Bull. Astron. Belgrade № 145 (1992), 65 – 81.

UDC 52-355.3
Preliminary report

STARK BROADENING PARAMETER TABLES FOR Be II LINES OF ASTROPHYSICAL INTEREST

M. S. Dimitrijević[1], and S.Sahal–Bréchot[2]

[1] *Astronomical Observatory, Volgina 7, 11050 Beograd, Yugoslavia*

[2] *Laboratoire "Astrophysique, Atomes et Molécules" Département Atomes et Molécules en Astrophysique Unité associée au C.N.R.S. No 812 Observatoire de Paris–Meudon, 92190 Meudon, France*

(Received: November 4, 1991)

SUMMARY: Using a semiclassical approach, we have calculated electron–, proton–, and ionized helium–impact line widths and shifts for 30 Be II multiplets as a function of temperature for perturber densities 10^{13} and 10^{16}-10^{19}cm^{-3}.

1. INTRODUCTION

Stark broadening data for singly ionized beryllium lines are of interest in astrophysics since the surface content of Be provides informations on nucleogenesis, mixing between atmosphera and interior, the internal structure and evolution of a star (Boesgaard, 1988). Such data are of interest also for the analysis and diagnostics of stellar and laboratory plasmas. Moreover, the astrophysical importance of such data for the investigation of subphotospheric layers is discussed by Seaton (1987).

The present paper concerns singly ionized beryllium: In order to provide reliable data for Be II lines broadened by collisions with charged perturbers in stellar and laboratory plasmas, we have calculated electron–, proton–, and ionized helium–impact line widths and shifts for 30 Be II multiplets, using the semiclassical–perturbation formalism (Sahal – Bréchot, 1969ab). The obtained results for perturber density of 10^{15}cm^{-3}, together with discussion, analysis and comparison with existing experimental and theoretical data will be published in the principal article elsewhere (Dimitrijević, and Sahal–Bréchot, 1992). Since data are not linear with perturber density (N), due to the Debye screening effect, which is often important at high densities of interest for subphotospheric layers, we will present here the data for N = 10^{16} – 10^{19}cm^{-3}. Moreover, we will present also the data for N = 10^{13} cm^{-3} of special interest for stellar atmospheres.

2. RESULTS AND DISCUSSION

All details of the calculation procedure have been described in Dimitrijević, Sahal–Bréchot, Bommier (1991) and will not be repeated here. Energy levels for Be II lines have been taken from Bashkin and Stoner (1975). Oscillator strengths have been calculated using the method of Bates and Damgaard

(1949) and tables of Oertel and Shomo (1968). For the transitions including higher atomic energy levels, the method described by Van Regemorter et al. (1979) has been used.

In addition to the electron–impact full half-widths and shifts, Stark broadening parameters due to proton–, and ionized helium–impact have been calculated. In such a way we provide Stark broadening data for all important charged perturbers in stellar plasma. Our results are shown in Table 1 for perturber densities 10^{13} and $10^{16} - 10^{19}$cm^{-3} and temperatures of T = 2,500; 5,000; 10,000; 20,000; 30,000 and 50,000 K. We also specify a parameter c (Dimitrijević and Sahal–Bréchot, 1984) which gives an estimate for the maximum perturber density for which the line may be treated as isolated when it is divided by the electron–impact full width at half maximum.

For each value given in Table 1, the collision volume (V) multiplied by the perturber density (N) is much less than one and the impact approximation is valid (Sahal–Bréchot, 1969ab). Values for NV > 0.5 are not given in Table 1; values for 0.1 < 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 formulae (cf. Sahal–Bréchot (1991) or Griem (1974)). The analysis of present results and comparison with available experimental and theoretical data is given in Dimitrijević and Sahal – Bréchot (1992).

Acknowledgments – This work is a part of French–Yugoslav collaboration through the project "L'élargissement Stark des raies spectrales des plasmas astrophysiques et de laboratoire". It is also a part of the project "Physics and dynamics of celestial bodies", supported by RFN of Serbia.

REFERENCES

Bashkin,S., and Stoner,J.O.Jr.: 1975, *Atomic Energy Levels and Grotrian Diagrams*, Vol.1, North Holland, Amsterdam.
Bates,D.R., and Damgaard,A.: 1949, *Trans. Roy. Soc. London, Ser. A* **242**, 101.
Boesgaard,A.M.: 1988, *Vistas in Astronomy*, **31**, 167.
Dimitrijević,M.S., and Sahal–Bréchot,S.: 1984, *JQSRT* **31**, 301.
Dimitrijević,M.S., and Sahal–Bréchot,S.: 1992, *JQSRT*, to be published.
Dimitrijević,M.S., Sahal–Bréchot,S., and Bommier, V.: 1991, *Astron. Astrophys. Suppl. Series.* **89**, 581.
Griem,H.R.: 1974, *Spectral Line Broadening by Plasmas*, Academic Press, New York.
Oertel,G.K., and Shomo,L.P.: 1968, *Astrophys. J. Suppl. Series* **16**, 175.
Sahal–Bréchot,S.: 1969a, *Astron.Astrophys.* **1**, 91.
Sahal–Bréchot,S.: 1969b, *Astron. Astrophys.* **2**, 322.
Sahal–Bréchot,S.: 1991, Astron.Astrophys. **245**, 322.
Seaton,M.J.: 1987, *J. Phys. B* **20**, 6363.
Van Regemorter,H., Hoang Binh Dy, and Prud'homme, M.: 1979, *J. Phys. B* **12**, 1073.

Table 1. **This table gives electron—, proton—, and ionized—helium— impact broadening parameters for Be II lines, for perturber densities 10^{13} and $10^{16} - 10^{19} cm^{-3}$ and temperatures from 2,500 K to 50,000 K. Transitions and averaged wavelengths for the multiplet (in Å) are also given. By dividing c by the electron—impact full halfwidth, 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 = 0.1D+14(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 2S-2P	2500.	0.126E-04	-0.110E-05	0.375E-07	-0.362E-07	0.638E-07	-0.362E-07
3131.5 A	5000.	0.801E-05	-0.102E-05	0.998E-07	-0.720E-07	0.154E-06	-0.712E-07
C= 0.31E+17	10000.	0.574E-05	-0.478E-06	0.219E-06	-0.134E-06	0.293E-06	-0.127E-06
	20000.	0.444E-05	-0.499E-06	0.366E-06	-0.216E-06	0.433E-06	-0.191E-06
	30000.	0.405E-05	-0.402E-06	0.460E-06	-0.261E-06	0.508E-06	-0.232E-06
	50000.	0.384E-05	-0.477E-06	0.552E-06	-0.326E-06	0.571E-06	-0.275E-06
Be II 2S-3P	2500.	0.652E-05	0.586E-06	0.164E-06	0.217E-06	0.212E-06	0.203E-06
1036.3 A	5000.	0.555E-05	0.368E-06	0.305E-06	0.322E-06	0.340E-06	0.290E-06
C= 0.17E+15	10000.	0.478E-05	0.476E-06	0.484E-06	0.437E-06	0.463E-06	0.367E-06
	20000.	0.420E-05	0.435E-06	0.611E-06	0.524E-06	0.574E-06	0.445E-06
	30000.	0.392E-05	0.399E-06	0.684E-06	0.577E-06	0.637E-06	0.493E-06
	50000.	0.362E-05	0.403E-06	0.795E-06	0.646E-06	0.719E-06	0.557E-06
Be II 2S-4P	2500.	0.126E-04	0.254E-05	0.873E-06	0.960E-06	0.925E-06	0.848E-06
842.0 A	5000.	0.111E-04	0.234E-05	0.130E-05	0.121E-05	0.122E-05	0.104E-05
C= 0.47E+14	10000.	0.101E-04	0.205E-05	0.166E-05	0.147E-05	0.151E-05	0.124E-05
	20000.	0.948E-05	0.170E-05	0.202E-05	0.172E-05	0.180E-05	0.146E-05
	30000.	0.915E-05	0.163E-05	0.221E-05	0.192E-05	0.195E-05	0.154E-05
	50000.	0.873E-05	0.139E-05	0.247E-05	0.196E-05	0.222E-05	0.175E-05
Be II 2S-5P	2500.	0.253E-04	0.822E-05	0.290E-05	0.279E-05	0.274E-05	0.238E-05
775.4 A	5000.	0.231E-04	0.704E-05	0.368E-05	0.340E-05	0.338E-05	0.285E-05
C= 0.20E+14	10000.	0.221E-04	0.542E-05	0.472E-05	0.401E-05	0.401E-05	0.340E-05
	20000.	0.214E-04	0.471E-05	0.526E-05	0.448E-05	0.493E-05	0.368E-05
	30000.	0.209E-04	0.416E-05	0.552E-05	0.507E-05	0.473E-05	0.404E-05
	50000.	0.202E-04	0.332E-05	0.618E-05	0.523E-05	0.577E-05	0.453E-05
Be II 2P-3S	2500.	0.184E-04	0.831E-05	0.683E-07	0.277E-06	0.929E-07	0.265E-06
1776.2 A	5000.	0.133E-04	0.631E-05	0.229E-06	0.459E-06	0.255E-06	0.410E-06
C= 0.26E+16	10000.	0.943E-05	0.488E-05	0.452E-06	0.640E-06	0.449E-06	0.564E-06
	20000.	0.722E-05	0.374E-05	0.730E-06	0.802E-06	0.651E-06	0.678E-06
	30000.	0.661E-05	0.334E-05	0.874E-06	0.888E-06	0.759E-06	0.755E-06
	50000.	0.605E-05	0.278E-05	0.105E-05	0.102E-05	0.903E-06	0.844E-06
Be II 2P-4S	2500.	0.223E-04	0.102E-04	0.451E-06	0.824E-06	0.443E-06	0.723E-06
1197.2 A	5000.	0.157E-04	0.924E-05	0.835E-06	0.113E-05	0.814E-06	0.977E-06
C= 0.47E+15	10000.	0.118E-04	0.750E-05	0.129E-05	0.138E-05	0.113E-05	0.117E-05
	20000.	0.100E-04	0.658E-05	0.162E-05	0.165E-05	0.143E-05	0.140E-05
	30000.	0.950E-05	0.585E-05	0.194E-05	0.183E-05	0.157E-05	0.155E-05
	50000.	0.900E-05	0.490E-05	0.220E-05	0.198E-05	0.181E-05	0.166E-05

PERTURBER DENSITY = 0.1D+14(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 2P-5S	2500.	0.340E-04	0.180E-04	0.162E-05	0.227E-05	0.159E-05	0.196E-05
1048.2 A	5000.	0.272E-04	0.167E-04	0.257E-05	0.278E-05	0.222E-05	0.236E-05
C= 0.18E+15	10000.	0.220E-04	0.152E-04	0.332E-05	0.331E-05	0.285E-05	0.279E-05
	20000.	0.200E-04	0.129E-04	0.419E-05	0.395E-05	0.358E-05	0.325E-05
	30000.	0.190E-04	0.120E-04	0.471E-05	0.415E-05	0.396E-05	0.359E-05
	50000.	0.190E-04	0.102E-04	0.531E-05	0.471E-05	0.432E-05	0.384E-05
Be II 2P-3D	2500.	0.167E-04	0.837E-06	0.150E-06	-0.287E-06	0.195E-06	-0.269E-06
1512.4 A	5000.	0.124E-04	0.696E-06	0.349E-06	-0.454E-06	0.366E-06	-0.398E-06
C= 0.36E+15	10000.	0.927E-05	0.324E-06	0.580E-06	-0.626E-06	0.587E-06	-0.540E-06
	20000.	0.709E-05	0.154E-06	0.810E-06	-0.763E-06	0.742E-06	-0.646E-06
	30000.	0.612E-05	0.737E-07	0.909E-06	-0.844E-06	0.833E-06	-0.715E-06
	50000.	0.531E-05	0.272E-07	0.108E-05	-0.969E-06	0.962E-06	-0.801E-06
Be II 2P-4D	2500.	0.532E-04	0.344E-05	0.115E-04	0.121E-04	0.101E-04	0.102E-04
1143.0 A	5000.	0.438E-04	0.292E-05	0.145E-04	0.144E-04	0.121E-04	0.121E-04
C= 0.33E+13	10000.	0.363E-04	0.243E-05	0.178E-04	0.167E-04	0.152E-04	0.142E-04
	20000.	0.302E-04	0.196E-05	0.198E-04	0.195E-04	0.171E-04	0.154E-04
	30000.	0.272E-04	0.147E-05	0.227E-04	0.205E-04	0.191E-04	0.180E-04
	50000.	0.239E-04	0.101E-05	0.237E-04	0.213E-04	0.187E-04	0.201E-04
Be II 2P-5D	2500.	0.129E-03	0.999E-05	0.378E-04	0.369E-04	0.331E-04	0.315E-04
1026.9 A	5000.	0.108E-03	0.823E-05	0.471E-04	0.432E-04	0.393E-04	0.353E-04
C= 0.14E+13	10000.	0.914E-04	0.669E-05	0.562E-04	0.504E-04	0.452E-04	0.408E-04
	20000.	0.773E-04	0.477E-05	0.667E-04	0.561E-04	0.513E-04	0.446E-04
	30000.	0.700E-04	0.336E-05	0.637E-04	0.638E-04	0.625E-04	0.474E-04
	50000.	0.614E-04	0.234E-05	0.638E-04	0.670E-04	0.631E-04	0.550E-04
Be II 3S-3P	2500.	0.134E-02	-0.209E-03	0.192E-04	0.193E-04	0.255E-04	0.180E-04
12099.6 A	5000.	0.110E-02	-0.158E-03	0.353E-04	0.303E-04	0.402E-04	0.266E-04
C= 0.23E+17	10000.	0.881E-03	-0.107E-03	0.535E-04	0.417E-04	0.540E-04	0.359E-04
	20000.	0.756E-03	-0.749E-04	0.667E-04	0.507E-04	0.647E-04	0.428E-04
	30000.	0.715E-03	-0.700E-04	0.753E-04	0.569E-04	0.714E-04	0.477E-04
	50000.	0.671E-03	-0.541E-04	0.854E-04	0.640E-04	0.790E-04	0.535E-04
Be II 3S-4P	2500.	0.220E-03	0.308E-04	0.129E-04	0.141E-04	0.138E-04	0.125E-04
3275.6 A	5000.	0.190E-03	0.281E-04	0.192E-04	0.179E-04	0.183E-04	0.153E-04
C= 0.71E+15	10000.	0.169E-03	0.227E-04	0.246E-04	0.218E-04	0.224E-04	0.182E-04
	20000.	0.157E-03	0.173E-04	0.304E-04	0.253E-04	0.267E-04	0.218E-04
	30000.	0.151E-03	0.166E-04	0.318E-04	0.278E-04	0.298E-04	0.232E-04
	50000.	0.145E-03	0.139E-04	0.384E-04	0.293E-04	0.326E-04	0.261E-04
Be II 3S-5P	2500.	0.265E-03	0.734E-04	0.289E-04	0.278E-04	0.274E-04	0.238E-04
2454.6 A	5000.	0.241E-03	0.635E-04	0.366E-04	0.338E-04	0.337E-04	0.285E-04
C= 0.20E+15	10000.	0.228E-03	0.510E-04	0.469E-04	0.401E-04	0.399E-04	0.339E-04
	20000.	0.220E-03	0.416E-04	0.528E-04	0.446E-04	0.497E-04	0.371E-04
	30000.	0.216E-03	0.363E-04	0.552E-04	0.505E-04	0.473E-04	0.401E-04
	50000.	0.209E-03	0.289E-04	0.618E-04	0.521E-04	0.572E-04	0.451E-04

PERTURBER DENSITY = 0.1D+14(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 3P-4S	2500.	0.470E-03	0.166E-03	0.752E-05	0.120E-04	0.836E-05	0.107E-04
5272.1 A	5000.	0.360E-03	0.155E-03	0.135E-04	0.167E-04	0.139E-04	0.147E-04
C= 0.43E+16	10000.	0.292E-03	0.125E-03	0.206E-04	0.209E-04	0.187E-04	0.177E-04
	20000.	0.268E-03	0.110E-03	0.261E-04	0.252E-04	0.235E-04	0.209E-04
	30000.	0.254E-03	0.979E-04	0.306E-04	0.275E-04	0.264E-04	0.231E-04
	50000.	0.244E-03	0.813E-04	0.336E-04	0.304E-04	0.289E-04	0.256E-04
Be II 3P-5S	2500.	0.336E-03	0.166E-03	0.149E-04	0.207E-04	0.147E-04	0.180E-04
3242.7 A	5000.	0.265E-03	0.163E-03	0.236E-04	0.256E-04	0.205E-04	0.216E-04
C= 0.16E+16	10000.	0.230E-03	0.140E-03	0.303E-04	0.305E-04	0.264E-04	0.258E-04
	20000.	0.214E-03	0.118E-03	0.366E-04	0.362E-04	0.326E-04	0.303E-04
	30000.	0.206E-03	0.109E-03	0.425E-04	0.391E-04	0.356E-04	0.328E-04
	50000.	0.206E-03	0.924E-04	0.484E-04	0.438E-04	0.391E-04	0.352E-04
Be II 3P-3D	2500.	0.422E-01	-0.502E-02	0.704E-03	-0.126E-02	0.857E-03	-0.115E-02
64174.1 A	5000.	0.336E-01	-0.285E-02	0.140E-02	-0.181E-02	0.145E-02	-0.160E-02
C= 0.64E+18	10000.	0.276E-01	-0.281E-02	0.227E-02	-0.231E-02	0.209E-02	-0.199E-02
	20000.	0.234E-01	-0.245E-02	0.288E-02	-0.278E-02	0.259E-02	-0.235E-02
	30000.	0.215E-01	-0.223E-02	0.330E-02	-0.306E-02	0.285E-02	-0.257E-02
	50000.	0.195E-01	-0.208E-02	0.370E-02	-0.345E-02	0.333E-02	-0.295E-02
Be II 3P-4D	2500.	0.820E-03	0.152E-04	0.167E-03	0.176E-03	0.146E-03	0.148E-03
4362.1 A	5000.	0.684E-03	0.200E-04	0.210E-03	0.209E-03	0.177E-03	0.175E-03
C= 0.48E+14	10000.	0.575E-03	0.175E-04	0.258E-03	0.242E-03	0.220E-03	0.206E-03
	20000.	0.484E-03	0.125E-04	0.286E-03	0.282E-03	0.249E-03	0.222E-03
	30000.	0.439E-03	0.910E-05	0.329E-03	0.298E-03	0.275E-03	0.261E-03
	50000.	0.389E-03	0.465E-05	0.346E-03	0.306E-03	0.268E-03	0.290E-03
Be II 3P-5D	2500.	0.115E-02	0.774E-04	0.333E-03	0.325E-03	0.291E-03	0.277E-03
3047.5 A	5000.	0.972E-03	0.621E-04	0.414E-03	0.380E-03	0.346E-03	0.311E-03
C= 0.13E+14	10000.	0.825E-03	0.491E-04	0.495E-03	0.444E-03	0.398E-03	0.360E-03
	20000.	0.701E-03	0.349E-04	0.586E-03	0.494E-03	0.453E-03	0.393E-03
	30000.	0.636E-03	0.251E-04	0.561E-03	0.561E-03	0.550E-03	0.417E-03
	50000.	0.560E-03	0.155E-04	0.561E-03	0.590E-03	0.555E-03	0.485E-03
Be II 3D-4P	2500.	0.487E-03	0.845E-04	0.283E-04	0.330E-04	0.296E-04	0.291E-04
4829.6 A	5000.	0.421E-03	0.780E-04	0.425E-04	0.416E-04	0.398E-04	0.355E-04
C= 0.15E+16	10000.	0.378E-03	0.708E-04	0.548E-04	0.501E-04	0.483E-04	0.422E-04
	20000.	0.348E-03	0.595E-04	0.673E-04	0.591E-04	0.608E-04	0.500E-04
	30000.	0.333E-03	0.560E-04	0.757E-04	0.645E-04	0.645E-04	0.528E-04
	50000.	0.316E-03	0.478E-04	0.795E-04	0.679E-04	0.737E-04	0.594E-04
Be II 3D-5P	2500.	0.467E-03	0.149E-03	0.502E-04	0.489E-04	0.473E-04	0.418E-04
3234.5 A	5000.	0.424E-03	0.127E-03	0.644E-04	0.597E-04	0.586E-04	0.500E-04
C= 0.35E+15	10000.	0.403E-03	0.970E-04	0.823E-04	0.700E-04	0.699E-04	0.596E-04
	20000.	0.387E-03	0.828E-04	0.917E-04	0.790E-04	0.848E-04	0.641E-04
	30000.	0.378E-03	0.733E-04	0.969E-04	0.894E-04	0.832E-04	0.710E-04
	50000.	0.364E-03	0.589E-04	0.106E-03	0.913E-04	0.995E-04	0.792E-04

PERTURBER DENSITY = 0.1D+14(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 3D-4F	2500.	0.600E-03	-0.605E-06	0.153E-03	-0.164E-03	0.133E-03	-0.139E-03
4674.7 A	5000.	0.489E-03	-0.771E-05	0.192E-03	-0.195E-03	0.168E-03	-0.167E-03
C= 0.56E+14	10000.	0.398E-03	-0.734E-05	0.251E-03	-0.231E-03	0.210E-03	-0.189E-03
	20000.	0.324E-03	-0.852E-05	0.279E-03	-0.251E-03	0.254E-03	-0.220E-03
	30000.	0.290E-03	-0.551E-05	0.309E-03	-0.282E-03	0.265E-03	-0.228E-03
	50000.	0.253E-03	-0.166E-05	0.380E-03	-0.302E-03	0.272E-03	-0.249E-03
Be II 3D-5F	2500.	0.168E-02	0.375E-04	0.101E-02	0.905E-03	0.841E-03	0.763E-03
3198.1 A	5000.	0.136E-02	0.298E-04	0.115E-02	0.106E-02	0.104E-02	0.870E-03
C= 0.16E+13	10000.	0.110E-02	0.126E-04	0.135E-02	0.128E-02	0.119E-02	0.952E-03
	20000.	0.880E-03	-0.129E-05	0.165E-02	0.139E-02	0.119E-02	0.106E-02
	30000.	0.772E-03	-0.557E-05	0.159E-02	0.153E-02	0.143E-02	0.124E-02
	50000.	0.653E-03	-0.628E-05	0.197E-02	0.145E-02	0.125E-02	0.135E-02
Be II 4S-4P	2500.	0.240E-01	-0.332E-03	0.908E-03	0.892E-03	0.101E-02	0.798E-03
30339.8 A	5000.	0.207E-01	-0.675E-03	0.138E-02	0.119E-02	0.133E-02	0.100E-02
C= 0.61E+17	10000.	0.183E-01	-0.117E-02	0.172E-02	0.143E-02	0.161E-02	0.120E-02
	20000.	0.173E-01	-0.122E-02	0.212E-02	0.169E-02	0.189E-02	0.142E-02
	30000.	0.168E-01	-0.114E-02	0.233E-02	0.187E-02	0.205E-02	0.153E-02
	50000.	0.163E-01	-0.113E-02	0.247E-02	0.205E-02	0.215E-02	0.167E-02
Be II 4S-5P	2500.	0.264E-02	0.678E-03	0.256E-03	0.243E-03	0.241E-03	0.208E-03
7403.3 A	5000.	0.243E-02	0.479E-03	0.322E-03	0.292E-03	0.295E-03	0.247E-03
C= 0.19E+16	10000.	0.230E-02	0.303E-03	0.402E-03	0.351E-03	0.339E-03	0.287E-03
	20000.	0.222E-02	0.238E-03	0.470E-03	0.393E-03	0.430E-03	0.334E-03
	30000.	0.219E-02	0.200E-03	0.473E-03	0.430E-03	0.430E-03	0.339E-03
	50000.	0.213E-02	0.131E-03	0.562E-03	0.460E-03	0.503E-03	0.401E-03
Be II 4P-5S	2500.	0.517E-02	0.145E-02	0.139E-03	0.140E-03	0.154E-03	0.125E-03
11662.1 A	5000.	0.449E-02	0.144E-02	0.211E-03	0.185E-03	0.203E-03	0.157E-03
C= 0.90E+16	10000.	0.409E-02	0.140E-02	0.264E-03	0.223E-03	0.242E-03	0.187E-03
	20000.	0.392E-02	0.120E-02	0.319E-03	0.261E-03	0.293E-03	0.221E-03
	30000.	0.387E-02	0.109E-02	0.367E-03	0.286E-03	0.316E-03	0.239E-03
	50000.	0.385E-02	0.967E-03	0.388E-03	0.317E-03	0.325E-03	0.259E-03
Be II 4P-5D	2500.	0.120E-01	0.335E-03	0.320E-02	0.312E-02	0.279E-02	0.267E-02
9478.9 A	5000.	0.102E-01	0.327E-03	0.401E-02	0.365E-02	0.334E-02	0.299E-02
C= 0.12E+15	10000.	0.875E-02	0.224E-03	0.470E-02	0.428E-02	0.380E-02	0.346E-02
	20000.	0.750E-02	0.164E-03	0.558E-02	0.473E-02	0.435E-02	0.377E-02
	30000.	0.686E-02	0.632E-04	0.543E-02	0.539E-02	0.522E-02	0.404E-02
	50000.	0.610E-02	0.741E-05	0.532E-02	0.567E-02	0.537E-02	0.467E-02
Be II 4D-5P	2500.	0.828E-02	0.141E-02	0.710E-03	-0.735E-03	0.640E-03	-0.618E-03
10470.5 A	5000.	0.729E-02	0.114E-02	0.908E-03	-0.873E-03	0.806E-03	-0.742E-03
C= 0.28E+15	10000.	0.662E-02	0.871E-03	0.108E-02	-0.102E-02	0.955E-03	-0.873E-03
	20000.	0.608E-02	0.728E-03	0.141E-02	-0.118E-02	0.111E-02	-0.102E-02
	30000.	0.579E-02	0.661E-03	0.141E-02	-0.120E-02	0.125E-02	-0.106E-02
	50000.	0.541E-02	0.551E-03	0.168E-02	-0.141E-02	0.129E-02	-0.113E-02

PERTURBER DENSITY = 0.1D+14(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 4D-5F	2500.	0.196E-01	0.105E-03	0.101E-01	0.888E-02	0.849E-02	0.753E-02
10098.4 A	5000.	0.160E-01	0.659E-04	0.111E-01	0.103E-01	0.104E-01	0.850E-02
C= 0.16E+14	10000.	0.130E-01	-0.798E-04	0.125E-01	0.124E-01	0.120E-01	0.937E-02
	20000.	0.106E-01	-0.168E-03	0.167E-01	0.131E-01	0.118E-01	0.101E-01
	30000.	0.934E-02	-0.185E-03	0.153E-01	0.150E-01	0.139E-01	0.121E-01
	50000.	0.796E-02	-0.145E-03	0.190E-01	0.135E-01	0.120E-01	0.125E-01
Be II 4F-5D	2500.	0.143E-01	0.141E-02	0.396E-02	0.392E-02	0.342E-02	0.324E-02
10138.4 A	5000.	0.120E-01	0.109E-02	0.491E-02	0.446E-02	0.403E-02	0.374E-02
C= 0.14E+15	10000.	0.102E-01	0.786E-03	0.591E-02	0.517E-02	0.469E-02	0.424E-02
	20000.	0.859E-02	0.557E-03	0.711E-02	0.569E-02	0.506E-02	0.472E-02
	30000.	0.777E-02	0.391E-03	0.727E-02	0.670E-02	0.622E-02	0.476E-02
	50000.	0.682E-02	0.248E-03	0.722E-02	0.710E-02	0.662E-02	0.581E-02
Be II 5S-5P	2500.	0.214	0.158E-01	0.148E-01	0.133E-01	0.141E-01	0.112E-01
61098.2 A	5000.	0.201	0.903E-03	0.184E-01	0.158E-01	0.173E-01	0.134E-01
C= 0.13E+18	10000.	0.194	-0.707E-02	0.231E-01	0.190E-01	0.205E-01	0.158E-01
	20000.	0.188	-0.106E-01	0.269E-01	0.215E-01	0.229E-01	0.181E-01
	30000.	0.187	-0.103E-01	0.286E-01	0.223E-01	0.260E-01	0.199E-01
	50000.	0.185	-0.110E-01	0.309E-01	0.254E-01	0.250E-01	0.218E-01

PERTURBER DENSITY = 0.1D+17(cm-3)

Be II 2S-2P	2500.	0.126E-01	-0.112E-02	0.370E-04	-0.311E-04	0.631E-04	-0.311E-04
3131.5 A	5000.	0.800E-02	-0.101E-02	0.997E-04	-0.682E-04	0.154E-03	-0.674E-04
C= 0.31E+20	10000.	0.574E-02	-0.485E-03	0.219E-03	-0.133E-03	0.293E-03	-0.125E-03
	20000.	0.445E-02	-0.513E-03	0.366E-03	-0.216E-03	0.433E-03	-0.190E-03
	30000.	0.405E-02	-0.401E-03	0.460E-03	-0.261E-03	0.508E-03	-0.232E-03
	50000.	0.384E-02	-0.477E-03	0.552E-03	-0.326E-03	0.571E-03	-0.275E-03
Be II 2S-3P	2500.	0.655E-02	0.514E-03	0.162E-03	0.181E-03	0.209E-03	0.167E-03
1036.3 A	5000.	0.555E-02	0.360E-03	0.304E-03	0.296E-03	0.339E-03	0.264E-03
C= 0.17E+18	10000.	0.478E-02	0.463E-03	0.484E-03	0.428E-03	0.463E-03	0.357E-03
	20000.	0.420E-02	0.433E-03	0.611E-03	0.522E-03	0.574E-03	0.443E-03
	30000.	0.392E-02	0.395E-03	0.684E-03	0.576E-03	0.637E-03	0.492E-03
	50000.	0.362E-02	0.403E-03	0.795E-03	0.646E-03	0.719E-03	0.557E-03
Be II 2S-4P	2500.	0.126E-01	0.222E-02	0.858E-03	0.722E-03	*0.900E-03	*0.610E-03
842.0 A	5000.	0.111E-01	0.216E-02	0.128E-02	0.104E-02	*0.120E-02	*0.861E-03
C= 0.47E+17	10000.	0.101E-01	0.198E-02	0.166E-02	0.140E-02	0.149E-02	0.117E-02
	20000.	0.948E-02	0.169E-02	0.202E-02	0.170E-02	0.180E-02	0.145E-02
	30000.	0.915E-02	0.162E-02	0.221E-02	0.191E-02	0.195E-02	0.153E-02
	50000.	0.873E-02	0.139E-02	0.247E-02	0.196E-02	0.222E-02	0.175E-02
Be II 2S-5P	2500.	0.253E-01	0.699E-02	*0.281E-02	*0.172E-02		
775.4 A	5000.	0.231E-01	0.622E-02	*0.371E-02	*0.257E-02		
C= 0.20E+17	10000.	0.221E-01	0.510E-02	*0.474E-02	*0.372E-02		
	20000.	0.214E-01	0.466E-02	*0.525E-02	*0.443E-02	*0.493E-02	*0.363E-02
	30000.	0.209E-01	0.411E-02	*0.552E-02	*0.503E-02	*0.473E-02	*0.400E-02
	50000.	0.202E-01	0.332E-02	*0.618E-02	*0.523E-02	*0.577E-02	*0.453E-02

PERTURBER DENSITY = 0.1D+17(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 2P-3S	2500.	0.187E-01	0.827E-02	0.679E-04	0.236E-03	0.927E-04	0.223E-03
1776.2 A	5000.	0.133E-01	0.629E-02	0.229E-03	0.428E-03	0.255E-03	0.379E-03
C= 0.26E+19	10000.	0.943E-02	0.486E-02	0.451E-03	0.628E-03	0.448E-03	0.553E-03
	20000.	0.722E-02	0.374E-02	0.730E-03	0.800E-03	0.651E-03	0.676E-03
	30000.	0.661E-02	0.334E-02	0.874E-03	0.887E-03	0.759E-03	0.753E-03
	50000.	0.605E-02	0.278E-02	0.105E-02	0.102E-02	0.903E-03	0.844E-03
Be II 2P-4S	2500.	0.223E-01	0.998E-02	0.450E-03	0.661E-03	0.443E-03	0.560E-03
1197.2 A	5000.	0.156E-01	0.911E-02	0.841E-03	0.101E-02	0.824E-03	0.859E-03
C= 0.47E+18	10000.	0.117E-01	0.741E-02	0.129E-02	0.134E-02	0.113E-02	0.113E-02
	20000.	0.100E-01	0.658E-02	0.162E-02	0.165E-02	0.143E-02	0.139E-02
	30000.	0.950E-02	0.584E-02	0.194E-02	0.183E-02	0.157E-02	0.154E-02
	50000.	0.900E-02	0.490E-02	0.220E-02	0.198E-02	0.181E-02	0.166E-02
Be II 2P-5S	2500.	0.340E-01	0.172E-01	0.162E-02	0.163E-02	*0.158E-02	*0.133E-02
1048.2 A	5000.	0.272E-01	0.162E-01	0.255E-02	0.230E-02	*0.222E-02	*0.190E-02
C= 0.18E+18	10000.	0.220E-01	0.149E-01	0.333E-02	0.312E-02	*0.284E-02	*0.262E-02
	20000.	0.200E-01	0.128E-01	0.419E-02	0.392E-02	*0.358E-02	*0.322E-02
	30000.	0.190E-01	0.120E-01	0.471E-02	0.413E-02	0.396E-02	0.356E-02
	50000.	0.190E-01	0.101E-01	0.531E-02	0.471E-02	0.432E-02	0.384E-02
Be II 2P-3D	2500.	0.167E-01	0.931E-03	0.149E-03	-0.242E-03	0.193E-03	-0.224E-03
1512.4 A	5000.	0.124E-01	0.735E-03	0.348E-03	-0.422E-03	0.366E-03	-0.366E-03
C= 0.36E+18	10000.	0.926E-02	0.333E-03	0.580E-03	-0.614E-03	0.587E-03	-0.528E-03
	20000.	0.709E-02	0.154E-03	0.810E-03	-0.761E-03	0.742E-03	-0.643E-03
	30000.	0.612E-02	0.752E-04	0.909E-03	-0.842E-03	0.883E-03	-0.713E-03
	50000.	0.531E-02	0.272E-04	0.108E-02	-0.969E-03	0.962E-03	-0.801E-03
Be II 2P-4D	2500.	0.467E-01	-0.205E-02				
1143.0 A	5000.	0.394E-01	-0.864E-03				
C= 0.33E+16	10000.	0.333E-01	0.743E-03				
	20000.	0.281E-01	0.162E-02	*0.198E-01	*0.192E-01		
	30000.	0.255E-01	0.120E-02	*0.227E-01	*0.202E-01		
	50000.	0.225E-01	0.101E-02	*0.237E-01	*0.213E-01		
Be II 2P-5D	2500.	0.927E-01	-0.947E-02				
1026.9 A	5000.	0.838E-01	-0.553E-02				
C= 0.14E+16	10000.	0.744E-01	0.298E-04				
	20000.	0.654E-01	0.315E-02				
	30000.	0.602E-01	0.204E-02				
	50000.	0.539E-01	0.129E-02				
Be II 3S-3P	2500.	1.37	-0.211	0.189E-01	0.163E-01	0.251E-01	0.150E-01
12099.6 A	5000.	1.10	-0.161	0.352E-01	0.282E-01	0.400E-01	0.244E-01
C= 0.23E+20	10000.	0.880	-0.108	0.535E-01	0.409E-01	0.540E-01	0.351E-01
	20000.	0.756	-0.748E-01	0.667E-01	0.506E-01	0.646E-01	0.427E-01
	30000.	0.715	-0.703E-01	0.753E-01	0.568E-01	0.714E-01	0.476E-01
	50000.	0.671	-0.541E-01	0.854E-01	0.640E-01	0.790E-01	0.535E-01

PERTURBER DENSITY = 0.1D+17(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 3S-4P	2500.	0.220	0.269E-01	0.127E-01	0.106E-01	*0.134E-01	*0.899E-02
3275.6 A	5000.	0.190	0.256E-01	0.190E-01	0.153E-01	*0.179E-01	*0.127E-01
C= 0.71E+18	10000.	0.169	0.217E-01	0.246E-01	0.208E-01	0.223E-01	0.172E-01
	20000.	0.157	0.172E-01	0.304E-01	0.251E-01	0.267E-01	0.216E-01
	30000.	0.151	0.165E-01	0.317E-01	0.277E-01	0.297E-01	0.230E-01
	50000.	0.145	0.139E-01	0.384E-01	0.293E-01	0.326E-01	0.261E-01
Be II 3S-5P	2500.	0.265	0.611E-01	*0.280E-01	*0.171E-01		
2454.6 A	5000.	0.241	0.564E-01	*0.370E-01	*0.257E-01		
C= 0.20E+18	10000.	0.228	0.477E-01	*0.472E-01	*0.372E-01		
	20000.	0.220	0.411E-01	*0.528E-01	*0.441E-01	*0.497E-01	*0.365E-01
	30000.	0.216	0.359E-01	*0.551E-01	*0.501E-01	*0.473E-01	*0.397E-01
	50000.	0.209	0.289E-01	*0.618E-01	*0.521E-01	*0.572E-01	*0.451E-01
Be II 3P-4S	2500.	0.470	0.164	0.749E-02	0.979E-02	0.827E-02	0.845E-02
5272.1 A	5000.	0.359	0.154	0.135E-01	0.151E-01	0.140E-01	0.131E-01
C= 0.43E+19	10000.	0.292	0.124	0.206E-01	0.202E-01	0.187E-01	0.171E-01
	20000.	0.268	0.110	0.261E-01	0.250E-01	0.235E-01	0.208E-01
	30000.	0.254	0.978E-01	0.306E-01	0.274E-01	0.264E-01	0.230E-01
	50000.	0.244	0.813E-01	0.336E-01	0.304E-01	0.289E-01	0.256E-01
Be II 3P-5S	2500.	0.336	0.160	0.149E-01	0.150E-01	*0.146E-01	*0.122E-01
3242.7 A	5000.	0.265	0.159	0.238E-01	0.213E-01	*0.207E-01	*0.173E-01
C= 0.16E+19	10000.	0.230	0.137	0.304E-01	0.290E-01	*0.261E-01	*0.241E-01
	20000.	0.214	0.117	0.366E-01	0.359E-01	*0.326E-01	*0.300E-01
	30000.	0.206	0.109	0.426E-01	0.389E-01	0.356E-01	0.325E-01
	50000.	0.206	0.922E-01	0.484E-01	0.438E-01	0.391E-01	0.352E-01
Be II 3P-4D	2500.	0.726	-0.637E-01				
4362.1 A	5000.	0.620	-0.348E-01				
C= 0.48E+17	10000.	0.531	-0.668E-02				
	20000.	0.453	0.752E-02	*0.286	*0.277		
	30000.	0.414	0.515E-02	*0.329	*0.294		
	50000.	0.369	0.465E-02	*0.346	*0.306	*0.268	*0.290
Be II 3P-5D	2500.	0.834	-0.937E-01				
3047.5 A	5000.	0.757	-0.503E-01				
C= 0.13E+17	10000.	0.676	-0.899E-02				
	20000.	0.596	0.206E-01				
	30000.	0.550	0.135E-01				
	50000.	0.494	0.623E-02				
Be II 3D-4P	2500.	0.487	0.757E-01	0.279E-01	0.247E-01	*0.289E-01	*0.208E-01
4829.6 A	5000.	0.421	0.726E-01	0.431E-01	0.359E-01	*0.396E-01	*0.295E-01
C= 0.15E+19	10000.	0.378	0.683E-01	0.547E-01	0.478E-01	0.482E-01	0.400E-01
	20000.	0.348	0.590E-01	0.673E-01	0.587E-01	0.608E-01	0.496E-01
	30000.	0.333	0.556E-01	0.757E-01	0.642E-01	0.645E-01	0.525E-01
	50000.	0.316	0.478E-01	0.795E-01	0.679E-01	0.737E-01	0.594E-01

PERTURBER DENSITY = 0.1D+17(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 3D-5P	2500.	0.467	0.128	*0.487E-01	*0.301E-01		
3234.5 A	5000.	0.424	0.114	*0.643E-01	*0.450E-01		
C= 0.35E+18	10000.	0.403	0.915E-01	*0.828E-01	*0.648E-01		
	20000.	0.387	0.818E-01	*0.916E-01	*0.780E-01	*0.848E-01	*0.632E-01
	30000.	0.378	0.726E-01	*0.969E-01	*0.887E-01	*0.832E-01	*0.703E-01
	50000.	0.364	0.589E-01	*0.106	*0.913E-01	*0.995E-01	*0.792E-01
Be II 3D-4F	2500.	0.524	0.667E-01				
4674.7 A	5000.	0.436	0.395E-01				
C= 0.56E+17	10000.	0.362	0.134E-01				
	20000.	0.299	-0.428E-02	*0.279	*-0.247		
	30000.	0.270	-0.216E-02	*0.310	*-0.279		
	50000.	0.237	-0.166E-02	*0.380	*-0.302	*0.272	*-0.249
Be II 3D-5F	2500.	0.904	0.519E-01				
3198.1 A	5000.	0.819	0.312E-01				
C= 0.16E+16	10000.	0.714	0.916E-02				
	20000.	0.609	-0.521E-02				
	30000.	0.551	-0.824E-02				
	50000.	0.482	-0.628E-02				
Be II 4S-5P	2500.	2.64	0.574	*0.247	*0.151		
7403.3 A	5000.	2.43	0.408	*0.324	*0.227		
C= 0.19E+19	10000.	2.30	0.277	*0.403	*0.327	*0.343	*0.263
	20000.	2.22	0.233	*0.470	*0.389	*0.430	*0.330
	30000.	2.19	0.197	*0.473	*0.426	*0.429	*0.335
	50000.	2.13	0.131	*0.562	*0.460	*0.503	*0.401
Be II 4P-5S	2500.	5.17	1.41	0.137	0.108	*0.149	*0.922E-01
11662.1 A	5000.	4.49	1.42	0.210	0.162	0.202	0.133
C= 0.90E+19	10000.	4.09	1.39	0.264	0.214	0.242	0.178
	20000.	3.92	1.20	0.319	0.260	0.293	0.219
	30000.	3.87	1.09	0.367	0.285	0.316	0.238
	50000.	3.85	0.966	0.388	0.317	0.325	0.259
Be II 4P-5D	2500.	8.97	-1.29				
9478.9 A	5000.	8.15	-0.742				
C= 0.12E+18	10000.	7.30	-0.327				
	20000.	6.49	0.284E-01				
	30000.	6.03	-0.479E-01				
	50000.	5.46	0.741E-02				
Be II 4D-5P	2500.	7.74	1.65				
10470.5 A	5000.	6.93	1.30				
C= 0.28E+18	10000.	6.37	0.950	*1.10	*-0.933		
	20000.	5.90	0.747	*1.41	*-1.16		
	30000.	5.64	0.677	*1.41	*-1.19		
	50000.	5.30	0.566	*1.68	*-1.41	*1.29	*-1.13

PERTURBER DENSITY = 0.1D+17(cm-3)

	PERTURBERS ARE	ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 4D-5F	2500.	11.4	0.687				
10098.4 A	5000.	10.3	0.369				
C= 0.16E+17	10000.	8.98	0.175E-01				
	20000.	7.71	-0.180				
	30000.	7.00	-0.191				
	50000.	6.14	-0.154				
Be II 4F-5D	2500.	10.5	-0.805				
10138.4 A	5000.	9.41	-0.471				
C= 0.14E+18	10000.	8.33	0.401E-01				
	20000.	7.31	0.380				
	30000.	6.72	0.247				
	50000.	6.01	0.248				

PERTURBER DENSITY = 0.1D+18(cm-3)

Be II 2S-2P	2500.	0.126	-0.112E-01	0.336E-03	-0.217E-03	0.571E-03	-0.216E-03
3131.5 A	5000.	0.801E-01	-0.101E-01	0.985E-03	-0.605E-03	0.152E-02	-0.597E-03
C= 0.31E+21	10000.	0.573E-01	-0.497E-02	0.218E-02	-0.126E-02	0.292E-02	-0.118E-02
	20000.	0.445E-01	-0.499E-02	0.366E-02	-0.213E-02	0.433E-02	-0.188E-02
	30000.	0.405E-01	-0.395E-02	0.460E-02	-0.259E-02	0.508E-02	-0.229E-02
	50000.	0.384E-01	-0.482E-02	0.552E-02	-0.325E-02	0.571E-02	-0.274E-02
Be II 2S-3P	2500.	0.655E-01	0.412E-02	0.146E-02	0.115E-02	0.182E-02	0.102E-02
1036.3 A	5000.	0.555E-01	0.283E-02	0.299E-02	0.242E-02	0.330E-02	0.211E-02
C= 0.17E+19	10000.	0.478E-01	0.418E-02	0.477E-02	0.377E-02	0.457E-02	0.307E-02
	20000.	0.420E-01	0.414E-02	0.611E-02	0.502E-02	0.573E-02	0.423E-02
	30000.	0.392E-01	0.393E-02	0.679E-02	0.556E-02	0.636E-02	0.475E-02
	50000.	0.362E-01	0.400E-02	0.795E-02	0.643E-02	0.719E-02	0.554E-02
Be II 2S-4P	2500.	0.126	0.153E-01				
842.0 A	5000.	0.111	0.172E-01				
C= 0.47E+18	10000.	0.101	0.164E-01	*0.162E-01	*0.107E-01		
	20000.	0.948E-01	0.155E-01	*0.202E-01	*0.157E-01		
	30000.	0.915E-01	0.150E-01	*0.221E-01	*0.179E-01		
	50000.	0.872E-01	0.137E-01	*0.247E-01	*0.193E-01		
Be II 2S-5P	2500.	*0.245	*0.372E-01				
775.4 A	5000.	0.227	0.407E-01				
C= 0.20E+18	10000.	0.218	0.343E-01				
	20000.	0.212	0.400E-01				
	30000.	0.208	0.359E-01				
	50000.	0.201	0.320E-01				
Be II 2P-3S	2500.	0.187	0.816E-01	0.665E-03	0.159E-02	0.899E-03	0.146E-02
1776.2 A	5000.	0.133	0.621E-01	0.228E-02	0.366E-02	0.253E-02	0.317E-02
C= 0.26E+20	10000.	0.944E-01	0.481E-01	0.452E-02	0.570E-02	0.450E-02	0.495E-02
	20000.	0.723E-01	0.371E-01	0.729E-02	0.776E-02	0.651E-02	0.652E-02
	30000.	0.661E-01	0.333E-01	0.874E-02	0.867E-02	0.758E-02	0.735E-02
	50000.	0.605E-01	0.277E-01	0.105E-01	0.101E-01	0.903E-02	0.840E-02

PERTURBER DENSITY = 0.1D+18(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 2P-4S	2500.	0.223	0.954E-01	*0.435E-02	*0.364E-02	*0.416E-02	*0.263E-02
1197.2 A	5000.	0.157	0.883E-01	*0.830E-02	*0.776E-02	*0.812E-02	*0.615E-02
C= 0.47E+19	10000.	0.118	0.722E-01	*0.127E-01	*0.111E-01	*0.112E-01	*0.908E-02
	20000.	0.100	0.642E-01	0.163E-01	0.155E-01	*0.144E-01	*0.131E-01
	30000.	0.950E-01	0.577E-01	0.193E-01	0.174E-01	*0.159E-01	*0.146E-01
	50000.	0.900E-01	0.488E-01	0.220E-01	0.197E-01	*0.181E-01	*0.164E-01
Be II 2P-5S	2500.	*0.340	*0.155				
1048.2 A	5000.	0.272	0.151				
C= 0.18E+19	10000.	0.220	0.141				
	20000.	0.200	0.122				
	30000.	0.190	0.117				
	50000.	0.190	0.991E-01	*0.531E-01	*0.465E-01		
Be II 2P-3D	2500.	0.167	0.105E-01	0.138E-02	-0.161E-02	0.175E-02	-0.143E-02
1512.4 A	5000.	0.123	0.809E-02	0.344E-02	-0.355E-02	0.359E-02	-0.299E-02
C= 0.36E+19	10000.	0.926E-01	0.396E-02	0.575E-02	-0.553E-02	0.581E-02	-0.467E-02
	20000.	0.708E-01	0.183E-02	0.810E-02	-0.736E-02	0.742E-02	-0.618E-02
	30000.	0.612E-01	0.102E-02	0.910E-02	-0.822E-02	0.826E-02	-0.689E-02
	50000.	0.532E-01	0.310E-03	0.108E-01	-0.964E-02	0.962E-02	-0.797E-02
Be II 2P-4D	2500.	0.342	-0.293E-01				
1143.0 A	5000.	0.308	-0.205E-01				
C= 0.33E+17	10000.	0.273	-0.118E-01				
	20000.	0.239	-0.454E-02				
	30000.	0.221	-0.865E-04				
	50000.	0.199	0.556E-02				
Be II 2P-5D	2500.	0.555	-0.794E-01				
1026.9 A	5000.	0.562	-0.579E-01				
C= 0.14E+17	10000.	0.548	-0.387E-01				
	20000.	0.515	-0.259E-01				
	30000.	0.489	-0.104E-01				
	50000.	0.451	0.795E-02				
Be II 3S-3P	2500.	13.7	-2.20	0.169	0.108	0.215	0.953E-01
12099.6 A	5000.	11.0	-1.66	0.345	0.237	0.388	0.200
C= 0.23E+21	10000.	8.81	-1.12	0.534	0.370	0.536	0.310
	20000.	7.56	-0.783	0.666	0.489	0.645	0.410
	30000.	7.15	-0.717	0.751	0.554	0.719	0.462
	50000.	6.72	-0.542	0.854	0.637	0.789	0.532
Be II 3S-4P	2500.	2.20	0.168				
3275.6 A	5000.	1.90	0.190				
C= 0.71E+19	10000.	1.69	0.166	*0.242	*0.159		
	20000.	1.57	0.151	*0.307	*0.233		
	30000.	1.51	0.148	*0.319	*0.263		
	50000.	1.45	0.136	*0.384	*0.290	*0.326	*0.258

PERTURBER DENSITY = 0.1D+18(cm-3)

	PERTURBERS ARE	ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 3S-5P	2500.	*2.57	*0.285				
2454.6 A	5000.	2.36	0.340				
C= 0.20E+19	10000.	2.25	0.311				
	20000.	2.18	0.345				
	30000.	2.14	0.350				
	50000.	2.08	0.277				
Be II 3P-4S	2500.	4.70	1.58	0.695E-01	0.573E-01	*0.737E-01	*0.441E-01
5272.1 A	5000.	3.60	1.50	0.133	0.118	*0.136	*0.978E-01
C= 0.43E+20	10000.	2.92	1.22	0.203	0.172	*0.186	*0.139
	20000.	2.68	1.08	0.261	0.238	*0.235	*0.195
	30000.	2.54	0.968	0.309	0.263	*0.266	*0.222
	50000.	2.44	0.811	0.336	0.302	*0.289	*0.253
Be II 3P-5S	2500.	*3.36	*1.44				
3242.7 A	5000.	2.65	1.49				
C= 0.16E+20	10000.	2.30	1.30				
	20000.	2.14	1.12				
	30000.	2.06	1.06	*0.428	*0.357		
	50000.	2.06	0.901	*0.484	*0.433		
Be II 3P-4D	2500.	5.44	-0.747				
4362.1 A	5000.	4.94	-0.507				
C= 0.48E+18	10000.	4.44	-0.334				
	20000.	3.92	-0.139				
	30000.	3.65	0.625E-02				
	50000.	3.31	-0.190E-01				
Be II 3P-5D	2500.	5.05	-0.793				
3047.5 A	5000.	5.14	-0.606				
C= 0.13E+18	10000.	5.02	-0.434				
	20000.	4.74	-0.295				
	30000.	4.51	-0.135				
	50000.	4.17	0.182E-01				
Be II 3D-4P	2500.	4.86	0.515				
4829.6 A	5000.	4.21	0.563				
C= 0.15E+20	10000.	3.77	0.564	*0.532	*0.366		
	20000.	3.48	0.543	*0.676	*0.540		
	30000.	3.33	0.550	*0.759	*0.608		
	50000.	3.16	0.470	*0.795	*0.671		
Be II 3D-5P	2500.	4.53	0.705				
3234.5 A	5000.	4.16	0.750				
C= 0.35E+19	10000.	3.97	0.619				
	20000.	3.83	0.702				
	30000.	3.75	0.709				
	50000.	3.62	0.568				

PERTURBER DENSITY = 0.1D+18(cm-3)							
PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 3D-4F	2500.	3.74	0.846				
4674.7 A	5000.	3.33	0.583				
C= 0.56E+18	10000.	2.90	0.403				
	20000.	2.49	0.231				
	30000.	2.29	0.135				
	50000.	2.06	0.404E-01				
Be II 3D-5F	2500.	5.01	0.676				
3198.1 A	5000.	5.03	0.469				
C= 0.16E+17	10000.	4.81	0.339				
	20000.	4.42	0.193				
	30000.	4.14	0.623E-01				
	50000.	3.76	-0.515E-01				
PERTURRER DENSITY = 0.1D+19(cm-3)							
Be II 2S-2P	2500.	1.26	-0.105	0.163E-02	-0.649E-03	0.268E-02	-0.646E-03
3131.5 A	5000.	0.801	-0.967E-01	0.855E-02	-0.397E-02	0.129E-01	-0.390E-02
C= 0.31E+22	10000.	0.574	-0.465E-01	0.214E-01	-0.109E-01	0.284E-01	-0.101E-01
	20000.	0.444	-0.476E-01	0.364E-01	-0.197E-01	0.430E-01	-0.172E-01
	30000.	0.405	-0.386E-01	0.459E-01	-0.248E-01	0.507E-01	-0.219E-01
	50000.	0.384	-0.478E-01	0.552E-01	-0.320E-01	0.570E-01	-0.269E-01
Be II 2S-3P	2500.	0.649	-0.930E-03	*0.484E-02	*0.126E-02		
1036.3 A	5000.	0.553	0.408E-02	*0.228E-01	*0.989E-02		
C= 0.17E+20	10000.	0.477	0.261E-01	*0.460E-01	*0.262E-01		
	20000.	0.419	0.292E-01	*0.594E-01	*0.390E-01		
	30000.	0.392	0.298E-01	*0.686E-01	*0.484E-01		
	50000.	0.361	0.358E-01	*0.790E-01	*0.602E-01		
Be II 2S-4P	2500.	*1.25	*-0.102				
842.0 A	5000.	*1.02	*0.121E-01				
C= 0.47E+19	10000.	0.956	0.603E-01				
	20000.	0.909	0.735E-01				
	30000.	0.884	0.938E-01				
	50000.	0.849	0.107				
Be II 2S-5P	2500.						
775.4 A	5000.	*1.53	*-0.935E-01				
C= 0.20E+19	10000.	1.70	-0.131E-02				
	20000.	1.79	0.102				
	30000.	1.81	0.145				
	50000.	1.80	0.192				
Be II 2P-3S	2500.	1.87	0.772	0.462E-02	0.358E-02	*0.546E-02	*0.242E-02
1776.2 A	5000.	1.33	0.595	0.216E-01	0.197E-01	*0.233E-01	*0.149E-01
C= 0.26E+21	10000.	0.943	0.464	0.448E-01	0.434E-01	*0.442E-01	*0.358E-01
	20000.	0.722	0.358	0.736E-01	0.654E-01	*0.655E-01	*0.531E-01
	30000.	0.661	0.321	0.880E-01	0.781E-01	*0.773E-01	*0.646E-01
	50000.	0.605	0.269	0.106	0.967E-01	*0.910E-01	*0.788E-01

PERTURBER DENSITY = 0.1D+19(cm-3)

TRANSITION	T(K)	ELECTRONS WIDTH(A)	ELECTRONS SHIFT(A)	PROTONS WIDTH(A)	PROTONS SHIFT(A)	IONIZED HELIUM WIDTH(A)	IONIZED HELIUM SHIFT(A)
Be II 2P-4S	2500.						
1197.2 A	5000.	*1.56	*0.780				
C= 0.47E+20	10000.	1.18	0.655				
	20000.	1.00	0.594				
	30000.	0.950	0.535				
	50000.	0.899	0.456				
Be II 2P-5S	2500.						
1048.2 A	5000.						
C= 0.18E+20	10000.	*2.19	*1.14				
	20000.	1.99	1.03				
	30000.	1.89	0.992				
	50000.	1.89	0.883				
Be II 2P-3D	2500.	1.66	0.157	*0.689E-02	*-0.306E-02	*0.588E-02	*-0.151E-02
1512.4 A	5000.	1.23	0.111	*0.297E-01	*-0.176E-01	*0.276E-01	*-0.121E-01
C= 0.36E+20	10000.	0.925	0.593E-01	*0.564E-01	*-0.406E-01	*0.561E-01	*-0.323E-01
	20000.	0.708	0.336E-01	*0.815E-01	*-0.604E-01	*0.728E-01	*-0.485E-01
	30000.	0.611	0.201E-01	*0.911E-01	*-0.726E-01	*0.830E-01	*-0.595E-01
	50000.	0.531	0.829E-02	*0.106	*-C.912E-01	*0.952E-01	*-0.745E-01
Be II 2P-4D	2500.						
1143.0 A	5000.	2.08	-0.304E-01				
C= 0.33E+18	10000.	2.00	-0.260E-01				
	20000.	1.86	-0.195E-01				
	30000.	1.77	-0.338E-01				
	50000.	1.65	-0.498E-02				
Be II 2P-5D	2500.						
1026.9 A	5000.	*3.13	*0.304E-01				
C= 0.14E+18	10000.	3.09	-0.172E-01				
	20000.	3.40	-0.785E-01				
	30000.	3.45	-0.796E-01				
	50000.	3.39	-0.728E-01				
Be II 3S-4P	2500.						
3275.6 A	5000.	*17.7	*-0.431				
C= 0.71E+20	10000.	16.0	0.149				
	20000.	15.1	0.323				
	30000.	14.6	0.661				
	50000.	14.1	0.918				

PERTURBER DENSITY = 0.1D+20(cm-3)

Be II 2S-2P	2500.						
3131.5 A	5000.	8.00	-0.858				
C= 0.31E+23	10000.	5.73	-0.387				
	20000.	4.44	-0.431	0.350	-0.160	*0.405	*-0.135
	30000.	4.05	-0.349	0.449	-0.213	*0.489	*-0.184
	50000.	3.84	-0.442	0.547	-0.288	*0.565	*-0.236

PERTURBER DENSITY = 0.1D+20(cm-3)

PERTURBERS ARE		ELECTRONS		PROTONS		IONIZED HELIUM	
TRANSITION	T(K)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)	WIDTH(A)	SHIFT(A)
Be II 2S-3P	2500.						
1036.3 A	5000.						
C= 0.17E+21	10000.	4.40	-0.226				
	20000.	3.91	-0.310E-01				
	30000.	3.70	0.262E-01				
	50000.	3.45	0.157				
Be II 2S-4P	2500.						
842.0 A	5000.						
C= 0.47E+20	10000.	*5.94	*-0.767				
	20000.	6.48	-0.322				
	30000.	6.73	-0.322E-01				
	50000.	6.88	0.129				
Be II 2P-3S	2500.						
1776.2 A	5000.	*13.2	*4.88				
C= 0.26E+22	10000.	9.42	4.03				
	20000.	7.22	3.19				
	30000.	6.61	2.91				
	50000.	6.05	2.46				
Be II 2P-4S	2500.						
1197.2 A	5000.						
C= 0.47E+21	10000.	*11.0	*4.02				
	20000.	9.67	4.31				
	30000.	9.24	4.07				
	50000.	8.80	3.56				
Be II 2P-5S	2500.						
1048.2 A	5000.						
C= 0.18E+21	10000.						
	20000.	*15.1	*4.56				
	30000.	*15.3	*5.32				
	50000.	16.3	5.23				
Be II 2P-3D	2500.						
1512.4 A	5000.	*10.7	*1.99				
C= 0.36E+21	10000.	8.51	1.20				
	20000.	6.68	0.735				
	30000.	5.81	0.538				
	50000.	5.09	0.373				

ТАБЕЛЕ ПАРАМЕТАРА ШТАРКОВОГ ШИРЕЊА ЛИНИЈА Be II ОД ЗНАЧАЈА У АСТРОФИЗИЦИ

М. С. Димитријевић[1] и S.Sahal–Bréchot[2]

[1] *Астрономска опсерваторија, Волгина 7, 11050 Београд, Југославија*
[2] *Laboratoire "Astrophysique, Atomes et Molécules" Département Atomes et Molécules en Astrophysique Unité associée au C.N.R.S. No 812 Observatoire de Paris-Meudon, 92190 Meudon, France*

УДК 52–355.3
Претходно саопштење

Користећи семикласичан прилаз, израчунате су ширине и помераји спектралних линија, проузроковани сударима са електронима, протонима и јонима хелијума, за 30 мултиплета јонизованог берилијума. Резултати су дати у функцији температуре и концентрације пертурбера.