E-01	0.190E-03	0.599E-02	0.334E-02	0.993E-02	0.676E-02
Ti XII 4P 6D	500000.	0.219E-01	0.607E-03	0.337E-02	0.250E-02	*0.664E-02	*0.479E-02
146.4 Å	750000.	0.189E-01	0.629E-03	0.387E-02	0.282E-02	*0.754E-02	*0.553E-02
C=0.24E+20	1000000.	0.172E-01	0.612E-03	0.426E-02	0.305E-02	*0.821E-02	*0.604E-02
	2000000.	0.139E-01	0.466E-03	0.537E-02	0.363E-02	*0.994E-02	*0.735E-02
	4000000.	0.114E-01	0.376E-03	0.662E-02	0.419E-02	*0.114E-01	*0.850E-02
	6000000.	0.102E-01	0.339E-03	0.763E-02	0.459E-02	*0.122E-01	*0.921E-02

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 5P 5D	500000.	2.90	-0.217E-02	0.314	0.114	*0.619	*0.222
1985.9 Å	750000.	2.50	0.307E-02	0.364	0.140	*0.718	*0.278
C=0.77E+22	1000000.	2.26	0.189E-02	0.389	0.158	*0.760	*0.315
	2000000.	1.81	-0.616E-03	0.468	0.190	0.879	0.383
	4000000.	1.48	-0.659E-02	0.567	0.229	0.992	0.459
	6000000.	1.33	-0.592E-02	0.633	0.246	1.03	0.497
Ti XII 5P 6D	500000.	0.184	0.307E-02	0.265E-01	0.175E-01	*0.522E-01	*0.336E-01
395.8 Å	750000.	0.160	0.338E-02	0.301E-01	0.198E-01	*0.587E-01	*0.387E-01
C=0.17E+21	1000000.	0.145	0.326E-02	0.329E-01	0.214E-01	*0.630E-01	*0.422E-01
	2000000.	0.118	0.225E-02	0.412E-01	0.257E-01	*0.750E-01	*0.516E-01
	4000000.	0.972E-01	0.170E-02	0.501E-01	0.293E-01	*0.849E-01	*0.592E-01
	6000000.	0.875E-01	0.155E-02	0.572E-01	0.320E-01	*0.903E-01	*0.640E-01
Ti XII 3D 4P	500000.	0.430E-02	0.570E-04	0.255E-03	0.600E-04	0.503E-03	0.117E-03
140.0 Å	750000.	0.360E-02	0.622E-04	0.332E-03	0.830E-04	0.658E-03	0.165E-03
C=0.16E+21	1000000.	0.319E-02	0.667E-04	0.384E-03	0.102E-03	0.761E-03	0.203E-03
	2000000.	0.244E-02	0.660E-04	0.495E-03	0.144E-03	0.984E-03	0.290E-03
	4000000.	0.192E-02	0.612E-04	0.575E-03	0.181E-03	0.112E-02	0.365E-03
	6000000.	0.169E-02	0.575E-04	0.631E-03	0.203E-03	0.120E-02	0.410E-03
Ti XII 3D 5P	500000.	0.358E-02	0.889E-04	0.374E-03	0.110E-03	0.740E-03	0.215E-03
87.4 Å	750000.	0.305E-02	0.836E-04	0.455E-03	0.136E-03	0.903E-03	0.269E-03
C=0.31E+20	1000000.	0.274E-02	0.853E-04	0.493E-03	0.157E-03	0.982E-03	0.313E-03
	2000000.	0.216E-02	0.819E-04	0.570E-03	0.198E-03	0.112E-02	0.399E-03
	4000000.	0.175E-02	0.749E-04	0.662E-03	0.239E-03	0.126E-02	0.482E-03
	6000000.	0.157E-02	0.674E-04	0.715E-03	0.264E-03	0.132E-02	0.530E-03
Ti XII 4D 5P	500000.	0.508E-01	0.788E-03	0.509E-02	0.765E-03	0.100E-01	0.150E-02
307.5 Å	750000.	0.434E-01	0.790E-03	0.612E-02	0.101E-02	0.121E-01	0.201E-02
C=0.37E+21	1000000.	0.390E-01	0.814E-03	0.657E-02	0.115E-02	0.130E-01	0.229E-02
	2000000.	0.309E-01	0.738E-03	0.762E-02	0.156E-02	0.148E-01	0.315E-02
	4000000.	0.252E-01	0.723E-03	0.895E-02	0.187E-02	0.165E-01	0.378E-02
	6000000.	0.226E-01	0.656E-03	0.975E-02	0.208E-02	0.171E-01	0.417E-02
PERTURBER DENSITY = 1.E+20cm-3							
Ti XII 3S 3P	500000.	0.193	-0.216E-02	0.288E-02	-0.240E-02	0.559E-02	-0.451E-02
466.9 Å	750000.	0.160	-0.259E-02	0.473E-02	-0.357E-02	0.926E-02	-0.689E-02
C=0.47E+23	1000000.	0.141	-0.300E-02	0.630E-02	-0.459E-02	0.124E-01	-0.895E-02
	2000000.	0.105	-0.279E-02	0.105E-01	-0.718E-02	0.208E-01	-0.143E-01
	4000000.	0.798E-01	-0.273E-02	0.152E-01	-0.988E-02	0.301E-01	-0.199E-01
	6000000.	0.689E-01	-0.271E-02	0.173E-01	-0.110E-01	0.336E-01	-0.221E-01
Ti XII 3S 4P	500000.	0.149E-01	0.821E-04	0.808E-03	0.106E-03	0.157E-02	0.198E-03
82.2 Å	750000.	0.125E-01	0.103E-03	0.106E-02	0.155E-03	0.210E-02	0.299E-03
C=0.56E+21	1000000.	0.111E-01	0.103E-03	0.123E-02	0.195E-03	0.242E-02	0.380E-03
	2000000.	0.848E-02	0.992E-04	0.159E-02	0.293E-03	0.317E-02	0.583E-03
	4000000.	0.668E-02	0.945E-04	0.185E-02	0.398E-03	0.359E-02	0.802E-03
	6000000.	0.588E-02	0.856E-04	0.203E-02	0.442E-03	0.384E-02	0.892E-03
Ti XII 3S 5P	500000.	0.174E-01	0.344E-03	0.176E-02	0.462E-03		
60.7 Å	750000.	0.149E-01	0.322E-03	0.215E-02	0.587E-03		
C=0.15E+21	1000000.	0.133E-01	0.325E-03	0.234E-02	0.696E-03		
	2000000.	0.105E-01	0.315E-03	0.270E-02	0.896E-03	*0.531E-02	*0.177E-02
	4000000.	0.852E-02	0.293E-03	0.314E-02	0.108E-02	*0.599E-02	*0.217E-02
	6000000.	0.763E-02	0.263E-03	0.339E-02	0.120E-02	*0.624E-02	*0.242E-02
Ti XII 4S 4P	500000.	3.86	-0.882E-01	0.190	-0.122	*0.372	-0.228
1204.5 Å	750000.	3.26	-0.936E-01	0.252	-0.164	*0.499	-0.314
C=0.12E+24	1000000.	2.91	-0.846E-01	0.299	-0.190	*0.591	-0.367
	2000000.	2.26	-0.846E-01	0.401	-0.259	*0.795	-0.515
	4000000.	1.79	-0.798E-01	0.499	-0.310	0.955	-0.625
	6000000.	1.58	-0.711E-01	0.573	-0.344	1.05	-0.691
Ti XII 4S 5P	500000.	0.197	0.774E-03	0.179E-01	0.144E-02		
194.8 Å	750000.	0.168	0.290E-03	0.218E-01	0.201E-02		
C=0.15E+22	1000000.	0.151	0.549E-03	0.236E-01	0.247E-02		
	2000000.	0.119	0.476E-03	0.271E-01	0.348E-02	*0.531E-01	*0.691E-02
	4000000.	0.970E-01	0.393E-03	0.316E-01	0.433E-02	*0.592E-01	*0.871E-02
	6000000.	0.869E-01	0.371E-03	0.343E-01	0.481E-02	*0.614E-01	*0.968E-02

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3P 4S	500000.	0.159E-01	0.980E-03	0.585E-03	0.123E-02	0.116E-02	0.229E-02
108.8 Å	750000.	0.134E-01	0.108E-02	0.105E-02	0.161E-02	0.210E-02	0.308E-02
C=0.98E+21	1000000.	0.120E-01	0.103E-02	0.129E-02	0.188E-02	0.258E-02	0.363E-02
	2000000.	0.923E-02	0.101E-02	0.230E-02	0.249E-02	0.459E-02	0.494E-02
	4000000.	0.726E-02	0.965E-03	0.311E-02	0.299E-02	0.607E-02	0.602E-02
	6000000.	0.636E-02	0.877E-03	0.365E-02	0.331E-02	0.691E-02	0.665E-02
Ti XII 3P 5S	500000.	0.128E-01	0.150E-02	0.144E-02	0.209E-02	*0.289E-02	*0.378E-02
71.8 Å	750000.	0.110E-01	0.147E-02	0.209E-02	0.263E-02	*0.421E-02	*0.489E-02
C=0.21E+21	1000000.	0.999E-02	0.148E-02	0.266E-02	0.294E-02	*0.531E-02	*0.557E-02
	2000000.	0.797E-02	0.146E-02	0.362E-02	0.361E-02	*0.713E-02	*0.711E-02
	4000000.	0.642E-02	0.128E-02	0.477E-02	0.431E-02	*0.898E-02	*0.871E-02
	6000000.	0.567E-02	0.114E-02	0.543E-02	0.471E-02	*0.994E-02	*0.943E-02
Ti XII 3P 6S	500000.	0.182E-01	0.254E-02	*0.393E-02	*0.422E-02		
61.2 Å	750000.	0.159E-01	0.259E-02	*0.491E-02	*0.496E-02		
C=0.84E+20	1000000.	0.146E-01	0.259E-02	*0.559E-02	*0.557E-02		
	2000000.	0.118E-01	0.251E-02	*0.722E-02	*0.687E-02		
	4000000.	0.962E-02	0.212E-02	*0.946E-02	*0.796E-02		
	6000000.	0.851E-02	0.192E-02	*0.105E-01	*0.864E-02		
Ti XII 3P 7S	500000.	0.287E-01	0.418E-02				
56.3 Å	750000.	0.253E-01	0.429E-02				
C=0.46E+20	1000000.	0.232E-01	0.442E-02				
	2000000.	0.190E-01	0.407E-02				
	4000000.	0.155E-01	0.346E-02				
	6000000.	0.137E-01	0.325E-02				
Ti XII 4P 5S	500000.	0.249	0.177E-01	0.206E-01	0.259E-01	*0.410E-01	*0.468E-01
256.7 Å	750000.	0.214	0.170E-01	0.291E-01	0.326E-01	*0.584E-01	*0.608E-01
C=0.27E+22	1000000.	0.193	0.170E-01	0.357E-01	0.366E-01	*0.714E-01	*0.692E-01
	2000000.	0.153	0.168E-01	0.476E-01	0.450E-01	*0.934E-01	*0.885E-01
	4000000.	0.123	0.146E-01	0.618E-01	0.537E-01	*0.116	*0.108
	6000000.	0.109	0.129E-01	0.703E-01	0.579E-01	*0.129	*0.116
Ti XII 4P 6S	500000.	0.154	0.164E-01	*0.265E-01	*0.280E-01		
158.2 Å	750000.	0.134	0.167E-01	*0.329E-01	*0.329E-01		
C=0.57E+21	1000000.	0.122	0.166E-01	*0.375E-01	*0.370E-01		
	2000000.	0.984E-01	0.161E-01	*0.483E-01	*0.456E-01		
	4000000.	0.799E-01	0.135E-01	*0.631E-01	*0.530E-01		
	6000000.	0.708E-01	0.122E-01	*0.703E-01	*0.574E-01		
Ti XII 4P 7S	500000.	0.173	0.217E-01				
129.5 Å	750000.	0.152	0.222E-01				
C=0.24E+21	1000000.	0.139	0.229E-01				
	2000000.	0.113	0.210E-01				
	4000000.	0.922E-01	0.178E-01				
	6000000.	0.816E-01	0.167E-01				
Ti XII 5P 6S	500000.	2.13	0.141	*0.282	*0.265		
495.6 Å	750000.	1.85	0.146	*0.338	*0.310		
C=0.55E+22	1000000.	1.68	0.145	*0.383	*0.349		
	2000000.	1.36	0.141	*0.489	*0.429		
	4000000.	1.11	0.116	*0.618	*0.499		
	6000000.	0.989	0.105	*0.717	*0.539		
Ti XII 5P 7S	500000.	1.09	0.104				
292.3 Å	750000.	0.959	0.107				
C=0.12E+22	1000000.	0.876	0.110				
	2000000.	0.712	0.101				
	4000000.	0.582	0.853E-01				
	6000000.	0.518	0.803E-01				
Ti XII 3P 3D	500000.	0.115	-0.652E-03	0.265E-02	-0.423E-03	0.514E-02	-0.794E-03
346.9 Å	750000.	0.951E-01	-0.420E-03	0.407E-02	-0.648E-03	0.797E-02	-0.125E-02
C=0.26E+23	1000000.	0.833E-01	-0.485E-03	0.521E-02	-0.861E-03	0.102E-01	-0.168E-02
	2000000.	0.616E-01	-0.655E-03	0.787E-02	-0.150E-02	0.156E-01	-0.299E-02
	4000000.	0.468E-01	-0.528E-03	0.102E-01	-0.220E-02	0.203E-01	-0.441E-02
	6000000.	0.404E-01	-0.501E-03	0.111E-01	-0.267E-02	0.219E-01	-0.537E-02

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3P 4D	500000.	0.176E-01	0.195E-03	0.946E-03	0.558E-03	0.185E-02	0.104E-02
90.3 Å	750000.	0.148E-01	0.157E-03	0.128E-02	0.759E-03	0.252E-02	0.146E-02
C=0.32E+21	1000000.	0.131E-01	0.154E-03	0.151E-02	0.886E-03	0.295E-02	0.172E-02
	2000000.	0.100E-01	0.179E-03	0.212E-02	0.123E-02	0.404E-02	0.244E-02
	4000000.	0.791E-02	0.134E-03	0.268E-02	0.147E-02	0.480E-02	0.297E-02
	6000000.	0.696E-02	0.120E-03	0.310E-02	0.163E-02	0.531E-02	0.330E-02
Ti XII 3P 5D	500000.	0.219E-01	0.355E-03	0.226E-02	0.158E-02		
67.4 Å	750000.	0.187E-01	0.407E-03	0.290E-02	0.201E-02		
C=0.89E+20	1000000.	0.168E-01	0.421E-03	0.325E-02	0.227E-02		
	2000000.	0.132E-01	0.396E-03	0.415E-02	0.278E-02		
	4000000.	0.107E-01	0.321E-03	0.532E-02	0.331E-02	*0.934E-02	*0.672E-02
	6000000.	0.953E-02	0.310E-03	0.610E-02	0.362E-02	*0.101E-01	*0.729E-02
Ti XII 3P 6D	500000.	0.338E-01	0.633E-03	*0.538E-02	*0.368E-02		
59.3 Å	750000.	0.293E-01	0.755E-03	*0.621E-02	*0.429E-02		
C=0.39E+20	1000000.	0.266E-01	0.790E-03	*0.687E-02	*0.487E-02		
	2000000.	0.214E-01	0.657E-03	*0.871E-02	*0.597E-02		
	4000000.	0.176E-01	0.615E-03	*0.108E-01	*0.693E-02		
	6000000.	0.158E-01	0.631E-03	*0.124E-01	*0.757E-02		
Ti XII 4P 4D	500000.	2.76	0.163E-02	0.184	0.427E-01	*0.358	*0.800E-01
951.5 Å	750000.	2.34	-0.706E-02	0.228	0.588E-01	*0.448	*0.113
C=0.35E+23	1000000.	2.09	-0.912E-02	0.267	0.712E-01	*0.524	*0.138
	2000000.	1.62	-0.496E-02	0.330	0.996E-01	*0.635	*0.198
	4000000.	1.29	-0.913E-02	0.401	0.122	0.727	0.246
	6000000.	1.15	-0.943E-02	0.452	0.135	0.779	0.272
Ti XII 4P 5D	500000.	0.237	0.243E-02	*0.238E-01	*0.145E-01		
208.1 Å	750000.	0.203	0.270E-02	*0.299E-01	*0.185E-01		
C=0.85E+21	1000000.	0.182	0.276E-02	0.330E-01	0.209E-01		
	2000000.	0.144	0.258E-02	0.415E-01	0.257E-01		
	4000000.	0.117	0.191E-02	0.527E-01	0.307E-01	*0.909E-01	*0.614E-01
	6000000.	0.105	0.187E-02	0.599E-01	0.334E-01	*0.992E-01	*0.674E-01
Ti XII 4P 6D	500000.	0.218	0.338E-02	*0.334E-01	*0.223E-01		
146.4 Å	750000.	0.189	0.402E-02	*0.384E-01	*0.259E-01		
C=0.24E+21	1000000.	0.172	0.419E-02	*0.425E-01	*0.294E-01		
	2000000.	0.138	0.341E-02	*0.537E-01	*0.362E-01		
	4000000.	0.114	0.317E-02	*0.662E-01	*0.418E-01		
	6000000.	0.102	0.330E-02	*0.763E-01	*0.459E-01		
Ti XII 5P 6D	500000.	1.84	0.120E-01				
395.8 Å	750000.	1.60	0.181E-01	*0.299	*0.183		
C=0.17E+22	1000000.	1.45	0.192E-01	*0.328	*0.207		
	2000000.	1.18	0.138E-01	*0.412	*0.256		
	4000000.	0.970	0.130E-01	*0.501	*0.292		
	6000000.	0.874	0.149E-01	*0.572	*0.320		
Ti XII 3D 4P	500000.	0.430E-01	0.539E-03	0.255E-02	0.570E-03	0.497E-02	0.107E-02
140.0 Å	750000.	0.360E-01	0.599E-03	0.332E-02	0.805E-03	0.655E-02	0.155E-02
C=0.16E+22	1000000.	0.319E-01	0.647E-03	0.384E-02	0.101E-02	0.759E-02	0.196E-02
	2000000.	0.244E-01	0.645E-03	0.495E-02	0.144E-02	0.984E-02	0.286E-02
	4000000.	0.192E-01	0.606E-03	0.575E-02	0.181E-02	0.112E-01	0.365E-02
	6000000.	0.169E-01	0.574E-03	0.631E-02	0.203E-02	0.120E-01	0.409E-02
Ti XII 3D 5P	500000.	0.358E-01	0.830E-03	0.372E-02	0.103E-02		
87.4 Å	750000.	0.305E-01	0.784E-03	0.454E-02	0.130E-02		
C=0.31E+21	1000000.	0.274E-01	0.808E-03	0.493E-02	0.154E-02		
	2000000.	0.216E-01	0.792E-03	0.570E-02	0.198E-02	*0.112E-01	*0.391E-02
	4000000.	0.175E-01	0.735E-03	0.662E-02	0.239E-02	*0.126E-01	*0.481E-02
	6000000.	0.157E-01	0.672E-03	0.715E-02	0.264E-02	*0.132E-01	*0.529E-02
Ti XII 4D 5P	500000.	0.508	0.751E-02	0.506E-01	0.722E-02		
307.5 Å	750000.	0.434	0.756E-02	0.610E-01	0.974E-02		
C=0.37E+22	1000000.	0.390	0.784E-02	0.656E-01	0.113E-01		
	2000000.	0.309	0.722E-02	0.762E-01	0.156E-01	*0.148	*0.310E-01
	4000000.	0.252	0.714E-02	0.895E-01	0.187E-01	*0.165	*0.377E-01
	6000000.	0.226	0.654E-02	0.975E-01	0.208E-01	*0.171	*0.416E-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+21cm-3							
Ti XII 3S 3P	500000.	1.93	-0.179E-01	0.284E-01	-0.210E-01	0.530E-01	-0.344E-01
466.9 Å	750000.	1.60	-0.229E-01	0.470E-01	-0.329E-01	0.910E-01	-0.593E-01
C=0.47E+24	1000000.	1.41	-0.275E-01	0.629E-01	-0.431E-01	0.123	-0.801E-01
	2000000.	1.05	-0.261E-01	0.105	-0.706E-01	0.208	-0.137
	4000000.	0.798	-0.261E-01	0.152	-0.986E-01	0.301	-0.195
	6000000.	0.689	-0.265E-01	0.173	-0.110	0.336	-0.221
Ti XII 3S 4P	500000.	0.149	0.659E-03	*0.790E-02	*0.925E-03		
82.2 Å	750000.	0.125	0.901E-03	*0.105E-01	*0.143E-02		
C=0.56E+22	1000000.	0.111	0.917E-03	0.122E-01	0.183E-02		
	2000000.	0.848E-01	0.913E-03	0.159E-01	0.288E-02		
	4000000.	0.668E-01	0.893E-03	0.185E-01	0.397E-02		
	6000000.	0.588E-01	0.825E-03	0.203E-01	0.441E-02	*0.384E-01	*0.890E-02
Ti XII 3S 5P	500000.	0.174	0.257E-02				
60.7 Å	750000.	0.148	0.253E-02				
C=0.15E+22	1000000.	0.133	0.265E-02				
	2000000.	0.105	0.271E-02				
	4000000.	0.851E-01	0.264E-02	*0.314E-01	*0.108E-01		
	6000000.	0.762E-01	0.247E-02	*0.339E-01	*0.119E-01		
Ti XII 4S 5P	500000.	*1.96	*0.542E-02				
194.8 Å	750000.	1.68	0.123E-02				
C=0.15E+23	1000000.	1.51	0.382E-02				
	2000000.	1.19	0.363E-02				
	4000000.	0.969	0.317E-02	*0.316	*0.432E-01		
	6000000.	0.868	0.329E-02	0.343	0.480E-01		
Ti XII 3P 4S	500000.	0.159	0.752E-02	0.584E-02	0.105E-01		
108.8 Å	750000.	0.134	0.897E-02	0.105E-01	0.143E-01		
C=0.98E+22	1000000.	0.120	0.880E-02	0.129E-01	0.171E-01		
	2000000.	0.922E-01	0.900E-02	0.230E-01	0.242E-01		
	4000000.	0.726E-01	0.891E-02	0.311E-01	0.298E-01		
	6000000.	0.636E-01	0.835E-02	0.365E-01	0.330E-01	*0.691E-01	*0.662E-01
Ti XII 3P 5S	500000.	0.127	0.915E-02				
71.8 Å	750000.	0.110	0.102E-01				
C=0.21E+22	1000000.	0.994E-01	0.109E-01				
	2000000.	0.794E-01	0.117E-01				
	4000000.	0.640E-01	0.109E-01	*0.477E-01	*0.429E-01		
	6000000.	0.566E-01	0.104E-01	*0.543E-01	*0.469E-01		
Ti XII 3P 6S	500000.	0.174	0.871E-02				
61.2 Å	750000.	0.153	0.127E-01				
C=0.84E+21	1000000.	0.141	0.146E-01				
	2000000.	0.115	0.168E-01				
	4000000.	0.937E-01	0.156E-01				
	6000000.	0.831E-01	0.161E-01				
Ti XII 3P 7S	500000.	*0.253	*0.427E-02				
56.3 Å	750000.	*0.227	*0.131E-01				
C=0.46E+21	1000000.	0.210	0.188E-01				
	2000000.	0.175	0.217E-01				
	4000000.	0.144	0.213E-01				
	6000000.	0.128	0.246E-01				
Ti XII 4P 5S	500000.	2.48	0.105				
256.7 Å	750000.	2.13	0.114				
C=0.27E+23	1000000.	1.92	0.121				
	2000000.	1.52	0.133				
	4000000.	1.23	0.123	*0.618	*0.535		
	6000000.	1.09	0.117	*0.703	*0.576		
Ti XII 4P 6S	500000.	*1.49	*0.536E-01				
158.2 Å	750000.	1.30	0.788E-01				
C=0.57E+22	1000000.	1.19	0.909E-01				
	2000000.	0.961	0.106				
	4000000.	0.782	0.981E-01				
	6000000.	0.694	0.101				

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 4P 7S	500000.	*1.55	*0.194E-01				
129.5 Å	750000.	*1.38	*0.653E-01				
C=0.24E+22	1000000.	*1.27	*0.946E-01				
	2000000.	1.05	0.110				
	4000000.	0.865	0.108				
	6000000.	0.770	0.126				
Ti XII 5P 6S	500000.	*20.8	*0.378				
495.6 Å	750000.	*18.1	*0.636				
C=0.55E+23	1000000.	16.5	0.748				
	2000000.	13.3	0.892				
	4000000.	10.9	0.819				
	6000000.	9.75	0.859				
Ti XII 5P 7S	500000.	*10.0	*0.465E-01				
292.3 Å	750000.	*8.88	*0.285				
C=0.12E+23	1000000.	*8.16	*0.432				
	2000000.	6.71	0.510				
	4000000.	5.53	0.501				
	6000000.	4.94	0.595				
Ti XII 3P 3D	500000.	1.15	-0.580E-02	0.261E-01	-0.371E-02	*0.484E-01	-0.608E-02
346.9 Å	750000.	0.951	-0.371E-02	0.404E-01	-0.600E-02	*0.780E-01	-0.108E-01
C=0.26E+24	1000000.	0.833	-0.429E-02	0.519E-01	-0.814E-02	*0.101	-0.152E-01
	2000000.	0.616	-0.627E-02	0.786E-01	-0.148E-01	0.155	-0.288E-01
	4000000.	0.468	-0.507E-02	0.102	-0.219E-01	0.203	-0.436E-01
	6000000.	0.404	-0.490E-02	0.111	-0.266E-01	0.219	-0.536E-01
Ti XII 3P 4D	500000.	0.175	0.858E-03	*0.927E-02	*0.480E-02		
90.3 Å	750000.	0.147	0.745E-03	*0.127E-01	*0.685E-02		
C=0.32E+22	1000000.	0.131	0.817E-03	*0.150E-01	*0.814E-02		
	2000000.	0.100	0.126E-02	*0.211E-01	*0.120E-01		
	4000000.	0.790E-01	0.997E-03	0.268E-01	0.147E-01		
	6000000.	0.696E-01	0.101E-02	0.310E-01	0.163E-01		
Ti XII 3P 5D	500000.	0.215	-0.563E-03				
67.4 Å	750000.	0.184	0.769E-03				
C=0.89E+21	1000000.	0.166	0.144E-02				
	2000000.	0.131	0.189E-02				
	4000000.	0.106	0.178E-02				
	6000000.	0.944E-01	0.229E-02				
Ti XII 3P 6D	500000.	*0.318	-0.330E-02				
59.3 Å	750000.	*0.278	-0.293E-03				
C=0.39E+21	1000000.	*0.253	0.123E-02				
	2000000.	0.205	0.138E-02				
	4000000.	0.169	0.225E-02				
	6000000.	0.153	0.378E-02				
Ti XII 4P 5D	500000.	*2.33	-0.131E-01				
208.1 Å	750000.	2.00	-0.301E-02				
C=0.85E+22	1000000.	1.80	0.242E-02				
	2000000.	1.43	0.693E-02				
	4000000.	1.16	0.602E-02				
	6000000.	1.04	0.113E-01				
Ti XII 4P 6D	500000.	*2.06	-0.240E-01				
146.4 Å	750000.	*1.80	-0.690E-02				
C=0.24E+22	1000000.	*1.64	*0.188E-02				
	2000000.	1.33	0.296E-02				
	4000000.	1.10	0.829E-02				
	6000000.	0.991	0.178E-01				
Ti XII 5P 6D	500000.	*17.5	-0.269				
395.8 Å	750000.	*15.3	-0.137				
C=0.17E+23	1000000.	*13.9	-0.775E-01				
	2000000.	11.4	-0.725E-01				
	4000000.	9.42	-0.310E-01				
	6000000.	8.50	0.442E-01				

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3D 4P	500000.	0.430	0.447E-02	*0.249E-01	*0.497E-02		
140.0 Å	750000.	0.360	0.528E-02	*0.327E-01	*0.736E-02		
C=0.16E+23	1000000.	0.319	0.583E-02	*0.382E-01	*0.938E-02		
	2000000.	0.244	0.602E-02	*0.494E-01	*0.141E-01		
	4000000.	0.192	0.577E-02	0.575E-01	0.181E-01		
	6000000.	0.169	0.557E-02	0.631E-01	0.203E-01	*0.120	*0.408E-01
Ti XII 3D 5P	500000.	0.357	0.631E-02				
87.4 Å	750000.	0.305	0.627E-02				
C=0.31E+22	1000000.	0.273	0.672E-02				
	2000000.	0.215	0.694E-02				
	4000000.	0.175	0.671E-02	*0.662E-01	*0.238E-01		
	6000000.	0.157	0.636E-02	*0.715E-01	*0.263E-01		
Ti XII 4D 5P	500000.	*5.07	*0.636E-01				
307.5 Å	750000.	4.33	0.661E-01				
C=0.37E+23	1000000.	3.90	0.703E-01				
	2000000.	3.09	0.663E-01				
	4000000.	2.52	0.676E-01	*0.895	*0.186		
	6000000.	2.26	0.632E-01	*0.975	*0.207		
PERTURBER DENSITY = 1.E+22cm-3							
Ti XII 3S 3P	500000.	19.3	-0.470E-01	*0.239	-0.132		
466.9 Å	750000.	16.0	-0.128	*0.450	-0.259		
C=0.47E+25	1000000.	14.1	-0.189	*0.614	-0.366		
	2000000.	10.5	-0.205	1.04	-0.645		
	4000000.	7.98	-0.218	1.52	-0.961		
	6000000.	6.89	-0.228	1.73	-1.08		
Ti XII 3S 4P	500000.	*1.48	*0.908E-04				
82.2 Å	750000.	*1.24	*0.412E-02				
C=0.56E+23	1000000.	*1.10	*0.492E-02				
	2000000.	0.843	0.640E-02				
	4000000.	0.664	0.694E-02				
	6000000.	0.586	0.648E-02				
Ti XII 3S 5P	500000.						
60.7 Å	750000.	*1.40	-0.109E-02				
C=0.15E+23	1000000.	*1.26	*0.469E-02				
	2000000.	*1.01	*0.126E-01				
	4000000.	0.821	0.156E-01				
	6000000.	0.738	0.151E-01				
Ti XII 4S 5P	500000.						
194.8 Å	750000.						
C=0.15E+24	1000000.	*14.3	-0.232E-01				
	2000000.	*11.4	-0.187E-02				
	4000000.	9.36	0.764E-03				
	6000000.	8.41	0.554E-02				
Ti XII 3P 4S	500000.	*1.56	-0.116E-01				
108.8 Å	750000.	1.32	0.240E-01				
C=0.98E+23	1000000.	1.18	0.326E-01				
	2000000.	0.910	0.521E-01				
	4000000.	0.717	0.617E-01				
	6000000.	0.629	0.592E-01				
Ti XII 3P 5S	500000.	*1.07	-0.741E-01				
71.8 Å	750000.	*0.957	-0.301E-01				
C=0.21E+23	1000000.	*0.880	-0.206E-02				
	2000000.	0.719	0.423E-01				
	4000000.	0.588	0.531E-01				
	6000000.	0.524	0.515E-01				
Ti XII 3P 6S	500000.	*1.09	-0.193				
61.2 Å	750000.	*1.05	-0.100				
C=0.84E+22	1000000.	*1.01	-0.545E-01				
	2000000.	*0.883	*0.250E-01				
	4000000.	0.755	0.468E-01				
	6000000.	0.683	0.506E-01				

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3P 7S	500000.						
56.3 Å	750000.	*1.16	-0.188				
C=0.46E+22	1000000.	*1.17	-0.113				
	2000000.	*1.12	-0.375E-02				
	4000000.	*1.01	*0.333E-01				
	6000000.	0.933	0.541E-01				
Ti XII 4P 6S	500000.						
158.2 Å	750000.	*9.75	-0.701				
C=0.57E+23	1000000.	*9.17	-0.405				
	2000000.	*7.82	*0.120				
	4000000.	6.59	0.262				
	6000000.	5.94	0.288				
Ti XII 4P 7S	500000.						
129.5 Å	750000.						
C=0.24E+23	1000000.						
	2000000.	*7.21	-0.518E-01				
	4000000.	*6.37	*0.142				
	6000000.	5.85	0.252				
Ti XII 3P 3D	500000.	11.5	-0.353E-01	*0.215	-0.235E-01		
346.9 Å	750000.	9.51	-0.206E-01	*0.383	-0.477E-01		
C=0.26E+25	1000000.	8.33	-0.290E-01	*0.504	-0.700E-01		
	2000000.	6.16	-0.524E-01	*0.780	-0.138		
	4000000.	4.68	-0.438E-01	*1.02	-0.215		
	6000000.	4.04	-0.428E-01	1.11	-0.263		
Ti XII 3P 4D	500000.	*1.70	-0.156E-01				
90.3 Å	750000.	*1.43	-0.127E-01				
C=0.32E+23	1000000.	*1.28	-0.859E-02				
	2000000.	0.982	0.118E-02				
	4000000.	0.775	0.119E-02				
	6000000.	0.683	0.148E-02				
Ti XII 3P 5D	500000.						
67.4 Å	750000.	*1.64	-0.203E-01				
C=0.89E+22	1000000.	*1.49	-0.140E-01				
	2000000.	*1.20	-0.281E-02				
	4000000.	0.982	0.324E-03				
	6000000.	0.883	0.339E-02				
Ti XII 3P 6D	500000.						
59.3 Å	750000.						
C=0.39E+22	1000000.						
	2000000.	*1.72	-0.851E-02				
	4000000.	*1.46	-0.233E-03				
	6000000.	*1.34	*0.708E-02				
Ti XII 3D 4P	500000.	*4.26	*0.103E-01				
140.0 Å	750000.	*3.57	*0.269E-01				
C=0.16E+24	1000000.	*3.17	*0.360E-01				
	2000000.	2.42	0.455E-01				
	4000000.	1.91	0.469E-01				
	6000000.	1.68	0.463E-01				
Ti XII 3D 5P	500000.						
87.4 Å	750000.	*2.87	*0.357E-02				
C=0.31E+23	1000000.	*2.59	*0.182E-01				
	2000000.	*2.06	*0.366E-01				
	4000000.	1.69	0.428E-01				
	6000000.	1.52	0.420E-01				
PERTURBER DENSITY = 1.E+23cm-3							
Ti XII 3P 4S	500000.						
108.8 Å	750000.						
C=0.98E+24	1000000.	*9.51	-0.738				
	2000000.	*7.76	-0.216				
	4000000.	6.30	0.954E-01				
	6000000.	5.59	0.160				

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
TRANSITION	T(K)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)	WIDTH(Å)	SHIFT(Å)
Ti XII 3P 5S	500000.						
71.8 Å	750000.						
C=0.21E+24	1000000.	*4.61	-0.913				
	2000000.	*4.44	-0.357				
	4000000.	*4.04	-0.538E-01				
	6000000.	3.75	0.317E-01				
Ti XII 3P 4D	500000.						
90.3 Å	750000.						
C=0.32E+24	1000000.						
	2000000.	*8.80	-0.901E-02				
	4000000.	*7.08	-0.149E-01				
	6000000.	6.30	-0.725E-02				

2. RESULTS AND DISCUSSION

Details of calculation and the discussion of results, will be published in Dimitrijević and Sahal−-Bréchot, 1998. Here, only tables of Stark broadening parameters will be shown. Atomic energy levels needed for calculations have been taken from Bashkin and Stoner (1978) for Sc X and Sc XI, and from Wiese and Musgrove (1989) for Ti XI and Ti XII. Our results for 4 Sc X multiplets are presented in Table 1, for temperature range from 200,000 K to 5,000,000 K and perturber densities 10^{19}cm^{-3} – 10^{22} cm^{-3}. Results for 10 Sc XI multiplets are shown in Table 2 for temperature range from 500,000 K to 5,000,000 K and perturber densities 10^{18}cm^{-3} – 10^{22}cm^{-3}. For Ti XI calculations were performed for four multiplets, for temperatures from 500,000 K to 5,000,000 K, and perturber densities 10^{18}cm^{-3} – 10^{22}cm^{-3}, and results are presented in Table 3. Finaly, for 27 Ti XII multiplets, results are shown in Table 4, for temperatures from 500,000 K to 6,000,000 K, and perturber densities 10^{18}cm^{-3} – 10^{23}cm^{-3}. Stark broadening parameter values, for densities lower than for tabulated values, are linear with perturber density. The parameter c (Dimitrijević and Sahal−Bréchot 1984), 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 Tables 1 - 4, 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 $0.1 < \mathrm{NV} \leq 0.5$ are denoted by an asterisk. 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.

Presented results are the first Stark broadening data concerning scandium X and XI as well as titanium XI and XII spectral lines. We hope that the presented data will be interesting for astrophysical and laboratory plasma research, modeling and diagnostics, as well as for the theoretical considerations of systematic trends along isoelectronic sequences. Such data are also of interest for fusion plasma research, and for development of lasers and consideration of laser produced plasmas.

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ТАБЕЛЕ ПАРАМЕТАРА ШТАРКОВОГ ШИРЕЊА СПЕКТРАЛНИХ ЛИНИЈА Sc X, Sc XI, Ti XI И Ti XII

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Претходно саопштење

Користећи семикласичан прилаз, израчунате су ширине и помераји спектралних линија, проузроковани сударима са електронима, протонима и двоструко наелектрисаним јонима хелијума, за 4 мултиплета Sc X, 10 мултиплета Sc XI, 4 мултиплета Ti XI, и 27 мултиплета Ti XII. Резултати су дати у функцији температуре и концентрације пертурбера.