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Preliminary report

# STARK BROADENING PARAMETER TABLES FOR Na X

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**SUMMARY: Using a semiclassical approach, we have calculated electron–, proton–, and He III–impact line widths and shifts for 57 Na X multiplets as a function of temperature (200 000 K - 5 000 000 K) and perturber density ($10^{17}$cm$^{-3}$ - $10^{24}$cm$^{-3}$.**

## 1. INTRODUCTION

Stark broadening parameters of spectral lines of sodium ions in various ionization stages are of interest for astrophysics, as, e.g., for the consideration of radiative transfer through subphotospheric layers, as well as for the fusion plasmas and laser produced plasmas research. The importance of such data for the development of soft x-ray lasers, where Stark broadening data are needed to calculate gain values, model radiation trapping and to consider photoresonant pumping schemes, has been pointed out recently by Griem and Moreno (1990) and Fill and Schöning (1994).

In accordance with our project (Dimitrijević 1996) to provide as large as possible set of reliable Stark broadening data needed for the consideration and modeling of astrophysical and laboratory plasmas as well as for investigations of laser produced and fusion plasmas, we have calculated within the semiclassical-perturbation formalism (Sahal–Bréchot 1969ab, see also Sahal-Bréchot 1974, Fleurier *et al.* 1977, Dimitrijević and Sahal-Bréchot 1984, Dimitrijević *et al.* 1991, Dimitrijević and Sahal-Bréchot 1995) electron-, proton-, and He III-impact line widths and shifts for 57 Na X multiplets. The theoretical formalism applied here, has been reviewed several times, e.g., briefly in Dimitrijević and Sahal-Bréchot, 1995.

## 2. RESULTS AND DISCUSSION

All details of the calculation procedure as well as the result analysis, will be published in Dimitrijević and Sahal–Bréchot, 1998. Here, only tables of Stark broadening parameters are presented. Atomic energy levels needed for calculations have been taken from Martin and Zalubas (1981). Our results for 57 Na X multiplets are shown in Table 1, for perturber densities $10^{17} - 10^{24}$ cm$^{-3}$, and temperatures T = 200,000 − 5,000,000 K. The complete set of data is given for the perturber density of $10^{19}$cm$^{-3}$. For lower perturber densities, only data needed for better interpolation are given. Stark broadening parameters for densities lower than tabulated, or for transi-

**Table 1**. This table shows electron-, proton-, and He III-impact broadening parameters for Na X for perturber densities of $10^{17}$− $10^{24}$ cm$^{-3}$ and temperatures from 200,000 up 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+17cm-3

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 4S-4P | 200000. | 1.83 | -0.180 | 0.467 | -0.541 | 0.853 | -1.08 |
| 13500.7 Å | 500000. | 1.33 | -0.163 | 0.837 | -0.689 | 1.38 | -1.40 |
| C=0.25E+21 | 1000000. | 1.06 | -0.138 | 1.18 | -0.820 | 1.77 | -1.67 |
| | 2000000. | 0.836 | -0.108 | 1.59 | -0.932 | 2.28 | -1.89 |
| | 3000000. | 0.730 | -0.930E-01 | 1.86 | -0.999 | 2.63 | -2.06 |
| | 5000000. | 0.616 | -0.747E-01 | 2.19 | -1.11 | 2.90 | -2.27 |
| Na X 2P-6S | 200000. | 0.348E-04 | 0.580E-05 | 0.134E-04 | 0.141E-04 | 0.264E-04 | 0.281E-04 |
| 41.3 Å | 500000. | 0.264E-04 | 0.514E-05 | 0.193E-04 | 0.177E-04 | 0.366E-04 | 0.361E-04 |
| C=0.37E+16 | 1000000. | 0.211E-04 | 0.409E-05 | 0.253E-04 | 0.203E-04 | 0.463E-04 | 0.418E-04 |
| | 2000000. | 0.167E-04 | 0.327E-05 | 0.335E-04 | 0.233E-04 | 0.552E-04 | 0.486E-04 |
| | 3000000. | 0.145E-04 | 0.276E-05 | 0.379E-04 | 0.248E-04 | 0.595E-04 | 0.518E-04 |
| | 5000000. | 0.121E-04 | 0.218E-05 | 0.463E-04 | 0.274E-04 | 0.696E-04 | 0.574E-04 |
| Na X 2P-7S | 200000. | 0.641E-04 | 0.114E-04 | 0.283E-04 | 0.282E-04 | *0.560E-04 | *0.561E-04 |
| 39.9 Å | 500000. | 0.483E-04 | 0.944E-05 | 0.410E-04 | 0.350E-04 | *0.763E-04 | *0.713E-04 |
| C=0.22E+16 | 1000000. | 0.385E-04 | 0.752E-05 | 0.507E-04 | 0.396E-04 | *0.910E-04 | *0.810E-04 |
| | 2000000. | 0.303E-04 | 0.582E-05 | 0.661E-04 | 0.444E-04 | *0.107E-03 | *0.918E-04 |
| | 3000000. | 0.262E-04 | 0.486E-05 | 0.713E-04 | 0.509E-04 | 0.103E-03 | 0.999E-04 |
| | 5000000. | 0.217E-04 | 0.367E-05 | 0.883E-04 | 0.505E-04 | 0.135E-03 | 0.104E-03 |
| Na X 2P-8S | 200000. | 0.111E-03 | 0.199E-04 | 0.543E-04 | 0.523E-04 | | |
| 39.1 Å | 500000. | 0.829E-04 | 0.160E-04 | 0.765E-04 | 0.629E-04 | | |
| C=0.14E+16 | 1000000. | 0.657E-04 | 0.128E-04 | *0.926E-04 | *0.717E-04 | *0.163E-03 | *0.144E-03 |
| | 2000000. | 0.515E-04 | 0.966E-05 | 0.110E-03 | 0.810E-04 | *0.179E-03 | *0.161E-03 |
| | 3000000. | 0.444E-04 | 0.792E-05 | 0.137E-03 | 0.874E-04 | *0.208E-03 | *0.178E-03 |
| | 5000000. | 0.367E-04 | 0.583E-05 | 0.165E-03 | 0.905E-04 | *0.246E-03 | *0.185E-03 |
| Na X 3P-6S | 200000. | 0.268E-03 | 0.425E-04 | 0.965E-04 | 0.101E-03 | 0.190E-03 | 0.202E-03 |
| 110.0 Å | 500000. | 0.202E-03 | 0.375E-04 | 0.140E-03 | 0.127E-03 | 0.264E-03 | 0.259E-03 |
| C=0.26E+17 | 1000000. | 0.161E-03 | 0.299E-04 | 0.184E-03 | 0.146E-03 | 0.331E-03 | 0.296E-03 |
| | 2000000. | 0.128E-03 | 0.239E-04 | 0.246E-03 | 0.167E-03 | 0.404E-03 | 0.346E-03 |
| | 3000000. | 0.111E-03 | 0.202E-04 | 0.277E-03 | 0.179E-03 | 0.436E-03 | 0.369E-03 |
| | 5000000. | 0.921E-04 | 0.159E-04 | 0.337E-03 | 0.197E-03 | 0.504E-03 | 0.409E-03 |
| Na X 3P-7S | 200000. | 0.427E-03 | 0.740E-04 | 0.181E-03 | 0.181E-03 | *0.360E-03 | *0.359E-03 |
| 100.9 Å | 500000. | 0.321E-03 | 0.612E-04 | 0.263E-03 | 0.224E-03 | *0.490E-03 | *0.457E-03 |
| C=0.14E+17 | 1000000. | 0.255E-03 | 0.488E-04 | 0.325E-03 | 0.254E-03 | *0.584E-03 | *0.519E-03 |
| | 2000000. | 0.201E-03 | 0.377E-04 | 0.427E-03 | 0.285E-03 | *0.693E-03 | *0.589E-03 |
| | 3000000. | 0.174E-03 | 0.315E-04 | 0.464E-03 | 0.327E-03 | 0.667E-03 | 0.643E-03 |
| | 5000000. | 0.144E-03 | 0.238E-04 | 0.568E-03 | 0.324E-03 | 0.867E-03 | 0.667E-03 |
| Na X 3P-8S | 200000. | 0.679E-03 | 0.120E-03 | *0.326E-03 | *0.314E-03 | | |
| 95.8 Å | 500000. | 0.509E-03 | 0.970E-04 | 0.461E-03 | 0.378E-03 | | |
| C=0.84E+16 | 1000000. | 0.403E-03 | 0.776E-04 | 0.558E-03 | 0.431E-03 | *0.977E-03 | *0.867E-03 |
| | 2000000. | 0.316E-03 | 0.585E-04 | 0.666E-03 | 0.487E-03 | *0.108E-02 | *0.967E-03 |
| | 3000000. | 0.272E-03 | 0.479E-04 | 0.828E-03 | 0.525E-03 | *0.125E-02 | *0.107E-02 |
| | 5000000. | 0.225E-03 | 0.353E-04 | 0.999E-03 | 0.544E-03 | *0.148E-02 | *0.111E-02 |
| Na X 4P-5S | 200000. | 0.266E-02 | 0.331E-03 | 0.753E-03 | 0.799E-03 | 0.144E-02 | 0.161E-02 |
| 412.4 Å | 500000. | 0.197E-02 | 0.301E-03 | 0.120E-02 | 0.102E-02 | 0.208E-02 | 0.207E-02 |
| C=0.23E+18 | 1000000. | 0.157E-02 | 0.245E-03 | 0.166E-02 | 0.120E-02 | 0.266E-02 | 0.243E-02 |
| | 2000000. | 0.124E-02 | 0.194E-03 | 0.218E-02 | 0.137E-02 | 0.325E-02 | 0.277E-02 |
| | 3000000. | 0.108E-02 | 0.167E-03 | 0.254E-02 | 0.144E-02 | 0.362E-02 | 0.296E-02 |
| | 5000000. | 0.910E-03 | 0.133E-03 | 0.309E-02 | 0.163E-02 | 0.426E-02 | 0.334E-02 |
| Na X 4P-6S | 200000. | 0.187E-02 | 0.275E-03 | 0.636E-03 | 0.645E-03 | 0.124E-02 | 0.129E-02 |
| 264.6 Å | 500000. | 0.140E-02 | 0.242E-03 | 0.953E-03 | 0.811E-03 | 0.174E-02 | 0.166E-02 |
| C=0.96E+17 | 1000000. | 0.112E-02 | 0.192E-03 | 0.128E-02 | 0.947E-03 | 0.210E-02 | 0.191E-02 |
| | 2000000. | 0.883E-03 | 0.153E-03 | 0.165E-02 | 0.105E-02 | 0.252E-02 | 0.214E-02 |
| | 3000000. | 0.767E-03 | 0.129E-03 | 0.185E-02 | 0.111E-02 | 0.282E-02 | 0.230E-02 |
| | 5000000. | 0.641E-03 | 0.101E-03 | 0.234E-02 | 0.127E-02 | 0.323E-02 | 0.256E-02 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 4P-7S | 200000. | 0.220E-02 | 0.364E-03 | 0.892E-03 | 0.872E-03 | *0.173E-02 | *0.173E-02 |
| 217.6 Å | 500000. | 0.165E-02 | 0.301E-03 | 0.131E-02 | 0.107E-02 | *0.238E-02 | *0.220E-02 |
| C=0.65E+17 | 1000000. | 0.131E-02 | 0.240E-03 | 0.165E-02 | 0.125E-02 | *0.277E-02 | *0.249E-02 |
| | 2000000. | 0.103E-02 | 0.185E-03 | 0.213E-02 | 0.135E-02 | *0.338E-02 | *0.280E-02 |
| | 3000000. | 0.894E-03 | 0.155E-03 | 0.245E-02 | 0.157E-02 | 0.342E-02 | 0.320E-02 |
| | 5000000. | 0.743E-03 | 0.117E-03 | 0.283E-02 | 0.157E-02 | 0.406E-02 | 0.318E-02 |
| Na X 4P-8S | 200000. | 0.299E-02 | 0.515E-03 | *0.140E-02 | *0.133E-02 | | |
| 195.2 Å | 500000. | 0.224E-02 | 0.416E-03 | 0.195E-02 | 0.158E-02 | | |
| C=0.35E+17 | 1000000. | 0.177E-02 | 0.333E-03 | 0.238E-02 | 0.183E-02 | *0.409E-02 | *0.368E-02 |
| | 2000000. | 0.139E-02 | 0.251E-03 | 0.288E-02 | 0.209E-02 | *0.457E-02 | *0.409E-02 |
| | 3000000. | 0.120E-02 | 0.205E-03 | 0.354E-02 | 0.222E-02 | *0.527E-02 | *0.453E-02 |
| | 5000000. | 0.993E-03 | 0.152E-03 | 0.429E-02 | 0.228E-02 | *0.632E-02 | *0.469E-02 |
| Na X 2P-4D | 200000. | 0.150E-04 | 0.778E-06 | 0.809E-04 | 0.435E-04 | *0.115E-03 | *0.860E-04 |
| 49.0 Å | 500000. | 0.107E-04 | 0.898E-06 | 0.103E-03 | 0.538E-04 | *0.174E-03 | *0.110E-03 |
| C=0.94E+14 | 1000000. | 0.835E-05 | 0.673E-06 | 0.110E-03 | 0.623E-04 | *0.217E-03 | *0.124E-03 |
| | 2000000. | 0.649E-05 | 0.493E-06 | 0.121E-03 | 0.680E-04 | *0.261E-03 | *0.140E-03 |
| | 3000000. | 0.561E-05 | 0.395E-06 | 0.122E-03 | 0.783E-04 | *0.261E-03 | *0.158E-03 |
| | 5000000. | 0.469E-05 | 0.305E-06 | 0.126E-03 | 0.790E-04 | *0.299E-03 | *0.159E-03 |
| Na X 3P-3D | 200000. | 2.19 | 0.114 | 0.229 | 0.398 | 0.417 | 0.800 |
| 27739.3 Å | 500000. | 1.52 | 0.109 | 0.626 | 0.605 | 0.997 | 1.23 |
| C=0.28E+22 | 1000000. | 1.16 | 0.924E-01 | 1.03 | 0.728 | 1.47 | 1.47 |
| | 2000000. | 0.904 | 0.761E-01 | 1.51 | 0.868 | 1.95 | 1.77 |
| | 3000000. | 0.785 | 0.660E-01 | 1.79 | 0.942 | 2.34 | 1.91 |
| | 5000000. | 0.661 | 0.539E-01 | 2.16 | 1.03 | 2.83 | 2.12 |
| Na X 3P-4D | 200000. | 0.257E-03 | 0.155E-04 | 0.120E-02 | 0.648E-03 | *0.172E-02 | *0.128E-02 |
| 188.7 Å | 500000. | 0.186E-03 | 0.165E-04 | 0.153E-02 | 0.798E-03 | *0.260E-02 | *0.163E-02 |
| C=0.14E+16 | 1000000. | 0.145E-03 | 0.127E-04 | 0.165E-02 | 0.931E-03 | *0.322E-02 | *0.185E-02 |
| | 2000000. | 0.114E-03 | 0.940E-05 | 0.180E-02 | 0.101E-02 | *0.389E-02 | *0.208E-02 |
| | 3000000. | 0.985E-04 | 0.764E-05 | 0.184E-02 | 0.117E-02 | *0.390E-02 | *0.236E-02 |
| | 5000000. | 0.826E-04 | 0.594E-05 | 0.191E-02 | 0.118E-02 | *0.444E-02 | *0.237E-02 |
| Na X 4P-4D | 200000. | 58.5 | 4.49 | 184. | 99.8 | *263. | *198. |
| 72674.4 Å | 500000. | 42.6 | 4.28 | 234. | 122. | *400. | *250. |
| C=0.21E+21 | 1000000. | 33.6 | 3.33 | 264. | 142. | *486. | *290. |
| | 2000000. | 26.5 | 2.49 | 275. | 154. | *593. | *318. |
| | 3000000. | 23.0 | 2.04 | 302. | 179. | *624. | *365. |
| | 5000000. | 19.4 | 1.56 | 296. | 182. | *665. | *369. |
| Na X 2P-6S | 200000. | 0.303E-04 | 0.507E-05 | 0.982E-05 | 0.108E-04 | 0.196E-04 | 0.215E-04 |
| 40.3 Å | 500000. | 0.230E-04 | 0.462E-05 | 0.144E-04 | 0.136E-04 | 0.279E-04 | 0.277E-04 |
| C=0.47E+16 | 1000000. | 0.185E-04 | 0.372E-05 | 0.191E-04 | 0.158E-04 | 0.352E-04 | 0.322E-04 |
| | 2000000. | 0.147E-04 | 0.299E-05 | 0.236E-04 | 0.177E-04 | 0.413E-04 | 0.363E-04 |
| | 3000000. | 0.127E-04 | 0.255E-05 | 0.273E-04 | 0.193E-04 | 0.442E-04 | 0.391E-04 |
| | 5000000. | 0.106E-04 | 0.203E-05 | 0.314E-04 | 0.207E-04 | 0.486E-04 | 0.418E-04 |
| Na X 2P-7S | 200000. | 0.559E-04 | 0.100E-04 | 0.215E-04 | 0.218E-04 | *0.425E-04 | *0.433E-04 |
| 39.0 Å | 500000. | 0.423E-04 | 0.860E-05 | 0.304E-04 | 0.269E-04 | *0.592E-04 | *0.547E-04 |
| C=0.28E+16 | 1000000. | 0.338E-04 | 0.679E-05 | 0.383E-04 | 0.311E-04 | *0.693E-04 | *0.623E-04 |
| | 2000000. | 0.267E-04 | 0.538E-05 | 0.478E-04 | 0.355E-04 | 0.807E-04 | 0.717E-04 |
| | 3000000. | 0.231E-04 | 0.451E-05 | 0.556E-04 | 0.365E-04 | 0.927E-04 | 0.746E-04 |
| | 5000000. | 0.192E-04 | 0.350E-05 | 0.658E-04 | 0.420E-04 | 0.994E-04 | 0.848E-04 |
| Na X 2P-8S | 200000. | 0.967E-04 | 0.180E-04 | 0.414E-04 | 0.403E-04 | | |
| 38.2 Å | 500000. | 0.728E-04 | 0.147E-04 | 0.575E-04 | 0.490E-04 | *0.111E-03 | *0.101E-03 |
| C=0.18E+16 | 1000000. | 0.579E-04 | 0.117E-04 | 0.744E-04 | 0.563E-04 | *0.132E-03 | *0.117E-03 |
| | 2000000. | 0.455E-04 | 0.897E-05 | 0.929E-04 | 0.619E-04 | *0.155E-03 | *0.127E-03 |
| | 3000000. | 0.394E-04 | 0.746E-05 | 0.101E-03 | 0.666E-04 | *0.162E-03 | *0.136E-03 |
| | 5000000. | 0.326E-04 | 0.556E-05 | 0.127E-03 | 0.760E-04 | *0.186E-03 | *0.151E-03 |
| Na X 3P-7S | 200000. | 0.379E-03 | 0.649E-04 | 0.139E-03 | 0.142E-03 | *0.276E-03 | *0.281E-03 |
| 99.3 Å | 500000. | 0.285E-03 | 0.556E-04 | 0.198E-03 | 0.175E-03 | *0.384E-03 | *0.355E-03 |
| C=0.18E+17 | 1000000. | 0.228E-03 | 0.439E-04 | 0.248E-03 | 0.202E-03 | *0.450E-03 | *0.404E-03 |
| | 2000000. | 0.180E-03 | 0.348E-04 | 0.311E-03 | 0.230E-03 | 0.524E-03 | 0.466E-03 |
| | 3000000. | 0.156E-03 | 0.291E-04 | 0.362E-03 | 0.237E-03 | 0.603E-03 | 0.485E-03 |
| | 5000000. | 0.130E-03 | 0.226E-04 | 0.429E-03 | 0.273E-03 | 0.646E-03 | 0.551E-03 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3P-8S | 200000. | 0.604E-03 | 0.110E-03 | 0.253E-03 | 0.246E-03 | | |
| 94.3 Å | 500000. | 0.454E-03 | 0.893E-04 | 0.351E-03 | 0.299E-03 | *0.678E-03 | *0.614E-03 |
| C=0.11E+17 | 1000000. | 0.361E-03 | 0.713E-04 | 0.454E-03 | 0.343E-03 | *0.803E-03 | *0.717E-03 |
| | 2000000. | 0.284E-03 | 0.546E-04 | 0.568E-03 | 0.378E-03 | *0.945E-03 | *0.775E-03 |
| | 3000000. | 0.245E-03 | 0.454E-04 | 0.618E-03 | 0.406E-03 | *0.988E-03 | *0.831E-03 |
| | 5000000. | 0.203E-03 | 0.338E-04 | 0.775E-03 | 0.463E-03 | *0.114E-02 | *0.923E-03 |
| Na X 4P-7S | 200000. | 0.196E-02 | 0.299E-03 | 0.646E-03 | 0.659E-03 | *0.128E-02 | *0.131E-02 |
| 215.1 Å | 500000. | 0.147E-02 | 0.255E-03 | 0.927E-03 | 0.812E-03 | *0.179E-02 | *0.165E-02 |
| C=0.85E+17 | 1000000. | 0.117E-02 | 0.201E-03 | 0.116E-02 | 0.937E-03 | *0.211E-02 | *0.189E-02 |
| | 2000000. | 0.925E-03 | 0.159E-03 | 0.147E-02 | 0.106E-02 | 0.243E-02 | 0.216E-02 |
| | 3000000. | 0.803E-03 | 0.133E-03 | 0.173E-02 | 0.110E-02 | 0.282E-02 | 0.227E-02 |
| | 5000000. | 0.669E-03 | 0.103E-03 | 0.203E-02 | 0.126E-02 | 0.298E-02 | 0.256E-02 |
| Na X 4P-8S | 200000. | 0.267E-02 | 0.454E-03 | 0.105E-02 | 0.103E-02 | | |
| 192.9 Å | 500000. | 0.200E-02 | 0.369E-03 | 0.147E-02 | 0.125E-02 | *0.282E-02 | *0.256E-02 |
| C=0.45E+17 | 1000000. | 0.159E-02 | 0.295E-03 | 0.191E-02 | 0.143E-02 | *0.334E-02 | *0.299E-02 |
| | 2000000. | 0.125E-02 | 0.225E-03 | 0.239E-02 | 0.158E-02 | *0.395E-02 | *0.323E-02 |
| | 3000000. | 0.108E-02 | 0.187E-03 | 0.262E-02 | 0.169E-02 | *0.414E-02 | *0.346E-02 |
| | 5000000. | 0.900E-03 | 0.139E-03 | 0.327E-02 | 0.193E-02 | *0.475E-02 | *0.385E-02 |
| Na X 3P-4D | 200000. | 0.211E-03 | 0.168E-05 | 0.128E-03 | 0.105E-03 | 0.177E-03 | 0.212E-03 |
| 182.7 Å | 500000. | 0.150E-03 | 0.120E-05 | 0.229E-03 | 0.134E-03 | 0.297E-03 | 0.272E-03 |
| C=0.14E+17 | 1000000. | 0.117E-03 | 0.725E-06 | 0.307E-03 | 0.158E-03 | 0.406E-03 | 0.324E-03 |
| | 2000000. | 0.922E-04 | 0.389E-06 | 0.374E-03 | 0.180E-03 | 0.534E-03 | 0.366E-03 |
| | 3000000. | 0.803E-04 | 0.116E-06 | 0.413E-03 | 0.193E-03 | 0.628E-03 | 0.393E-03 |
| | 5000000. | 0.679E-04 | -0.103E-06 | 0.446E-03 | 0.216E-03 | 0.743E-03 | 0.436E-03 |
| Na X 4P-4D | 200000. | 3.12 | -0.227E-01 | 1.19 | 0.957 | 1.59 | 1.92 |
| 18063.6 Å | 500000. | 2.24 | -0.276E-01 | 2.19 | 1.22 | 2.72 | 2.49 |
| C=0.13E+21 | 1000000. | 1.77 | -0.241E-01 | 2.97 | 1.46 | 3.70 | 2.94 |
| | 2000000. | 1.40 | -0.209E-01 | 3.71 | 1.65 | 5.10 | 3.36 |
| | 3000000. | 1.23 | -0.219E-01 | 4.12 | 1.77 | 5.96 | 3.67 |
| | 5000000. | 1.04 | -0.192E-01 | 4.57 | 1.98 | 6.95 | 4.00 |
| PERTURBER DENSITY = 1.E+18cm-3 | | | | | | | |
| Na X 1S-4P | 200000. | 0.549E-05 | -0.371E-06 | 0.164E-05 | -0.191E-05 | 0.293E-05 | -0.371E-05 |
| 9.0 Å | 500000. | 0.391E-05 | -0.331E-06 | 0.311E-05 | -0.251E-05 | 0.506E-05 | -0.511E-05 |
| C=0.11E+16 | 1000000. | 0.305E-05 | -0.280E-06 | 0.437E-05 | -0.299E-05 | 0.653E-05 | -0.610E-05 |
| | 2000000. | 0.239E-05 | -0.213E-06 | 0.588E-05 | -0.344E-05 | 0.846E-05 | -0.698E-05 |
| | 3000000. | 0.209E-05 | -0.180E-06 | 0.683E-05 | -0.371E-05 | 0.942E-05 | -0.765E-05 |
| | 5000000. | 0.176E-05 | -0.137E-06 | 0.805E-05 | -0.405E-05 | 0.110E-04 | -0.834E-05 |
| Na X 2S-3P | 200000. | 0.968E-04 | -0.441E-05 | 0.726E-05 | -0.148E-04 | 0.131E-04 | -0.290E-04 |
| 63.6 Å | 500000. | 0.663E-04 | -0.413E-05 | 0.216E-04 | -0.235E-04 | 0.355E-04 | -0.477E-04 |
| C=0.15E+18 | 1000000. | 0.506E-04 | -0.362E-05 | 0.369E-04 | -0.288E-04 | 0.566E-04 | -0.587E-04 |
| | 2000000. | 0.391E-04 | -0.290E-05 | 0.531E-04 | -0.343E-04 | 0.754E-04 | -0.698E-04 |
| | 3000000. | 0.338E-04 | -0.254E-05 | 0.636E-04 | -0.378E-04 | 0.888E-04 | -0.766E-04 |
| | 5000000. | 0.283E-04 | -0.205E-05 | 0.784E-04 | -0.418E-04 | 0.106E-03 | -0.858E-04 |
| Na X 2S-4P | 200000. | 0.157E-03 | -0.104E-04 | 0.460E-04 | -0.536E-04 | 0.821E-04 | -0.104E-03 |
| 47.5 Å | 500000. | 0.112E-03 | -0.956E-05 | 0.870E-04 | -0.702E-04 | 0.142E-03 | -0.143E-03 |
| C=0.31E+17 | 1000000. | 0.871E-04 | -0.813E-05 | 0.123E-03 | -0.839E-04 | 0.183E-03 | -0.171E-03 |
| | 2000000. | 0.685E-04 | -0.623E-05 | 0.165E-03 | -0.964E-04 | 0.236E-03 | -0.195E-03 |
| | 3000000. | 0.597E-04 | -0.531E-05 | 0.191E-03 | -0.104E-03 | 0.264E-03 | -0.214E-03 |
| | 5000000. | 0.505E-04 | -0.407E-05 | 0.226E-03 | -0.113E-03 | 0.309E-03 | -0.234E-03 |
| Na X 3S-3P | 200000. | 1.01 | -0.650E-01 | 0.844E-01 | -0.156 | 0.158 | -0.306 |
| 5666.0 Å | 500000. | 0.708 | -0.631E-01 | 0.223 | -0.241 | 0.384 | -0.488 |
| C=0.12E+22 | 1000000. | 0.550 | -0.580E-01 | 0.358 | -0.289 | 0.573 | -0.587 |
| | 2000000. | 0.432 | -0.481E-01 | 0.512 | -0.345 | 0.754 | -0.701 |
| | 3000000. | 0.375 | -0.420E-01 | 0.627 | -0.374 | 0.898 | -0.775 |
| | 5000000. | 0.315 | -0.347E-01 | 0.763 | -0.415 | 1.07 | -0.840 |
| Na X 3S-4P | 200000. | 0.255E-02 | -0.183E-03 | 0.697E-03 | -0.809E-03 | *0.125E-02 | -0.157E-02 |
| 182.2 Å | 500000. | 0.183E-02 | -0.172E-03 | 0.131E-02 | -0.106E-02 | 0.213E-02 | -0.215E-02 |
| C=0.46E+18 | 1000000. | 0.143E-02 | -0.150E-03 | 0.184E-02 | -0.127E-02 | 0.275E-02 | -0.256E-02 |
| | 2000000. | 0.113E-02 | -0.118E-03 | 0.250E-02 | -0.146E-02 | 0.350E-02 | -0.294E-02 |
| | 3000000. | 0.987E-03 | -0.101E-03 | 0.287E-02 | -0.156E-02 | 0.402E-02 | -0.320E-02 |
| | 5000000. | 0.835E-03 | -0.788E-04 | 0.340E-02 | -0.171E-02 | 0.476E-02 | -0.352E-02 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 4S-4P | 200000. | 18.3 | -1.63 | 4.67 | -5.30 | *8.52 | -10.2 |
| 13500.7 Å | 500000. | 13.3 | -1.56 | 8.37 | -6.87 | *13.8 | -14.0 |
| C=0.25E+22 | 1000000. | 10.5 | -1.37 | 11.8 | -8.20 | *17.7 | -16.6 |
| | 2000000. | 8.36 | -1.07 | 15.9 | -9.32 | 22.8 | -18.9 |
| | 3000000. | 7.30 | -0.930 | 18.6 | -9.99 | 26.3 | -20.6 |
| | 5000000. | 6.16 | -0.747 | 21.9 | -11.1 | 29.0 | -22.7 |
| Na X 2P-4S | 200000. | 0.904E-04 | 0.108E-04 | 0.143E-04 | 0.229E-04 | 0.288E-04 | 0.448E-04 |
| 49.1 Å | 500000. | 0.671E-04 | 0.108E-04 | 0.308E-04 | 0.331E-04 | 0.600E-04 | 0.672E-04 |
| C=0.18E+18 | 1000000. | 0.540E-04 | 0.975E-05 | 0.429E-04 | 0.399E-04 | 0.789E-04 | 0.811E-04 |
| | 2000000. | 0.431E-04 | 0.786E-05 | 0.579E-04 | 0.475E-04 | 0.100E-03 | 0.956E-04 |
| | 3000000. | 0.376E-04 | 0.695E-05 | 0.687E-04 | 0.511E-04 | 0.114E-03 | 0.104E-03 |
| | 5000000. | 0.315E-04 | 0.581E-05 | 0.842E-04 | 0.573E-04 | 0.128E-03 | 0.114E-03 |
| Na X 2P-5S | 200000. | 0.178E-03 | 0.251E-04 | 0.517E-04 | 0.623E-04 | *0.102E-03 | *0.120E-03 |
| 43.7 Å | 500000. | 0.135E-03 | 0.247E-04 | 0.836E-04 | 0.806E-04 | *0.160E-03 | *0.163E-03 |
| C=0.72E+17 | 1000000. | 0.109E-03 | 0.208E-04 | 0.112E-03 | 0.960E-04 | *0.202E-03 | *0.194E-03 |
| | 2000000. | 0.864E-04 | 0.166E-04 | 0.145E-03 | 0.111E-03 | 0.240E-03 | 0.222E-03 |
| | 3000000. | 0.752E-04 | 0.145E-04 | 0.168E-03 | 0.117E-03 | 0.273E-03 | 0.237E-03 |
| | 5000000. | 0.627E-04 | 0.117E-04 | 0.207E-03 | 0.128E-03 | 0.307E-03 | 0.267E-03 |
| Na X 2P-6S | 200000. | 0.348E-03 | 0.514E-04 | *0.134E-03 | *0.136E-03 | | |
| 41.3 Å | 500000. | 0.264E-03 | 0.487E-04 | 0.193E-03 | 0.176E-03 | | |
| C=0.37E+17 | 1000000. | 0.211E-03 | 0.405E-04 | 0.253E-03 | 0.203E-03 | | |
| | 2000000. | 0.167E-03 | 0.324E-04 | 0.335E-03 | 0.233E-03 | *0.552E-03 | *0.486E-03 |
| | 3000000. | 0.145E-03 | 0.276E-04 | 0.379E-03 | 0.248E-03 | *0.595E-03 | *0.518E-03 |
| | 5000000. | 0.121E-03 | 0.218E-04 | 0.463E-03 | 0.274E-03 | *0.696E-03 | *0.574E-03 |
| Na X 2P-7S | 200000. | 0.639E-03 | 0.948E-04 | *0.283E-03 | *0.270E-03 | | |
| 39.9 Å | 500000. | 0.482E-03 | 0.868E-04 | *0.410E-03 | *0.348E-03 | | |
| C=0.22E+17 | 1000000. | 0.384E-03 | 0.742E-04 | *0.507E-03 | *0.396E-03 | | |
| | 2000000. | 0.303E-03 | 0.572E-04 | *0.661E-03 | *0.444E-03 | | |
| | 3000000. | 0.262E-03 | 0.486E-04 | *0.713E-03 | *0.509E-03 | | |
| | 5000000. | 0.217E-03 | 0.367E-04 | *0.883E-03 | *0.505E-03 | | |
| Na X 2P-8S | 200000. | 0.109E-02 | 0.150E-03 | | | | |
| 39.1 Å | 500000. | 0.821E-03 | 0.141E-03 | | | | |
| C=0.14E+17 | 1000000. | 0.652E-03 | 0.126E-03 | | | | |
| | 2000000. | 0.511E-03 | 0.941E-04 | | | | |
| | 3000000. | 0.441E-03 | 0.792E-04 | | | | |
| | 5000000. | 0.365E-03 | 0.583E-04 | *0.165E-02 | *0.905E-03 | | |
| Na X 3P-4S | 200000. | 0.200E-02 | 0.198E-03 | 0.276E-03 | 0.427E-03 | 0.542E-03 | 0.830E-03 |
| 190.9 Å | 500000. | 0.146E-02 | 0.195E-03 | 0.595E-03 | 0.602E-03 | 0.111E-02 | 0.122E-02 |
| C=0.13E+19 | 1000000. | 0.116E-02 | 0.175E-03 | 0.866E-03 | 0.721E-03 | 0.147E-02 | 0.147E-02 |
| | 2000000. | 0.919E-03 | 0.140E-03 | 0.119E-02 | 0.853E-03 | 0.187E-02 | 0.171E-02 |
| | 3000000. | 0.801E-03 | 0.123E-03 | 0.142E-02 | 0.924E-03 | 0.213E-02 | 0.187E-02 |
| | 5000000. | 0.672E-03 | 0.102E-03 | 0.173E-02 | 0.992E-03 | 0.248E-02 | 0.202E-02 |
| Na X 3P-5S | 200000. | 0.185E-02 | 0.235E-03 | 0.480E-03 | 0.567E-03 | *0.945E-03 | *0.109E-02 |
| 129.2 Å | 500000. | 0.138E-02 | 0.230E-03 | 0.776E-03 | 0.731E-03 | *0.146E-02 | *0.149E-02 |
| C=0.60E+18 | 1000000. | 0.111E-02 | 0.194E-03 | 0.105E-02 | 0.864E-03 | *0.186E-02 | *0.177E-02 |
| | 2000000. | 0.877E-03 | 0.155E-03 | 0.141E-02 | 0.101E-02 | 0.224E-02 | 0.206E-02 |
| | 3000000. | 0.763E-03 | 0.135E-03 | 0.159E-02 | 0.107E-02 | 0.249E-02 | 0.216E-02 |
| | 5000000. | 0.638E-03 | 0.109E-03 | 0.200E-02 | 0.116E-02 | 0.292E-02 | 0.238E-02 |
| Na X 3P-6S | 200000. | 0.268E-02 | 0.376E-03 | *0.965E-03 | *0.976E-03 | | |
| 110.0 Å | 500000. | 0.202E-02 | 0.356E-03 | 0.140E-02 | 0.127E-02 | | |
| C=0.26E+18 | 1000000. | 0.161E-02 | 0.297E-03 | 0.184E-02 | 0.146E-02 | | |
| | 2000000. | 0.128E-02 | 0.237E-03 | 0.246E-02 | 0.167E-02 | *0.404E-02 | *0.346E-02 |
| | 3000000. | 0.111E-02 | 0.202E-03 | 0.277E-02 | 0.179E-02 | *0.436E-02 | *0.369E-02 |
| | 5000000. | 0.921E-03 | 0.159E-03 | 0.337E-02 | 0.197E-02 | *0.504E-02 | *0.409E-02 |
| Na X 3P-7S | 200000. | 0.426E-02 | 0.615E-03 | *0.181E-02 | *0.173E-02 | | |
| 100.9 Å | 500000. | 0.320E-02 | 0.563E-03 | *0.263E-02 | *0.223E-02 | | |
| C=0.14E+18 | 1000000. | 0.255E-02 | 0.481E-03 | *0.325E-02 | *0.254E-02 | | |
| | 2000000. | 0.201E-02 | 0.371E-03 | *0.427E-02 | *0.285E-02 | | |
| | 3000000. | 0.174E-02 | 0.315E-03 | *0.464E-02 | *0.327E-02 | | |
| | 5000000. | 0.144E-02 | 0.238E-03 | *0.568E-02 | *0.324E-02 | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3P-8S | 200000. | 0.672E-02 | 0.908E-03 | | | | |
| 95.8 Å | 500000. | 0.504E-02 | 0.853E-03 | | | | |
| C=0.84E+17 | 1000000. | 0.400E-02 | 0.762E-03 | | | | |
| | 2000000. | 0.313E-02 | 0.570E-03 | | | | |
| | 3000000. | 0.270E-02 | 0.479E-03 | | | | |
| | 5000000. | 0.224E-02 | 0.353E-03 | *0.999E-02 | *0.544E-02 | | |
| Na X 4P-5S | 200000. | 0.266E-01 | 0.299E-02 | 0.752E-02 | 0.780E-02 | *0.144E-01 | *0.150E-01 |
| 412.4 Å | 500000. | 0.197E-01 | 0.289E-02 | 0.120E-01 | 0.101E-01 | *0.208E-01 | *0.206E-01 |
| C=0.23E+19 | 1000000. | 0.157E-01 | 0.243E-02 | 0.166E-01 | 0.120E-01 | *0.266E-01 | *0.242E-01 |
| | 2000000. | 0.124E-01 | 0.192E-02 | 0.218E-01 | 0.137E-01 | *0.325E-01 | *0.277E-01 |
| | 3000000. | 0.108E-01 | 0.167E-02 | 0.254E-01 | 0.144E-01 | *0.362E-01 | *0.296E-01 |
| | 5000000. | 0.910E-02 | 0.133E-02 | 0.309E-01 | 0.163E-01 | *0.426E-01 | *0.334E-01 |
| Na X 4P-6S | 200000. | 0.187E-01 | 0.242E-02 | *0.635E-02 | *0.624E-02 | | |
| 264.6 Å | 500000. | 0.140E-01 | 0.229E-02 | *0.953E-02 | *0.808E-02 | | |
| C=0.96E+18 | 1000000. | 0.112E-01 | 0.191E-02 | *0.128E-01 | *0.947E-02 | | |
| | 2000000. | 0.883E-02 | 0.151E-02 | 0.165E-01 | 0.105E-01 | *0.252E-01 | *0.214E-01 |
| | 3000000. | 0.767E-02 | 0.129E-02 | 0.185E-01 | 0.111E-01 | *0.282E-01 | *0.230E-01 |
| | 5000000. | 0.640E-02 | 0.101E-02 | 0.234E-01 | 0.127E-01 | *0.323E-01 | *0.256E-01 |
| Na X 4P-7S | 200000. | 0.219E-01 | 0.302E-02 | *0.892E-02 | *0.835E-02 | | |
| 217.6 Å | 500000. | 0.165E-01 | 0.277E-02 | *0.131E-01 | *0.107E-01 | | |
| C=0.65E+18 | 1000000. | 0.131E-01 | 0.237E-02 | *0.165E-01 | *0.125E-01 | | |
| | 2000000. | 0.103E-01 | 0.182E-02 | *0.213E-01 | *0.135E-01 | | |
| | 3000000. | 0.892E-02 | 0.155E-02 | *0.245E-01 | *0.157E-01 | | |
| | 5000000. | 0.742E-02 | 0.117E-02 | *0.283E-01 | *0.157E-01 | | |
| Na X 4P-8S | 200000. | 0.296E-01 | 0.390E-02 | | | | |
| 195.2 Å | 500000. | 0.222E-01 | 0.366E-02 | | | | |
| C=0.35E+18 | 1000000. | 0.176E-01 | 0.326E-02 | | | | |
| | 2000000. | 0.138E-01 | 0.244E-02 | | | | |
| | 3000000. | 0.119E-01 | 0.205E-02 | | | | |
| | 5000000. | 0.987E-02 | 0.152E-02 | | | | |
| Na X 2P-3D | 200000. | 0.659E-04 | 0.192E-05 | 0.376E-05 | 0.901E-05 | 0.652E-05 | 0.177E-04 |
| 66.3 Å | 500000. | 0.441E-04 | 0.225E-05 | 0.135E-04 | 0.153E-04 | 0.205E-04 | 0.309E-04 |
| C=0.16E+18 | 1000000. | 0.330E-04 | 0.194E-05 | 0.261E-04 | 0.196E-04 | 0.375E-04 | 0.398E-04 |
| | 2000000. | 0.250E-04 | 0.177E-05 | 0.385E-04 | 0.236E-04 | 0.516E-04 | 0.481E-04 |
| | 3000000. | 0.215E-04 | 0.157E-05 | 0.461E-04 | 0.263E-04 | 0.611E-04 | 0.529E-04 |
| | 5000000. | 0.179E-04 | 0.133E-05 | 0.564E-04 | 0.293E-04 | 0.764E-04 | 0.593E-04 |
| Na X 2P-4D | 200000. | 0.138E-03 | 0.530E-05 | | | | |
| 49.0 Å | 500000. | 0.100E-03 | 0.625E-05 | | | | |
| C=0.94E+15 | 1000000. | 0.785E-04 | 0.638E-05 | *0.110E-02 | *0.623E-03 | | |
| | 2000000. | 0.614E-04 | 0.421E-05 | *0.121E-02 | *0.680E-03 | | |
| | 3000000. | 0.533E-04 | 0.395E-05 | *0.122E-02 | *0.783E-03 | | |
| | 5000000. | 0.447E-04 | 0.305E-05 | *0.126E-02 | *0.790E-03 | | |
| Na X 3P-3D | 200000. | 22.0 | 1.07 | 2.29 | 3.94 | 4.16 | 7.72 |
| 27739.3 Å | 500000. | 15.2 | 1.06 | 6.26 | 6.04 | 9.97 | 12.3 |
| C=0.28E+23 | 1000000. | 11.6 | 0.920 | 10.3 | 7.28 | 14.7 | 14.7 |
| | 2000000. | 9.04 | 0.757 | 15.1 | 8.68 | 19.5 | 17.7 |
| | 3000000. | 7.85 | 0.660 | 17.9 | 9.42 | 23.4 | 19.1 |
| | 5000000. | 6.61 | 0.539 | 21.6 | 10.3 | 28.3 | 21.2 |
| Na X 3P-4D | 200000. | 0.241E-02 | 0.113E-03 | | | | |
| 188.7 Å | 500000. | 0.175E-02 | 0.124E-03 | | | | |
| C=0.14E+17 | 1000000. | 0.138E-02 | 0.121E-03 | *0.165E-01 | *0.931E-02 | | |
| | 2000000. | 0.108E-02 | 0.832E-04 | *0.180E-01 | *0.101E-01 | | |
| | 3000000. | 0.942E-03 | 0.764E-04 | *0.184E-01 | *0.117E-01 | | |
| | 5000000. | 0.793E-03 | 0.594E-04 | *0.191E-01 | *0.118E-01 | | |
| Na X 3D-4P | 200000. | 0.254E-02 | -0.171E-03 | 0.744E-03 | -0.857E-03 | *0.133E-02 | -0.166E-02 |
| 186.9 Å | 500000. | 0.181E-02 | -0.160E-03 | 0.141E-02 | -0.113E-02 | 0.226E-02 | -0.228E-02 |
| C=0.48E+18 | 1000000. | 0.142E-02 | -0.136E-03 | 0.201E-02 | -0.135E-02 | 0.292E-02 | -0.272E-02 |
| | 2000000. | 0.112E-02 | -0.106E-03 | 0.273E-02 | -0.154E-02 | 0.373E-02 | -0.312E-02 |
| | 3000000. | 0.975E-03 | -0.902E-04 | 0.314E-02 | -0.165E-02 | 0.431E-02 | -0.338E-02 |
| | 5000000. | 0.826E-03 | -0.697E-04 | 0.371E-02 | -0.180E-02 | 0.512E-02 | -0.371E-02 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2S-3P | 200000. | 0.813E-04 | 0.383E-06 | 0.104E-05 | 0.197E-05 | 0.197E-05 | 0.386E-05 |
| 60.7 Å | 500000. | 0.548E-04 | 0.468E-06 | 0.356E-05 | 0.403E-05 | 0.655E-05 | 0.812E-05 |
| C=0.50E+18 | 1000000. | 0.415E-04 | 0.437E-06 | 0.657E-05 | 0.564E-05 | 0.111E-04 | 0.114E-04 |
| | 2000000. | 0.320E-04 | 0.337E-06 | 0.107E-04 | 0.706E-05 | 0.162E-04 | 0.144E-04 |
| | 3000000. | 0.277E-04 | 0.256E-06 | 0.136E-04 | 0.788E-05 | 0.191E-04 | 0.161E-04 |
| | 5000000. | 0.232E-04 | 0.241E-06 | 0.179E-04 | 0.893E-05 | 0.230E-04 | 0.184E-04 |
| Na X 2S-4P | 200000. | 0.128E-03 | 0.255E-05 | 0.805E-05 | 0.111E-04 | 0.156E-04 | 0.218E-04 |
| 45.7 Å | 500000. | 0.900E-04 | 0.269E-05 | 0.177E-04 | 0.170E-04 | 0.323E-04 | 0.345E-04 |
| C=0.12E+18 | 1000000. | 0.701E-04 | 0.223E-05 | 0.261E-04 | 0.204E-04 | 0.439E-04 | 0.416E-04 |
| | 2000000. | 0.552E-04 | 0.176E-05 | 0.369E-04 | 0.242E-04 | 0.563E-04 | 0.497E-04 |
| | 3000000. | 0.483E-04 | 0.162E-05 | 0.448E-04 | 0.267E-04 | 0.629E-04 | 0.537E-04 |
| | 5000000. | 0.411E-04 | 0.130E-05 | 0.547E-04 | 0.293E-04 | 0.734E-04 | 0.591E-04 |
| Na X 3S-3P | 200000. | 0.487 | -0.115E-01 | 0.535E-02 | -0.117E-01 | 0.102E-01 | -0.229E-01 |
| 4102.1 Å | 500000. | 0.336 | -0.121E-01 | 0.190E-01 | -0.230E-01 | 0.350E-01 | -0.465E-01 |
| C=0.23E+22 | 1000000. | 0.259 | -0.115E-01 | 0.363E-01 | -0.320E-01 | 0.595E-01 | -0.647E-01 |
| | 2000000. | 0.203 | -0.107E-01 | 0.613E-01 | -0.394E-01 | 0.876E-01 | -0.803E-01 |
| | 3000000. | 0.177 | -0.967E-02 | 0.794E-01 | -0.436E-01 | 0.103 | -0.892E-01 |
| | 5000000. | 0.149 | -0.792E-02 | 0.108 | -0.495E-01 | 0.125 | -0.102 |
| Na X 3S-4P | 200000. | 0.213E-02 | 0.136E-04 | 0.106E-03 | 0.142E-03 | 0.203E-03 | 0.278E-03 |
| 176.6 Å | 500000. | 0.150E-02 | 0.138E-04 | 0.236E-03 | 0.220E-03 | 0.422E-03 | 0.446E-03 |
| C=0.17E+19 | 1000000. | 0.118E-02 | 0.835E-05 | 0.356E-03 | 0.265E-03 | 0.583E-03 | 0.538E-03 |
| | 2000000. | 0.932E-03 | 0.358E-05 | 0.517E-03 | 0.317E-03 | 0.741E-03 | 0.643E-03 |
| | 3000000. | 0.816E-03 | 0.413E-05 | 0.641E-03 | 0.350E-03 | 0.853E-03 | 0.715E-03 |
| | 5000000. | 0.695E-03 | 0.270E-05 | 0.824E-03 | 0.383E-03 | 0.999E-03 | 0.790E-03 |
| Na X 4S-4P | 200000. | 8.90 | -0.272 | 0.259 | -0.300 | 0.486 | -0.587 |
| 9962.1 Å | 500000. | 6.40 | -0.260 | 0.613 | -0.487 | 1.02 | -0.985 |
| C=0.55E+22 | 1000000. | 5.07 | -0.257 | 1.01 | -0.607 | 1.44 | -1.23 |
| | 2000000. | 4.03 | -0.211 | 1.58 | -0.725 | 1.86 | -1.47 |
| | 3000000. | 3.53 | -0.179 | 2.03 | -0.799 | 2.17 | -1.63 |
| | 5000000. | 2.99 | -0.157 | 2.74 | -0.881 | 2.59 | -1.81 |
| Na X 2P-3S | 200000. | 0.547E-04 | 0.370E-05 | 0.137E-05 | 0.531E-05 | 0.265E-05 | 0.104E-04 |
| 65.2 Å | 500000. | 0.380E-04 | 0.411E-05 | 0.582E-05 | 0.944E-05 | 0.116E-04 | 0.191E-04 |
| C=0.10E+19 | 1000000. | 0.298E-04 | 0.391E-05 | 0.109E-04 | 0.129E-04 | 0.209E-04 | 0.262E-04 |
| | 2000000. | 0.235E-04 | 0.358E-05 | 0.163E-04 | 0.155E-04 | 0.299E-04 | 0.314E-04 |
| | 3000000. | 0.204E-04 | 0.320E-05 | 0.198E-04 | 0.171E-04 | 0.347E-04 | 0.347E-04 |
| | 5000000. | 0.171E-04 | 0.269E-05 | 0.254E-04 | 0.193E-04 | 0.414E-04 | 0.393E-04 |
| Na X 2P-4S | 200000. | 0.787E-04 | 0.926E-05 | 0.101E-04 | 0.169E-04 | 0.201E-04 | 0.333E-04 |
| 47.8 Å | 500000. | 0.578E-04 | 0.922E-05 | 0.223E-04 | 0.250E-04 | 0.438E-04 | 0.509E-04 |
| C=0.23E+18 | 1000000. | 0.465E-04 | 0.865E-05 | 0.313E-04 | 0.302E-04 | 0.587E-04 | 0.612E-04 |
| | 2000000. | 0.372E-04 | 0.705E-05 | 0.421E-04 | 0.359E-04 | 0.746E-04 | 0.725E-04 |
| | 3000000. | 0.325E-04 | 0.616E-05 | 0.490E-04 | 0.387E-04 | 0.846E-04 | 0.782E-04 |
| | 5000000. | 0.273E-04 | 0.526E-05 | 0.606E-04 | 0.430E-04 | 0.962E-04 | 0.867E-04 |
| Na X 2P-5S | 200000. | 0.155E-03 | 0.219E-04 | 0.361E-04 | 0.470E-04 | *0.720E-04 | *0.910E-04 |
| 42.6 Å | 500000. | 0.117E-03 | 0.218E-04 | 0.617E-04 | 0.613E-04 | 0.120E-03 | 0.125E-03 |
| C=0.92E+17 | 1000000. | 0.943E-04 | 0.188E-04 | 0.831E-04 | 0.731E-04 | 0.154E-03 | 0.150E-03 |
| | 2000000. | 0.752E-04 | 0.149E-04 | 0.108E-03 | 0.848E-04 | 0.188E-03 | 0.172E-03 |
| | 3000000. | 0.656E-04 | 0.132E-04 | 0.124E-03 | 0.926E-04 | 0.205E-03 | 0.184E-03 |
| | 5000000. | 0.549E-04 | 0.107E-04 | 0.149E-03 | 0.990E-04 | 0.235E-03 | 0.200E-03 |
| Na X 2P-6S | 200000. | 0.303E-03 | 0.460E-04 | 0.982E-04 | 0.105E-03 | | |
| 40.3 Å | 500000. | 0.230E-03 | 0.443E-04 | 0.144E-03 | 0.135E-03 | *0.279E-03 | *0.276E-03 |
| C=0.47E+17 | 1000000. | 0.185E-03 | 0.369E-04 | 0.191E-03 | 0.158E-03 | *0.352E-03 | *0.321E-03 |
| | 2000000. | 0.147E-03 | 0.296E-04 | 0.236E-03 | 0.177E-03 | *0.413E-03 | *0.363E-03 |
| | 3000000. | 0.127E-03 | 0.255E-04 | 0.273E-03 | 0.193E-03 | *0.442E-03 | *0.391E-03 |
| | 5000000. | 0.106E-03 | 0.203E-04 | 0.314E-03 | 0.207E-03 | *0.486E-03 | *0.418E-03 |
| Na X 2P-7S | 200000. | 0.559E-03 | 0.868E-04 | *0.215E-03 | *0.210E-03 | | |
| 39.0 Å | 500000. | 0.422E-03 | 0.807E-04 | *0.304E-03 | *0.268E-03 | | |
| C=0.28E+17 | 1000000. | 0.338E-03 | 0.672E-04 | *0.383E-03 | *0.311E-03 | | |
| | 2000000. | 0.267E-03 | 0.531E-04 | *0.478E-03 | *0.355E-03 | | |
| | 3000000. | 0.231E-03 | 0.451E-04 | *0.556E-03 | *0.365E-03 | | |
| | 5000000. | 0.192E-03 | 0.350E-04 | *0.658E-03 | *0.420E-03 | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-8S | 200000. | 0.963E-03 | 0.146E-03 | | | | |
| 38.2 Å | 500000. | 0.725E-03 | 0.133E-03 | | | | |
| C=0.18E+17 | 1000000. | 0.577E-03 | 0.116E-03 | | | | |
| | 2000000. | 0.454E-03 | 0.880E-04 | *0.929E-03 | *0.619E-03 | | |
| | 3000000. | 0.392E-03 | 0.746E-04 | *0.101E-02 | *0.666E-03 | | |
| | 5000000. | 0.325E-03 | 0.556E-04 | *0.127E-02 | *0.760E-03 | | |
| Na X 3P-4S | 200000. | 0.178E-02 | 0.137E-03 | 0.150E-03 | 0.250E-03 | 0.298E-03 | 0.492E-03 |
| 188.1 Å | 500000. | 0.128E-02 | 0.134E-03 | 0.333E-03 | 0.372E-03 | 0.649E-03 | 0.756E-03 |
| C=0.36E+19 | 1000000. | 0.102E-02 | 0.125E-03 | 0.472E-03 | 0.447E-03 | 0.878E-03 | 0.904E-03 |
| | 2000000. | 0.807E-03 | 0.102E-03 | 0.653E-03 | 0.528E-03 | 0.113E-02 | 0.107E-02 |
| | 3000000. | 0.704E-03 | 0.889E-04 | 0.784E-03 | 0.570E-03 | 0.130E-02 | 0.116E-02 |
| | 5000000. | 0.593E-03 | 0.756E-04 | 0.968E-03 | 0.632E-03 | 0.147E-02 | 0.128E-02 |
| Na X 3P-5S | 200000. | 0.164E-02 | 0.192E-03 | 0.318E-03 | 0.415E-03 | *0.634E-03 | *0.803E-03 |
| 127.1 Å | 500000. | 0.122E-02 | 0.190E-03 | 0.547E-03 | 0.541E-03 | 0.106E-02 | 0.110E-02 |
| C=0.82E+18 | 1000000. | 0.974E-03 | 0.163E-03 | 0.736E-03 | 0.645E-03 | 0.134E-02 | 0.132E-02 |
| | 2000000. | 0.775E-03 | 0.129E-03 | 0.958E-03 | 0.749E-03 | 0.166E-02 | 0.151E-02 |
| | 3000000. | 0.675E-03 | 0.114E-03 | 0.111E-02 | 0.817E-03 | 0.181E-02 | 0.162E-02 |
| | 5000000. | 0.566E-03 | 0.929E-04 | 0.135E-02 | 0.872E-03 | 0.209E-02 | 0.176E-02 |
| Na X 3P-6S | 200000. | 0.238E-02 | 0.330E-03 | 0.707E-03 | 0.755E-03 | | |
| 108.2 Å | 500000. | 0.179E-02 | 0.317E-03 | 0.104E-02 | 0.975E-03 | *0.201E-02 | *0.199E-02 |
| C=0.34E+18 | 1000000. | 0.143E-02 | 0.264E-03 | 0.138E-02 | 0.114E-02 | *0.254E-02 | *0.231E-02 |
| | 2000000. | 0.114E-02 | 0.211E-03 | 0.172E-02 | 0.127E-02 | *0.297E-02 | *0.261E-02 |
| | 3000000. | 0.986E-03 | 0.182E-03 | 0.199E-02 | 0.139E-02 | *0.320E-02 | *0.281E-02 |
| | 5000000. | 0.823E-03 | 0.145E-03 | 0.229E-02 | 0.150E-02 | *0.351E-02 | *0.301E-02 |
| Na X 3P-7S | 200000. | 0.379E-02 | 0.562E-03 | *0.140E-02 | *0.136E-02 | | |
| 99.3 Å | 500000. | 0.285E-02 | 0.522E-03 | *0.198E-02 | *0.174E-02 | | |
| C=0.18E+18 | 1000000. | 0.228E-02 | 0.434E-03 | *0.248E-02 | *0.202E-02 | | |
| | 2000000. | 0.180E-02 | 0.343E-03 | *0.311E-02 | *0.230E-02 | | |
| | 3000000. | 0.156E-02 | 0.291E-03 | *0.362E-02 | *0.237E-02 | | |
| | 5000000. | 0.130E-02 | 0.226E-03 | *0.429E-02 | *0.273E-02 | | |
| Na X 3P-8S | 200000. | 0.601E-02 | 0.889E-03 | | | | |
| 94.3 Å | 500000. | 0.452E-02 | 0.811E-03 | | | | |
| C=0.11E+18 | 1000000. | 0.360E-02 | 0.703E-03 | | | | |
| | 2000000. | 0.283E-02 | 0.535E-03 | *0.568E-02 | *0.378E-02 | | |
| | 3000000. | 0.245E-02 | 0.454E-03 | *0.618E-02 | *0.406E-02 | | |
| | 5000000. | 0.203E-02 | 0.338E-03 | *0.775E-02 | *0.463E-02 | | |
| Na X 4P-5S | 200000. | 0.235E-01 | 0.180E-02 | 0.299E-02 | 0.388E-02 | 0.588E-02 | 0.753E-02 |
| 408.5 Å | 500000. | 0.173E-01 | 0.177E-02 | 0.531E-02 | 0.509E-02 | 0.100E-01 | 0.104E-01 |
| C=0.85E+19 | 1000000. | 0.138E-01 | 0.153E-02 | 0.726E-02 | 0.607E-02 | 0.127E-01 | 0.124E-01 |
| | 2000000. | 0.110E-01 | 0.121E-02 | 0.994E-02 | 0.696E-02 | 0.161E-01 | 0.144E-01 |
| | 3000000. | 0.958E-02 | 0.106E-02 | 0.119E-01 | 0.759E-02 | 0.174E-01 | 0.155E-01 |
| | 5000000. | 0.808E-02 | 0.867E-03 | 0.148E-01 | 0.834E-02 | 0.205E-01 | 0.167E-01 |
| Na X 4P-6S | 200000. | 0.166E-01 | 0.185E-02 | 0.403E-02 | 0.429E-02 | *0.801E-02 | *0.813E-02 |
| 261.5 Å | 500000. | 0.124E-01 | 0.177E-02 | 0.604E-02 | 0.558E-02 | *0.114E-01 | *0.113E-01 |
| C=0.20E+19 | 1000000. | 0.989E-02 | 0.148E-02 | 0.803E-02 | 0.651E-02 | *0.144E-01 | *0.134E-01 |
| | 2000000. | 0.785E-02 | 0.118E-02 | 0.103E-01 | 0.729E-02 | *0.172E-01 | *0.148E-01 |
| | 3000000. | 0.683E-02 | 0.101E-02 | 0.119E-01 | 0.792E-02 | *0.190E-01 | *0.161E-01 |
| | 5000000. | 0.573E-02 | 0.808E-03 | 0.139E-01 | 0.844E-02 | *0.208E-01 | *0.171E-01 |
| Na X 4P-7S | 200000. | 0.195E-01 | 0.258E-02 | *0.647E-02 | *0.634E-02 | | |
| 215.1 Å | 500000. | 0.147E-01 | 0.239E-02 | *0.927E-02 | *0.808E-02 | | |
| C=0.85E+18 | 1000000. | 0.117E-01 | 0.199E-02 | *0.116E-01 | *0.937E-02 | | |
| | 2000000. | 0.925E-02 | 0.157E-02 | *0.147E-01 | *0.106E-01 | | |
| | 3000000. | 0.803E-02 | 0.133E-02 | *0.173E-01 | *0.110E-01 | | |
| | 5000000. | 0.669E-02 | 0.103E-02 | *0.203E-01 | *0.126E-01 | | |
| Na X 4P-8S | 200000. | 0.266E-01 | 0.368E-02 | | | | |
| 192.9 Å | 500000. | 0.200E-01 | 0.335E-02 | | | | |
| C=0.45E+18 | 1000000. | 0.159E-01 | 0.290E-02 | | | | |
| | 2000000. | 0.125E-01 | 0.221E-02 | *0.239E-01 | *0.158E-01 | | |
| | 3000000. | 0.108E-01 | 0.187E-02 | *0.262E-01 | *0.169E-01 | | |
| | 5000000. | 0.898E-02 | 0.139E-02 | *0.327E-01 | *0.193E-01 | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-3D | 200000. | 0.578E-04 | -0.116E-05 | 0.701E-06 | -0.228E-05 | -0.446E-05 | |
| 63.6 Å | 500000. | 0.381E-04 | -0.596E-06 | 0.307E-05 | -0.462E-05 | 0.563E-05 | -0.932E-05 |
| C=0.54E+18 | 1000000. | 0.282E-04 | -0.556E-06 | 0.612E-05 | -0.644E-05 | 0.105E-04 | -0.130E-04 |
| | 2000000. | 0.213E-04 | -0.269E-06 | 0.105E-04 | -0.805E-05 | 0.164E-04 | -0.164E-04 |
| | 3000000. | 0.183E-04 | -0.197E-06 | 0.133E-04 | -0.898E-05 | 0.196E-04 | -0.183E-04 |
| | 5000000. | 0.153E-04 | -0.118E-06 | 0.171E-04 | -0.102E-04 | 0.238E-04 | -0.207E-04 |
| Na X 2P-4D | 200000. | 0.122E-03 | -0.461E-06 | 0.867E-04 | 0.701E-04 | *0.120E-03 | *0.136E-03 |
| 47.5 Å | 500000. | 0.864E-04 | 0.370E-06 | 0.155E-03 | 0.908E-04 | *0.201E-03 | *0.184E-03 |
| C=0.93E+16 | 1000000. | 0.672E-04 | 0.896E-06 | 0.207E-03 | 0.108E-03 | *0.276E-03 | *0.219E-03 |
| | 2000000. | 0.525E-04 | 0.596E-06 | 0.250E-03 | 0.123E-03 | *0.360E-03 | *0.249E-03 |
| | 3000000. | 0.457E-04 | 0.485E-06 | 0.276E-03 | 0.131E-03 | *0.423E-03 | *0.267E-03 |
| | 5000000. | 0.385E-04 | 0.296E-06 | 0.298E-03 | 0.148E-03 | *0.501E-03 | *0.296E-03 |
| Na X 3P-3D | 200000. | 1.45 | -0.262E-01 | 0.301E-01 | -0.622E-01 | 0.576E-01 | -0.122 |
| 7430.0 Å | 500000. | 0.982 | -0.219E-01 | 0.952E-01 | -0.113 | 0.178 | -0.228 |
| C=0.74E+22 | 1000000. | 0.747 | -0.208E-01 | 0.177 | -0.154 | 0.300 | -0.314 |
| | 2000000. | 0.579 | -0.151E-01 | 0.274 | -0.186 | 0.408 | -0.376 |
| | 3000000. | 0.503 | -0.126E-01 | 0.345 | -0.206 | 0.473 | -0.418 |
| | 5000000. | 0.425 | -0.106E-01 | 0.450 | -0.231 | 0.580 | -0.475 |
| Na X 3P-4D | 200000. | 0.208E-02 | -0.131E-04 | 0.128E-02 | 0.103E-02 | *0.177E-02 | *0.200E-02 |
| 182.7 Å | 500000. | 0.148E-02 | -0.287E-05 | 0.229E-02 | 0.134E-02 | *0.297E-02 | *0.271E-02 |
| C=0.14E+18 | 1000000. | 0.116E-02 | 0.531E-05 | 0.307E-02 | 0.158E-02 | *0.406E-02 | *0.323E-02 |
| | 2000000. | 0.912E-03 | 0.193E-05 | 0.374E-02 | 0.180E-02 | *0.534E-02 | *0.366E-02 |
| | 3000000. | 0.795E-03 | 0.116E-05 | 0.413E-02 | 0.193E-02 | *0.628E-02 | *0.393E-02 |
| | 5000000. | 0.672E-03 | -0.103E-05 | 0.446E-02 | 0.216E-02 | *0.743E-02 | *0.436E-02 |
| Na X 3D-4P | 200000. | 0.230E-02 | 0.571E-04 | 0.151E-03 | 0.205E-03 | 0.291E-03 | 0.403E-03 |
| 189.3 Å | 500000. | 0.162E-02 | 0.558E-04 | 0.327E-03 | 0.311E-03 | 0.597E-03 | 0.632E-03 |
| C=0.20E+19 | 1000000. | 0.126E-02 | 0.475E-04 | 0.481E-03 | 0.374E-03 | 0.804E-03 | 0.758E-03 |
| | 2000000. | 0.998E-03 | 0.367E-04 | 0.680E-03 | 0.444E-03 | 0.102E-02 | 0.899E-03 |
| | 3000000. | 0.875E-03 | 0.335E-04 | 0.833E-03 | 0.485E-03 | 0.117E-02 | 0.983E-03 |
| | 5000000. | 0.746E-03 | 0.268E-04 | 0.105E-02 | 0.544E-03 | 0.133E-02 | 0.111E-02 |
| PERTURBER DENSITY = 1.E+19cm-3 | | | | | | | |
| Na X 1S-2P | 200000. | 0.608E-05 | -0.141E-06 | 0.893E-08 | -0.328E-07 | 0.167E-07 | -0.616E-07 |
| 11.0 Å | 500000. | 0.389E-05 | -0.508E-07 | 0.391E-07 | -0.854E-07 | 0.739E-07 | -0.168E-06 |
| C=0.74E+18 | 1000000. | 0.280E-05 | -0.203E-07 | 0.112E-06 | -0.158E-06 | 0.210E-06 | -0.318E-06 |
| | 2000000. | 0.203E-05 | -0.190E-07 | 0.253E-06 | -0.249E-06 | 0.448E-06 | -0.504E-06 |
| | 3000000. | 0.170E-05 | -0.134E-07 | 0.355E-06 | -0.302E-06 | 0.593E-06 | -0.611E-06 |
| | 5000000. | 0.137E-05 | -0.577E-08 | 0.527E-06 | -0.368E-06 | 0.833E-06 | -0.749E-06 |
| Na X 1S-3P | 200000. | 0.201E-04 | -0.748E-06 | 0.156E-05 | -0.301E-05 | 0.283E-05 | -0.559E-05 |
| 9.4 Å | 500000. | 0.137E-04 | -0.673E-06 | 0.467E-05 | -0.503E-05 | 0.769E-05 | -0.984E-05 |
| C=0.32E+17 | 1000000. | 0.104E-04 | -0.633E-06 | 0.802E-05 | -0.624E-05 | 0.122E-04 | -0.127E-04 |
| | 2000000. | 0.803E-05 | -0.524E-06 | 0.115E-04 | -0.746E-05 | 0.164E-04 | -0.151E-04 |
| | 3000000. | 0.693E-05 | -0.446E-06 | 0.138E-04 | -0.821E-05 | 0.194E-04 | -0.167E-04 |
| | 5000000. | 0.580E-05 | -0.351E-06 | 0.169E-04 | -0.915E-05 | 0.230E-04 | -0.186E-04 |
| Na X 1S-4P | 200000. | 0.535E-04 | -0.206E-05 | *0.164E-04 | -0.172E-04 | | |
| 9.0 Å | 500000. | 0.383E-04 | -0.210E-05 | *0.311E-04 | -0.244E-04 | | |
| C=0.11E+17 | 1000000. | 0.299E-04 | -0.226E-05 | *0.437E-04 | -0.298E-04 | | |
| | 2000000. | 0.235E-04 | -0.206E-05 | *0.588E-04 | -0.344E-04 | | |
| | 3000000. | 0.205E-04 | -0.172E-05 | *0.683E-04 | -0.371E-04 | | |
| | 5000000. | 0.174E-04 | -0.130E-05 | *0.805E-04 | -0.405E-04 | | |
| Na X 2S-2P | 200000. | 0.174 | -0.351E-02 | 0.326E-03 | -0.314E-02 | 0.613E-03 | -0.590E-02 |
| 1646.9 Å | 500000. | 0.114 | -0.421E-02 | 0.241E-02 | -0.772E-02 | 0.465E-02 | -0.152E-01 |
| C=0.16E+23 | 1000000. | 0.839E-01 | -0.387E-02 | 0.739E-02 | -0.126E-01 | 0.142E-01 | -0.254E-01 |
| | 2000000. | 0.629E-01 | -0.371E-02 | 0.147E-01 | -0.175E-01 | 0.264E-01 | -0.354E-01 |
| | 3000000. | 0.536E-01 | -0.348E-02 | 0.216E-01 | -0.201E-01 | 0.372E-01 | -0.408E-01 |
| | 5000000. | 0.441E-01 | -0.296E-02 | 0.294E-01 | -0.230E-01 | 0.462E-01 | -0.466E-01 |
| Na X 2S-3P | 200000. | 0.967E-03 | -0.345E-04 | 0.727E-04 | -0.139E-03 | 0.132E-03 | -0.259E-03 |
| 63.6 Å | 500000. | 0.663E-03 | -0.352E-04 | 0.216E-03 | -0.232E-03 | 0.356E-03 | -0.454E-03 |
| C=0.15E+19 | 1000000. | 0.506E-03 | -0.338E-04 | 0.369E-03 | -0.288E-03 | 0.566E-03 | -0.585E-03 |
| | 2000000. | 0.391E-03 | -0.287E-04 | 0.531E-03 | -0.343E-03 | 0.754E-03 | -0.696E-03 |
| | 3000000. | 0.338E-03 | -0.250E-04 | 0.636E-03 | -0.378E-03 | 0.888E-03 | -0.766E-03 |
| | 5000000. | 0.283E-03 | -0.202E-04 | 0.784E-03 | -0.418E-03 | 0.106E-02 | -0.858E-03 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2S-4P | 200000. | 0.153E-02 | -0.579E-04 | *0.459E-03 | -0.482E-03 | | |
| 47.5 Å | 500000. | 0.109E-02 | -0.612E-04 | *0.870E-03 | -0.683E-03 | | |
| C=0.31E+18 | 1000000. | 0.855E-03 | -0.660E-04 | *0.123E-02 | -0.835E-03 | | |
| | 2000000. | 0.673E-03 | -0.603E-04 | *0.165E-02 | -0.964E-03 | | |
| | 3000000. | 0.588E-03 | -0.507E-04 | *0.191E-02 | -0.104E-02 | | |
| | 5000000. | 0.498E-03 | -0.388E-04 | *0.226E-02 | -0.113E-02 | | |
| Na X 3S-3P | 200000. | 10.1 | -0.553 | 0.842 | -1.46 | 1.58 | -2.71 |
| 5666.0 Å | 500000. | 7.07 | -0.564 | 2.23 | -2.37 | 3.84 | -4.63 |
| C=0.12E+23 | 1000000. | 5.50 | -0.554 | 3.58 | -2.88 | 5.73 | -5.85 |
| | 2000000. | 4.31 | -0.478 | 5.12 | -3.45 | 7.54 | -6.99 |
| | 3000000. | 3.75 | -0.415 | 6.27 | -3.74 | 8.98 | -7.75 |
| | 5000000. | 3.15 | -0.343 | 7.63 | -4.15 | 10.7 | -8.40 |
| Na X 3S-4P | 200000. | 0.250E-01 | -0.114E-02 | *0.694E-02 | -0.728E-02 | | |
| 182.2 Å | 500000. | 0.179E-01 | -0.119E-02 | *0.131E-01 | -0.103E-01 | | |
| C=0.46E+19 | 1000000. | 0.141E-01 | -0.126E-02 | *0.184E-01 | -0.127E-01 | | |
| | 2000000. | 0.111E-01 | -0.114E-02 | *0.250E-01 | -0.146E-01 | | |
| | 3000000. | 0.974E-02 | -0.970E-03 | *0.287E-01 | -0.156E-01 | | |
| | 5000000. | 0.825E-02 | -0.760E-03 | *0.340E-01 | -0.171E-01 | | |
| Na X 2P-3S | 200000. | 0.624E-03 | 0.447E-04 | 0.242E-04 | 0.727E-04 | 0.474E-04 | 0.137E-03 |
| 66.9 Å | 500000. | 0.440E-03 | 0.467E-04 | 0.835E-04 | 0.131E-03 | 0.164E-03 | 0.257E-03 |
| C=0.79E+19 | 1000000. | 0.345E-03 | 0.461E-04 | 0.161E-03 | 0.174E-03 | 0.305E-03 | 0.353E-03 |
| | 2000000. | 0.272E-03 | 0.410E-04 | 0.233E-03 | 0.209E-03 | 0.410E-03 | 0.425E-03 |
| | 3000000. | 0.237E-03 | 0.360E-04 | 0.285E-03 | 0.231E-03 | 0.476E-03 | 0.473E-03 |
| | 5000000. | 0.199E-03 | 0.304E-04 | 0.358E-03 | 0.260E-03 | 0.574E-03 | 0.524E-03 |
| Na X 2P-4S | 200000. | 0.904E-03 | 0.924E-04 | 0.143E-03 | 0.212E-03 | *0.287E-03 | *0.386E-03 |
| 49.1 Å | 500000. | 0.672E-03 | 0.965E-04 | 0.308E-03 | 0.324E-03 | *0.600E-03 | *0.627E-03 |
| C=0.18E+19 | 1000000. | 0.540E-03 | 0.927E-04 | 0.430E-03 | 0.398E-03 | *0.789E-03 | *0.807E-03 |
| | 2000000. | 0.431E-03 | 0.780E-04 | 0.579E-03 | 0.475E-03 | *0.100E-02 | *0.952E-03 |
| | 3000000. | 0.376E-03 | 0.687E-04 | 0.687E-03 | 0.511E-03 | *0.114E-02 | *0.104E-02 |
| | 5000000. | 0.315E-03 | 0.575E-04 | 0.842E-03 | 0.573E-03 | *0.128E-02 | *0.114E-02 |
| Na X 2P-5S | 200000. | 0.177E-02 | 0.185E-03 | *0.516E-03 | *0.554E-03 | | |
| 43.7 Å | 500000. | 0.134E-02 | 0.198E-03 | *0.836E-03 | *0.780E-03 | | |
| C=0.72E+18 | 1000000. | 0.108E-02 | 0.188E-03 | *0.112E-02 | *0.955E-03 | | |
| | 2000000. | 0.861E-03 | 0.164E-03 | *0.145E-02 | *0.111E-02 | | |
| | 3000000. | 0.749E-03 | 0.142E-03 | *0.168E-02 | *0.117E-02 | | |
| | 5000000. | 0.625E-03 | 0.115E-03 | *0.207E-02 | *0.128E-02 | | |
| Na X 2P-6S | 200000. | 0.338E-02 | 0.301E-03 | | | | |
| 41.3 Å | 500000. | 0.258E-02 | 0.330E-03 | | | | |
| C=0.37E+18 | 1000000. | 0.207E-02 | 0.340E-03 | | | | |
| | 2000000. | 0.164E-02 | 0.316E-03 | | | | |
| | 3000000. | 0.143E-02 | 0.267E-03 | | | | |
| | 5000000. | 0.119E-02 | 0.211E-03 | | | | |
| Na X 2P-7S | 200000. | 0.591E-02 | 0.425E-03 | | | | |
| 39.9 Å | 500000. | 0.452E-02 | 0.468E-03 | | | | |
| C=0.22E+18 | 1000000. | 0.363E-02 | 0.561E-03 | | | | |
| | 2000000. | 0.288E-02 | 0.548E-03 | | | | |
| | 3000000. | 0.250E-02 | 0.458E-03 | | | | |
| | 5000000. | 0.207E-02 | 0.346E-03 | | | | |
| Na X 2P-8S | 200000. | 0.945E-02 | 0.472E-03 | | | | |
| 39.1 Å | 500000. | 0.730E-02 | 0.575E-03 | | | | |
| C=0.14E+18 | 1000000. | 0.588E-02 | 0.848E-03 | | | | |
| | 2000000. | 0.466E-02 | 0.880E-03 | | | | |
| | 3000000. | 0.404E-02 | 0.721E-03 | | | | |
| | 5000000. | 0.336E-02 | 0.528E-03 | | | | |
| Na X 3P-4S | 200000. | 0.200E-01 | 0.166E-02 | 0.276E-02 | 0.392E-02 | *0.542E-02 | *0.710E-02 |
| 190.9 Å | 500000. | 0.146E-01 | 0.172E-02 | 0.595E-02 | 0.588E-02 | *0.110E-01 | *0.114E-01 |
| C=0.13E+20 | 1000000. | 0.116E-01 | 0.165E-02 | 0.866E-02 | 0.718E-02 | *0.147E-01 | *0.147E-01 |
| | 2000000. | 0.918E-02 | 0.139E-02 | 0.119E-01 | 0.853E-02 | *0.187E-01 | *0.170E-01 |
| | 3000000. | 0.800E-02 | 0.122E-02 | 0.142E-01 | 0.924E-02 | *0.213E-01 | *0.187E-01 |
| | 5000000. | 0.672E-02 | 0.101E-02 | 0.173E-01 | 0.992E-02 | *0.248E-01 | *0.202E-01 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3P-5S | 200000. | 0.184E-01 | 0.173E-02 | *0.481E-02 | *0.504E-02 | | |
| 129.2 Å | 500000. | 0.138E-01 | 0.185E-02 | *0.776E-02 | *0.707E-02 | | |
| C=0.60E+19 | 1000000. | 0.110E-01 | 0.176E-02 | *0.105E-01 | *0.859E-02 | | |
| | 2000000. | 0.874E-02 | 0.152E-02 | *0.141E-01 | *0.101E-01 | | |
| | 3000000. | 0.760E-02 | 0.132E-02 | *0.159E-01 | *0.107E-01 | | |
| | 5000000. | 0.636E-02 | 0.107E-02 | *0.200E-01 | *0.116E-01 | | |
| Na X 3P-6S | 200000. | 0.261E-01 | 0.223E-02 | | | | |
| 110.0 Å | 500000. | 0.198E-01 | 0.243E-02 | | | | |
| C=0.26E+19 | 1000000. | 0.158E-01 | 0.249E-02 | | | | |
| | 2000000. | 0.125E-01 | 0.231E-02 | | | | |
| | 3000000. | 0.109E-01 | 0.195E-02 | | | | |
| | 5000000. | 0.907E-02 | 0.154E-02 | | | | |
| Na X 3P-7S | 200000. | 0.395E-01 | 0.279E-02 | | | | |
| 100.9 Å | 500000. | 0.301E-01 | 0.306E-02 | | | | |
| C=0.14E+19 | 1000000. | 0.241E-01 | 0.365E-02 | | | | |
| | 2000000. | 0.191E-01 | 0.356E-02 | | | | |
| | 3000000. | 0.166E-01 | 0.298E-02 | | | | |
| | 5000000. | 0.138E-01 | 0.225E-02 | | | | |
| Na X 3P-8S | 200000. | 0.583E-01 | 0.290E-02 | | | | |
| 95.8 Å | 500000. | 0.449E-01 | 0.352E-02 | | | | |
| C=0.84E+18 | 1000000. | 0.361E-01 | 0.515E-02 | | | | |
| | 2000000. | 0.286E-01 | 0.533E-02 | | | | |
| | 3000000. | 0.248E-01 | 0.437E-02 | | | | |
| | 5000000. | 0.207E-01 | 0.320E-02 | | | | |
| Na X 4P-5S | 200000. | 0.262 | 0.205E-01 | *0.754E-01 | *0.678E-01 | | |
| 412.4 Å | 500000. | 0.195 | 0.220E-01 | *0.120 | *0.975E-01 | | |
| C=0.23E+20 | 1000000. | 0.155 | 0.215E-01 | *0.166 | *0.119 | | |
| | 2000000. | 0.123 | 0.189E-01 | *0.218 | *0.137 | | |
| | 3000000. | 0.107 | 0.162E-01 | *0.254 | *0.144 | | |
| | 5000000. | 0.903E-01 | 0.129E-01 | *0.309 | *0.163 | | |
| Na X 4P-6S | 200000. | 0.182 | 0.141E-01 | | | | |
| 264.6 Å | 500000. | 0.137 | 0.153E-01 | | | | |
| C=0.96E+19 | 1000000. | 0.109 | 0.159E-01 | | | | |
| | 2000000. | 0.866E-01 | 0.147E-01 | | | | |
| | 3000000. | 0.753E-01 | 0.124E-01 | | | | |
| | 5000000. | 0.630E-01 | 0.977E-02 | | | | |
| Na X 4P-7S | 200000. | 0.204 | 0.138E-01 | | | | |
| 217.6 Å | 500000. | 0.155 | 0.151E-01 | | | | |
| C=0.65E+19 | 1000000. | 0.124 | 0.180E-01 | | | | |
| | 2000000. | 0.984E-01 | 0.175E-01 | | | | |
| | 3000000. | 0.854E-01 | 0.146E-01 | | | | |
| | 5000000. | 0.712E-01 | 0.110E-01 | | | | |
| Na X 4P-8S | 200000. | 0.259 | 0.127E-01 | | | | |
| 195.2 Å | 500000. | 0.199 | 0.153E-01 | | | | |
| C=0.35E+19 | 1000000. | 0.159 | 0.222E-01 | | | | |
| | 2000000. | 0.126 | 0.229E-01 | | | | |
| | 3000000. | 0.110 | 0.188E-01 | | | | |
| | 5000000. | 0.914E-01 | 0.138E-01 | | | | |
| Na X 2P-3D | 200000. | 0.658E-03 | 0.152E-04 | 0.375E-04 | 0.850E-04 | 0.653E-04 | 0.159E-03 |
| 66.3 Å | 500000. | 0.441E-03 | 0.190E-04 | 0.135E-03 | 0.151E-03 | 0.206E-03 | 0.297E-03 |
| C=0.16E+19 | 1000000. | 0.330E-03 | 0.179E-04 | 0.261E-03 | 0.195E-03 | 0.375E-03 | 0.397E-03 |
| | 2000000. | 0.250E-03 | 0.176E-04 | 0.385E-03 | 0.236E-03 | 0.516E-03 | 0.480E-03 |
| | 3000000. | 0.215E-03 | 0.155E-04 | 0.461E-03 | 0.263E-03 | 0.611E-03 | 0.529E-03 |
| | 5000000. | 0.179E-03 | 0.132E-04 | 0.564E-03 | 0.293E-03 | 0.764E-03 | 0.593E-03 |
| Na X 2P-4D | 200000. | 0.125E-02 | 0.239E-04 | | | | |
| 49.0 Å | 500000. | 0.916E-03 | 0.291E-04 | | | | |
| C=0.94E+16 | 1000000. | 0.723E-03 | 0.383E-04 | | | | |
| | 2000000. | 0.570E-03 | 0.403E-04 | | | | |
| | 3000000. | 0.497E-03 | 0.319E-04 | | | | |
| | 5000000. | 0.419E-03 | 0.241E-04 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3P-4D | 200000. | 0.220E-01 | 0.613E-03 | | | | |
| 188.7 Å | 500000. | 0.162E-01 | 0.686E-03 | | | | |
| C=0.14E+18 | 1000000. | 0.128E-01 | 0.816E-03 | | | | |
| | 2000000. | 0.102E-01 | 0.803E-03 | | | | |
| | 3000000. | 0.888E-02 | 0.648E-03 | | | | |
| | 5000000. | 0.751E-02 | 0.497E-03 | | | | |
| Na X 3D-4P | 200000. | 0.248E-01 | -0.973E-03 | *0.740E-02 | -0.772E-02 | | |
| 186.9 Å | 500000. | 0.178E-01 | -0.104E-02 | *0.141E-01 | -0.109E-01 | | |
| C=0.48E+19 | 1000000. | 0.139E-01 | -0.111E-02 | *0.201E-01 | -0.134E-01 | | |
| | 2000000. | 0.110E-01 | -0.103E-02 | *0.273E-01 | -0.154E-01 | | |
| | 3000000. | 0.961E-02 | -0.864E-03 | *0.314E-01 | -0.165E-01 | | |
| | 5000000. | 0.815E-02 | -0.668E-03 | *0.371E-01 | -0.180E-01 | | |
| Na X 2S-2P | 200000. | 0.768E-01 | -0.116E-02 | 0.107E-03 | -0.947E-03 | 0.201E-03 | -0.178E-02 |
| 1126.1 Å | 500000. | 0.499E-01 | -0.151E-02 | 0.698E-03 | -0.238E-02 | 0.134E-02 | -0.470E-02 |
| C=0.11E+23 | 1000000. | 0.365E-01 | -0.151E-02 | 0.215E-02 | -0.407E-02 | 0.413E-02 | -0.818E-02 |
| | 2000000. | 0.272E-01 | -0.146E-02 | 0.459E-02 | -0.581E-02 | 0.854E-02 | -0.118E-01 |
| | 3000000. | 0.231E-01 | -0.140E-02 | 0.672E-02 | -0.688E-02 | 0.121E-01 | -0.140E-01 |
| | 5000000. | 0.190E-01 | -0.123E-02 | 0.944E-02 | -0.788E-02 | 0.157E-01 | -0.161E-01 |
| Na X 2S-3P | 200000. | 0.813E-03 | 0.358E-05 | 0.104E-04 | 0.187E-04 | 0.196E-04 | 0.352E-04 |
| 60.7 Å | 500000. | 0.548E-03 | 0.402E-05 | 0.356E-04 | 0.399E-04 | 0.655E-04 | 0.787E-04 |
| C=0.50E+19 | 1000000. | 0.415E-03 | 0.402E-05 | 0.657E-04 | 0.563E-04 | 0.111E-03 | 0.114E-03 |
| | 2000000. | 0.320E-03 | 0.333E-05 | 0.107E-03 | 0.706E-04 | 0.162E-03 | 0.143E-03 |
| | 3000000. | 0.277E-03 | 0.252E-05 | 0.136E-03 | 0.788E-04 | 0.191E-03 | 0.161E-03 |
| | 5000000. | 0.232E-03 | 0.237E-05 | 0.179E-03 | 0.893E-04 | 0.230E-03 | 0.184E-03 |
| Na X 2S-4P | 200000. | 0.128E-02 | 0.190E-04 | 0.804E-04 | 0.104E-03 | *0.155E-03 | *0.193E-03 |
| 45.7 Å | 500000. | 0.900E-03 | 0.218E-04 | 0.177E-03 | 0.167E-03 | *0.323E-03 | *0.326E-03 |
| C=0.12E+19 | 1000000. | 0.701E-03 | 0.202E-04 | 0.261E-03 | 0.203E-03 | 0.439E-03 | 0.414E-03 |
| | 2000000. | 0.552E-03 | 0.173E-04 | 0.369E-03 | 0.242E-03 | 0.563E-03 | 0.496E-03 |
| | 3000000. | 0.483E-03 | 0.159E-04 | 0.448E-03 | 0.267E-03 | 0.629E-03 | 0.537E-03 |
| | 5000000. | 0.411E-03 | 0.127E-04 | 0.547E-03 | 0.293E-03 | 0.734E-03 | 0.591E-03 |
| Na X 3S-3P | 200000. | 4.87 | -0.109 | 0.535E-01 | -0.111 | 0.102 | -0.209 |
| 4102.1 Å | 500000. | 3.36 | -0.116 | 0.190 | -0.228 | 0.350 | -0.450 |
| C=0.23E+23 | 1000000. | 2.59 | -0.114 | 0.363 | -0.320 | 0.595 | -0.646 |
| | 2000000. | 2.03 | -0.107 | 0.613 | -0.394 | 0.876 | -0.802 |
| | 3000000. | 1.77 | -0.964E-01 | 0.794 | -0.436 | 1.03 | -0.892 |
| | 5000000. | 1.49 | -0.790E-01 | 1.08 | -0.495 | 1.25 | -1.02 |
| Na X 3S-4P | 200000. | 0.213E-01 | 0.510E-04 | 0.106E-02 | 0.133E-02 | 0.202E-02 | 0.247E-02 |
| 176.6 Å | 500000. | 0.150E-01 | 0.767E-04 | 0.235E-02 | 0.217E-02 | 0.422E-02 | 0.423E-02 |
| C=0.17E+20 | 1000000. | 0.118E-01 | 0.582E-04 | 0.356E-02 | 0.265E-02 | 0.583E-02 | 0.537E-02 |
| | 2000000. | 0.932E-02 | 0.327E-04 | 0.517E-02 | 0.317E-02 | 0.741E-02 | 0.641E-02 |
| | 3000000. | 0.816E-02 | 0.375E-04 | 0.641E-02 | 0.350E-02 | 0.853E-02 | 0.715E-02 |
| | 5000000. | 0.695E-02 | 0.240E-04 | 0.824E-02 | 0.383E-02 | 0.999E-02 | 0.790E-02 |
| Na X 2P-3S | 200000. | 0.549E-03 | 0.356E-04 | 0.138E-04 | 0.503E-04 | 0.266E-04 | 0.944E-04 |
| 65.2 Å | 500000. | 0.382E-03 | 0.390E-04 | 0.582E-04 | 0.933E-04 | 0.115E-03 | 0.184E-03 |
| C=0.10E+20 | 1000000. | 0.298E-03 | 0.383E-04 | 0.109E-03 | 0.129E-03 | 0.209E-03 | 0.261E-03 |
| | 2000000. | 0.235E-03 | 0.357E-04 | 0.163E-03 | 0.155E-03 | 0.299E-03 | 0.313E-03 |
| | 3000000. | 0.204E-03 | 0.319E-04 | 0.198E-03 | 0.171E-03 | 0.347E-03 | 0.347E-03 |
| | 5000000. | 0.171E-03 | 0.268E-04 | 0.254E-03 | 0.193E-03 | 0.414E-03 | 0.393E-03 |
| Na X 2P-4S | 200000. | 0.787E-03 | 0.820E-04 | 0.101E-03 | 0.157E-03 | *0.201E-03 | *0.290E-03 |
| 47.8 Å | 500000. | 0.579E-03 | 0.842E-04 | 0.223E-03 | 0.246E-03 | *0.438E-03 | *0.478E-03 |
| C=0.23E+19 | 1000000. | 0.465E-03 | 0.832E-04 | 0.313E-03 | 0.301E-03 | *0.587E-03 | *0.610E-03 |
| | 2000000. | 0.372E-03 | 0.700E-04 | 0.421E-03 | 0.359E-03 | *0.747E-03 | *0.723E-03 |
| | 3000000. | 0.325E-03 | 0.611E-04 | 0.490E-03 | 0.387E-03 | *0.846E-03 | *0.782E-03 |
| | 5000000. | 0.273E-03 | 0.522E-04 | 0.606E-03 | 0.430E-03 | 0.962E-03 | 0.867E-03 |
| Na X 2P-5S | 200000. | 0.155E-02 | 0.175E-03 | *0.363E-03 | *0.423E-03 | | |
| 42.6 Å | 500000. | 0.117E-02 | 0.185E-03 | *0.618E-03 | *0.595E-03 | | |
| C=0.92E+18 | 1000000. | 0.941E-03 | 0.175E-03 | *0.831E-03 | *0.727E-03 | | |
| | 2000000. | 0.751E-03 | 0.147E-03 | *0.108E-02 | *0.848E-03 | | |
| | 3000000. | 0.655E-03 | 0.130E-03 | *0.124E-02 | *0.926E-03 | | |
| | 5000000. | 0.548E-03 | 0.106E-03 | 0.149E-02 | 0.990E-03 | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-6S | 200000. | 0.299E-02 | 0.306E-03 | | | | |
| 40.3 Å | 500000. | 0.227E-02 | 0.332E-03 | | | | |
| C=0.47E+18 | 1000000. | 0.183E-02 | 0.324E-03 | | | | |
| | 2000000. | 0.145E-02 | 0.291E-03 | *0.236E-02 | *0.177E-02 | | |
| | 3000000. | 0.126E-02 | 0.248E-03 | *0.273E-02 | *0.193E-02 | | |
| | 5000000. | 0.105E-02 | 0.198E-03 | *0.314E-02 | *0.207E-02 | | |
| Na X 2P-7S | 200000. | 0.533E-02 | 0.463E-03 | | | | |
| 39.0 Å | 500000. | 0.407E-02 | 0.505E-03 | | | | |
| C=0.28E+18 | 1000000. | 0.327E-02 | 0.543E-03 | | | | |
| | 2000000. | 0.259E-02 | 0.515E-03 | | | | |
| | 3000000. | 0.225E-02 | 0.432E-03 | | | | |
| | 5000000. | 0.187E-02 | 0.336E-03 | | | | |
| Na X 2P-8S | 200000. | 0.871E-02 | 0.599E-03 | | | | |
| 38.2 Å | 500000. | 0.669E-02 | 0.663E-03 | | | | |
| C=0.18E+18 | 1000000. | 0.537E-02 | 0.845E-03 | | | | |
| | 2000000. | 0.426E-02 | 0.838E-03 | | | | |
| | 3000000. | 0.370E-02 | 0.697E-03 | | | | |
| | 5000000. | 0.308E-02 | 0.519E-03 | | | | |
| Na X 3P-4S | 200000. | 0.178E-01 | 0.120E-02 | 0.150E-02 | 0.233E-02 | *0.297E-02 | *0.430E-02 |
| 188.1 Å | 500000. | 0.128E-01 | 0.122E-02 | 0.334E-02 | 0.365E-02 | *0.649E-02 | *0.711E-02 |
| C=0.36E+20 | 1000000. | 0.102E-01 | 0.120E-02 | 0.472E-02 | 0.446E-02 | *0.878E-02 | *0.901E-02 |
| | 2000000. | 0.807E-02 | 0.101E-02 | 0.653E-02 | 0.528E-02 | *0.113E-01 | *0.107E-01 |
| | 3000000. | 0.704E-02 | 0.882E-03 | 0.784E-02 | 0.570E-02 | 0.130E-01 | 0.116E-01 |
| | 5000000. | 0.593E-02 | 0.750E-03 | 0.968E-02 | 0.632E-02 | 0.147E-01 | 0.128E-01 |
| Na X 3P-5S | 200000. | 0.163E-01 | 0.152E-02 | *0.319E-02 | *0.373E-02 | | |
| 127.1 Å | 500000. | 0.121E-01 | 0.161E-02 | *0.548E-02 | *0.525E-02 | | |
| C=0.82E+19 | 1000000. | 0.973E-02 | 0.152E-02 | *0.736E-02 | *0.642E-02 | | |
| | 2000000. | 0.774E-02 | 0.128E-02 | *0.958E-02 | *0.749E-02 | | |
| | 3000000. | 0.674E-02 | 0.113E-02 | *0.111E-01 | *0.817E-02 | | |
| | 5000000. | 0.565E-02 | 0.916E-03 | *0.135E-01 | *0.872E-02 | | |
| Na X 3P-6S | 200000. | 0.235E-01 | 0.218E-02 | | | | |
| 108.2 Å | 500000. | 0.177E-01 | 0.237E-02 | | | | |
| C=0.34E+19 | 1000000. | 0.142E-01 | 0.231E-02 | | | | |
| | 2000000. | 0.113E-01 | 0.207E-02 | *0.172E-01 | *0.127E-01 | | |
| | 3000000. | 0.979E-02 | 0.177E-02 | *0.199E-01 | *0.139E-01 | | |
| | 5000000. | 0.817E-02 | 0.141E-02 | *0.229E-01 | *0.150E-01 | | |
| Na X 3P-7S | 200000. | 0.362E-01 | 0.299E-02 | | | | |
| 99.3 Å | 500000. | 0.275E-01 | 0.326E-02 | | | | |
| C=0.18E+19 | 1000000. | 0.220E-01 | 0.351E-02 | | | | |
| | 2000000. | 0.175E-01 | 0.333E-02 | | | | |
| | 3000000. | 0.152E-01 | 0.279E-02 | | | | |
| | 5000000. | 0.126E-01 | 0.216E-02 | | | | |
| Na X 3P-8S | 200000. | 0.545E-01 | 0.364E-02 | | | | |
| 94.3 Å | 500000. | 0.418E-01 | 0.402E-02 | | | | |
| C=0.11E+19 | 1000000. | 0.335E-01 | 0.514E-02 | | | | |
| | 2000000. | 0.266E-01 | 0.510E-02 | | | | |
| | 3000000. | 0.231E-01 | 0.424E-02 | | | | |
| | 5000000. | 0.192E-01 | 0.315E-02 | | | | |
| Na X 4P-5S | 200000. | 0.234 | 0.144E-01 | *0.299E-01 | *0.349E-01 | | |
| 408.5 Å | 500000. | 0.172 | 0.151E-01 | *0.531E-01 | *0.495E-01 | | |
| C=0.85E+20 | 1000000. | 0.138 | 0.142E-01 | *0.726E-01 | *0.604E-01 | | |
| | 2000000. | 0.110 | 0.119E-01 | *0.994E-01 | *0.696E-01 | | |
| | 3000000. | 0.958E-01 | 0.105E-01 | *0.119 | *0.759E-01 | | |
| | 5000000. | 0.808E-01 | 0.854E-02 | *0.148 | *0.834E-01 | *0.205 | *0.167 |
| Na X 4P-6S | 200000. | 0.164 | 0.122E-01 | | | | |
| 261.5 Å | 500000. | 0.123 | 0.132E-01 | | | | |
| C=0.20E+20 | 1000000. | 0.981E-01 | 0.129E-01 | | | | |
| | 2000000. | 0.779E-01 | 0.116E-01 | *0.103 | *0.729E-01 | | |
| | 3000000. | 0.679E-01 | 0.988E-02 | *0.119 | *0.792E-01 | | |
| | 5000000. | 0.569E-01 | 0.787E-02 | *0.139 | *0.844E-01 | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 4P-7S | 200000. | 0.188 | 0.136E-01 | | | | |
| 215.1 Å | 500000. | 0.142 | 0.148E-01 | | | | |
| C=0.85E+19 | 1000000. | 0.114 | 0.160E-01 | | | | |
| | 2000000. | 0.901E-01 | 0.152E-01 | | | | |
| | 3000000. | 0.783E-01 | 0.128E-01 | | | | |
| | 5000000. | 0.654E-01 | 0.989E-02 | | | | |
| Na X 4P-8S | 200000. | 0.243 | 0.149E-01 | | | | |
| 192.9 Å | 500000. | 0.185 | 0.165E-01 | | | | |
| C=0.45E+19 | 1000000. | 0.149 | 0.212E-01 | | | | |
| | 2000000. | 0.118 | 0.210E-01 | | | | |
| | 3000000. | 0.102 | 0.175E-01 | | | | |
| | 5000000. | 0.853E-01 | 0.130E-01 | | | | |
| Na X 2P-3D | 200000. | 0.578E-03 | -0.898E-05 | 0.701E-05 | -0.216E-04 | 0.133E-04 | -0.406E-04 |
| 63.6 Å | 500000. | 0.381E-03 | -0.538E-05 | 0.307E-04 | -0.457E-04 | 0.564E-04 | -0.903E-04 |
| C=0.54E+19 | 1000000. | 0.282E-03 | -0.537E-05 | 0.612E-04 | -0.643E-04 | 0.105E-03 | -0.130E-03 |
| | 2000000. | 0.213E-03 | -0.265E-05 | 0.105E-03 | -0.805E-04 | 0.164E-03 | -0.163E-03 |
| | 3000000. | 0.183E-03 | -0.192E-05 | 0.133E-03 | -0.898E-04 | 0.196E-03 | -0.183E-03 |
| | 5000000. | 0.153E-03 | -0.115E-05 | 0.171E-03 | -0.102E-03 | 0.238E-03 | -0.207E-03 |
| Na X 2P-4D | 200000. | 0.114E-02 | -0.219E-04 | *0.868E-03 | *0.623E-03 | | |
| 47.5 Å | 500000. | 0.818E-03 | -0.158E-04 | *0.155E-02 | *0.880E-03 | | |
| C=0.93E+17 | 1000000. | 0.639E-03 | -0.402E-05 | *0.207E-02 | *0.107E-02 | | |
| | 2000000. | 0.502E-03 | 0.344E-05 | *0.250E-02 | *0.123E-02 | | |
| | 3000000. | 0.438E-03 | 0.169E-05 | *0.276E-02 | *0.131E-02 | | |
| | 5000000. | 0.370E-03 | 0.510E-06 | *0.298E-02 | *0.148E-02 | | |
| Na X 3P-3D | 200000. | 14.5 | -0.227 | 0.301 | -0.589 | 0.574 | -1.11 |
| 7430.0 Å | 500000. | 9.82 | -0.199 | 0.952 | -1.11 | 1.78 | -2.20 |
| C=0.74E+23 | 1000000. | 7.47 | -0.199 | 1.77 | -1.54 | 3.00 | -3.13 |
| | 2000000. | 5.79 | -0.150 | 2.74 | -1.86 | 4.08 | -3.76 |
| | 3000000. | 5.03 | -0.125 | 3.45 | -2.06 | 4.73 | -4.18 |
| | 5000000. | 4.25 | -0.105 | 4.50 | -2.31 | 5.80 | -4.75 |
| Na X 3P-4D | 200000. | 0.197E-01 | -0.388E-03 | *0.128E-01 | *0.919E-02 | | |
| 182.7 Å | 500000. | 0.141E-01 | -0.310E-03 | *0.229E-01 | *0.130E-01 | | |
| C=0.14E+19 | 1000000. | 0.111E-01 | -0.136E-03 | *0.307E-01 | *0.158E-01 | | |
| | 2000000. | 0.878E-02 | -0.176E-04 | *0.374E-01 | *0.180E-01 | | |
| | 3000000. | 0.767E-02 | -0.347E-04 | *0.413E-01 | *0.193E-01 | | |
| | 5000000. | 0.651E-02 | -0.462E-04 | *0.446E-01 | *0.216E-01 | | |
| Na X 3D-4P | 200000. | 0.230E-01 | 0.439E-03 | 0.151E-02 | 0.192E-02 | *0.290E-02 | *0.355E-02 |
| 189.3 Å | 500000. | 0.162E-01 | 0.465E-03 | 0.327E-02 | 0.306E-02 | *0.597E-02 | *0.597E-02 |
| C=0.20E+20 | 1000000. | 0.126E-01 | 0.438E-03 | 0.481E-02 | 0.373E-02 | *0.804E-02 | *0.755E-02 |
| | 2000000. | 0.998E-02 | 0.363E-03 | 0.680E-02 | 0.444E-02 | 0.102E-01 | 0.897E-02 |
| | 3000000. | 0.875E-02 | 0.329E-03 | 0.833E-02 | 0.485E-02 | 0.117E-01 | 0.983E-02 |
| | 5000000. | 0.746E-02 | 0.264E-03 | 0.105E-01 | 0.544E-02 | 0.133E-01 | 0.111E-01 |
| PERTURBER DENSITY = 1.E+20cm-3 | | | | | | | |
| Na X 1S-2P | 200000. | 0.608E-04 | -0.191E-05 | 0.881E-07 | -0.288E-06 | 0.159E-06 | -0.469E-06 |
| 11.0 Å | 500000. | 0.389E-04 | -0.400E-06 | 0.390E-06 | -0.826E-06 | 0.737E-06 | -0.156E-05 |
| C=0.74E+19 | 1000000. | 0.280E-04 | -0.193E-06 | 0.112E-05 | -0.157E-05 | 0.210E-05 | -0.309E-05 |
| | 2000000. | 0.203E-04 | -0.177E-06 | 0.253E-05 | -0.249E-05 | 0.448E-05 | -0.500E-05 |
| | 3000000. | 0.170E-04 | -0.128E-06 | 0.355E-05 | -0.302E-05 | 0.593E-05 | -0.610E-05 |
| | 5000000. | 0.137E-04 | -0.566E-07 | 0.527E-05 | -0.368E-05 | 0.833E-05 | -0.748E-05 |
| Na X 1S-3P | 200000. | 0.195E-03 | -0.305E-05 | *0.156E-04 | -0.254E-04 | | |
| 9.4 Å | 500000. | 0.134E-03 | -0.353E-05 | *0.468E-04 | -0.470E-04 | | |
| C=0.32E+18 | 1000000. | 0.102E-03 | -0.368E-05 | *0.802E-04 | -0.608E-04 | | |
| | 2000000. | 0.789E-04 | -0.328E-05 | *0.115E-03 | -0.743E-04 | | |
| | 3000000. | 0.681E-04 | -0.347E-05 | 0.138E-03 | -0.818E-04 | | |
| | 5000000. | 0.571E-04 | -0.336E-05 | 0.169E-03 | -0.915E-04 | *0.230E-03 | -0.185E-03 |
| Na X 1S-4P | 200000. | 0.480E-03 | 0.161E-05 | | | | |
| 9.0 Å | 500000. | 0.350E-03 | -0.620E-05 | | | | |
| C=0.11E+18 | 1000000. | 0.276E-03 | -0.788E-05 | | | | |
| | 2000000. | 0.219E-03 | -0.834E-05 | | | | |
| | 3000000. | 0.192E-03 | -0.104E-04 | | | | |
| | 5000000. | 0.164E-03 | -0.117E-04 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2S-2P | 200000. | 1.74 | -0.314E-01 | 0.323E-02 | -0.275E-01 | 0.595E-02 | -0.448E-01 |
| 1646.9 Å | 500000. | 1.14 | -0.388E-01 | 0.242E-01 | -0.745E-01 | 0.465E-01 | -0.141 |
| C=0.16E+24 | 1000000. | 0.840 | -0.364E-01 | 0.739E-01 | -0.125 | 0.142 | -0.245 |
| | 2000000. | 0.629 | -0.355E-01 | 0.147 | -0.175 | 0.264 | -0.350 |
| | 3000000. | 0.536 | -0.340E-01 | 0.216 | -0.200 | 0.372 | -0.408 |
| | 5000000. | 0.441 | -0.295E-01 | 0.294 | -0.230 | 0.462 | -0.466 |
| Na X 2S-3P | 200000. | 0.943E-02 | -0.122E-03 | *0.726E-03 | -0.117E-02 | | |
| 63.6 Å | 500000. | 0.649E-02 | -0.205E-03 | *0.216E-02 | -0.217E-02 | | |
| C=0.15E+20 | 1000000. | 0.496E-02 | -0.215E-03 | *0.369E-02 | -0.280E-02 | | |
| | 2000000. | 0.384E-02 | -0.196E-03 | *0.531E-02 | -0.341E-02 | | |
| | 3000000. | 0.332E-02 | -0.204E-03 | 0.636E-02 | -0.377E-02 | | |
| | 5000000. | 0.279E-02 | -0.195E-03 | 0.784E-02 | -0.418E-02 | *0.106E-01 | -0.854E-02 |
| Na X 2S-4P | 200000. | 0.137E-01 | 0.546E-04 | | | | |
| 47.5 Å | 500000. | 0.100E-01 | -0.199E-03 | | | | |
| C=0.31E+19 | 1000000. | 0.791E-02 | -0.247E-03 | | | | |
| | 2000000. | 0.629E-02 | -0.260E-03 | | | | |
| | 3000000. | 0.551E-02 | -0.318E-03 | | | | |
| | 5000000. | 0.470E-02 | -0.352E-03 | | | | |
| Na X 3S-4P | 200000. | 0.227 | -0.111E-02 | | | | |
| 182.2 Å | 500000. | 0.166 | -0.530E-02 | | | | |
| C=0.46E+20 | 1000000. | 0.132 | -0.613E-02 | | | | |
| | 2000000. | 0.105 | -0.609E-02 | | | | |
| | 3000000. | 0.920E-01 | -0.677E-02 | | | | |
| | 5000000. | 0.783E-01 | -0.704E-02 | | | | |
| Na X 2P-3S | 200000. | 0.624E-02 | 0.310E-03 | 0.242E-03 | 0.625E-03 | *0.472E-03 | *0.994E-03 |
| 66.9 Å | 500000. | 0.440E-02 | 0.385E-03 | 0.835E-03 | 0.124E-02 | *0.164E-02 | *0.226E-02 |
| C=0.79E+20 | 1000000. | 0.345E-02 | 0.397E-03 | 0.161E-02 | 0.170E-02 | *0.305E-02 | *0.329E-02 |
| | 2000000. | 0.272E-02 | 0.365E-03 | 0.233E-02 | 0.209E-02 | *0.410E-02 | *0.415E-02 |
| | 3000000. | 0.237E-02 | 0.339E-03 | 0.285E-02 | 0.230E-02 | *0.476E-02 | *0.470E-02 |
| | 5000000. | 0.199E-02 | 0.301E-03 | 0.358E-02 | 0.260E-02 | 0.574E-02 | 0.522E-02 |
| Na X 2P-4S | 200000. | 0.879E-02 | 0.347E-03 | *0.143E-02 | *0.168E-02 | | |
| 49.1 Å | 500000. | 0.657E-02 | 0.620E-03 | *0.308E-02 | *0.294E-02 | | |
| C=0.18E+20 | 1000000. | 0.530E-02 | 0.647E-03 | *0.430E-02 | *0.383E-02 | | |
| | 2000000. | 0.424E-02 | 0.581E-03 | *0.579E-02 | *0.472E-02 | | |
| | 3000000. | 0.370E-02 | 0.593E-03 | *0.687E-02 | *0.509E-02 | | |
| | 5000000. | 0.311E-02 | 0.562E-03 | *0.842E-02 | *0.573E-02 | | |
| Na X 2P-5S | 200000. | 0.157E-01 | 0.569E-04 | | | | |
| 43.7 Å | 500000. | 0.123E-01 | 0.875E-03 | | | | |
| C=0.72E+19 | 1000000. | 0.999E-02 | 0.939E-03 | | | | |
| | 2000000. | 0.803E-02 | 0.936E-03 | | | | |
| | 3000000. | 0.702E-02 | 0.106E-02 | | | | |
| | 5000000. | 0.589E-02 | 0.109E-02 | | | | |
| Na X 2P-6S | 200000. | *0.262E-01 | -0.762E-03 | | | | |
| 41.3 Å | 500000. | 0.213E-01 | 0.904E-03 | | | | |
| C=0.37E+19 | 1000000. | 0.176E-01 | 0.113E-02 | | | | |
| | 2000000. | 0.142E-01 | 0.136E-02 | | | | |
| | 3000000. | 0.125E-01 | 0.168E-02 | | | | |
| | 5000000. | 0.105E-01 | 0.193E-02 | | | | |
| Na X 2P-7S | 200000. | *0.401E-01 | -0.176E-02 | | | | |
| 39.9 Å | 500000. | 0.339E-01 | 0.687E-03 | | | | |
| C=0.22E+19 | 1000000. | 0.285E-01 | 0.137E-02 | | | | |
| | 2000000. | 0.232E-01 | 0.180E-02 | | | | |
| | 3000000. | 0.205E-01 | 0.249E-02 | | | | |
| | 5000000. | 0.173E-01 | 0.303E-02 | | | | |
| Na X 2P-8S | 200000. | *0.574E-01 | -0.321E-02 | | | | |
| 39.1 Å | 500000. | *0.505E-01 | *0.200E-03 | | | | |
| C=0.14E+19 | 1000000. | 0.430E-01 | 0.163E-02 | | | | |
| | 2000000. | 0.355E-01 | 0.220E-02 | | | | |
| | 3000000. | 0.314E-01 | 0.350E-02 | | | | |
| | 5000000. | 0.266E-01 | 0.452E-02 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3P-4S | 200000. | 0.194 | 0.591E-02 | | | | |
| 190.9 Å | 500000. | 0.142 | 0.107E-01 | | | | |
| C=0.13E+21 | 1000000. | 0.114 | 0.112E-01 | | | | |
| | 2000000. | 0.902E-01 | 0.101E-01 | | | | |
| | 3000000. | 0.787E-01 | 0.103E-01 | *0.142 | *0.919E-01 | | |
| | 5000000. | 0.661E-01 | 0.986E-02 | *0.173 | *0.992E-01 | | |
| Na X 3P-5S | 200000. | 0.165 | 0.805E-03 | | | | |
| 129.2 Å | 500000. | 0.127 | 0.824E-02 | | | | |
| C=0.60E+20 | 1000000. | 0.103 | 0.886E-02 | | | | |
| | 2000000. | 0.821E-01 | 0.876E-02 | | | | |
| | 3000000. | 0.717E-01 | 0.991E-02 | | | | |
| | 5000000. | 0.602E-01 | 0.102E-01 | | | | |
| Na X 3P-6S | 200000. | *0.206 | -0.518E-02 | | | | |
| 110.0 Å | 500000. | 0.165 | 0.686E-02 | | | | |
| C=0.26E+20 | 1000000. | 0.136 | 0.848E-02 | | | | |
| | 2000000. | 0.110 | 0.101E-01 | | | | |
| | 3000000. | 0.960E-01 | 0.124E-01 | | | | |
| | 5000000. | 0.808E-01 | 0.141E-01 | | | | |
| Na X 3P-7S | 200000. | *0.273 | -0.111E-01 | | | | |
| 100.9 Å | 500000. | 0.229 | 0.476E-02 | | | | |
| C=0.14E+20 | 1000000. | 0.191 | 0.914E-02 | | | | |
| | 2000000. | 0.156 | 0.119E-01 | | | | |
| | 3000000. | 0.137 | 0.163E-01 | | | | |
| | 5000000. | 0.116 | 0.197E-01 | | | | |
| Na X 3P-8S | 200000. | *0.360 | -0.191E-01 | | | | |
| 95.8 Å | 500000. | *0.313 | *0.153E-02 | | | | |
| C=0.84E+19 | 1000000. | 0.266 | 0.102E-01 | | | | |
| | 2000000. | 0.220 | 0.135E-01 | | | | |
| | 3000000. | 0.194 | 0.213E-01 | | | | |
| | 5000000. | 0.165 | 0.275E-01 | | | | |
| Na X 4P-5S | 200000. | 2.32 | -0.103E-02 | | | | |
| 412.4 Å | 500000. | 1.77 | 0.903E-01 | | | | |
| C=0.23E+21 | 1000000. | 1.43 | 0.998E-01 | | | | |
| | 2000000. | 1.15 | 0.100 | | | | |
| | 3000000. | 1.01 | 0.116 | | | | |
| | 5000000. | 0.850 | 0.122 | | | | |
| Na X 4P-6S | 200000. | *1.46 | -0.338E-01 | | | | |
| 264.6 Å | 500000. | 1.16 | 0.423E-01 | | | | |
| C=0.96E+20 | 1000000. | 0.946 | 0.530E-01 | | | | |
| | 2000000. | 0.763 | 0.631E-01 | | | | |
| | 3000000. | 0.669 | 0.781E-01 | | | | |
| | 5000000. | 0.565 | 0.893E-01 | | | | |
| Na X 4P-7S | 200000. | *1.45 | -0.540E-01 | | | | |
| 217.6 Å | 500000. | *1.20 | *0.239E-01 | | | | |
| C=0.65E+20 | 1000000. | 0.996 | 0.452E-01 | | | | |
| | 2000000. | 0.811 | 0.583E-01 | | | | |
| | 3000000. | 0.713 | 0.801E-01 | | | | |
| | 5000000. | 0.603 | 0.968E-01 | | | | |
| Na X 4P-8S | 200000. | *1.64 | -0.812E-01 | | | | |
| 195.2 Å | 500000. | *1.41 | *0.778E-02 | | | | |
| C=0.35E+20 | 1000000. | 1.19 | 0.443E-01 | | | | |
| | 2000000. | 0.981 | 0.586E-01 | | | | |
| | 3000000. | 0.867 | 0.919E-01 | | | | |
| | 5000000. | 0.736 | 0.118 | | | | |
| Na X 2P-3D | 200000. | 0.643E-02 | 0.137E-04 | 0.375E-03 | 0.727E-03 | *0.645E-03 | *0.115E-02 |
| 66.3 Å | 500000. | 0.432E-02 | 0.110E-03 | 0.135E-02 | 0.143E-02 | *0.205E-02 | *0.260E-02 |
| C=0.16E+20 | 1000000. | 0.323E-02 | 0.111E-03 | 0.261E-02 | 0.191E-02 | *0.375E-02 | *0.369E-02 |
| | 2000000. | 0.246E-02 | 0.125E-03 | 0.385E-02 | 0.235E-02 | *0.516E-02 | *0.468E-02 |
| | 3000000. | 0.211E-02 | 0.129E-03 | 0.461E-02 | 0.262E-02 | *0.611E-02 | *0.526E-02 |
| | 5000000. | 0.176E-02 | 0.128E-03 | 0.564E-02 | 0.293E-02 | *0.764E-02 | *0.591E-02 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-4D | 200000. | 0.106E-01 | -0.636E-04 | | | | |
| 49.0 Å | 500000. | 0.792E-02 | 0.868E-04 | | | | |
| C=0.94E+17 | 1000000. | 0.634E-02 | 0.137E-03 | | | | |
| | 2000000. | 0.507E-02 | 0.157E-03 | | | | |
| | 3000000. | 0.445E-02 | 0.192E-03 | | | | |
| | 5000000. | 0.379E-02 | 0.220E-03 | | | | |
| Na X 3P-4D | 200000. | 0.190 | -0.288E-03 | | | | |
| 188.7 Å | 500000. | 0.142 | 0.258E-02 | | | | |
| C=0.14E+19 | 1000000. | 0.114 | 0.345E-02 | | | | |
| | 2000000. | 0.918E-01 | 0.360E-02 | | | | |
| | 3000000. | 0.807E-01 | 0.420E-02 | | | | |
| | 5000000. | 0.688E-01 | 0.459E-02 | | | | |
| Na X 3D-4P | 200000. | 0.223 | 0.114E-02 | | | | |
| 186.9 Å | 500000. | 0.163 | -0.345E-02 | | | | |
| C=0.48E+20 | 1000000. | 0.129 | -0.424E-02 | | | | |
| | 2000000. | 0.103 | -0.455E-02 | | | | |
| | 3000000. | 0.902E-01 | -0.551E-02 | | | | |
| | 5000000. | 0.769E-01 | -0.608E-02 | | | | |
| Na X 2S-2P | 200000. | 0.768 | -0.820E-02 | 0.106E-02 | -0.830E-02 | 0.193E-02 | -0.135E-01 |
| 1126.1 Å | 500000. | 0.499 | -0.143E-01 | 0.698E-02 | -0.230E-01 | 0.134E-01 | -0.435E-01 |
| C=0.11E+24 | 1000000. | 0.365 | -0.143E-01 | 0.215E-01 | -0.403E-01 | 0.415E-01 | -0.791E-01 |
| | 2000000. | 0.272 | -0.141E-01 | 0.459E-01 | -0.580E-01 | 0.855E-01 | -0.116 |
| | 3000000. | 0.231 | -0.138E-01 | 0.672E-01 | -0.687E-01 | 0.121 | -0.140 |
| | 5000000. | 0.190 | -0.122E-01 | 0.944E-01 | -0.788E-01 | 0.157 | -0.160 |
| Na X 2S-3P | 200000. | 0.812E-02 | -0.510E-05 | 0.102E-03 | 0.163E-03 | 0.187E-03 | 0.265E-03 |
| 60.7 Å | 500000. | 0.548E-02 | 0.193E-04 | 0.356E-03 | 0.382E-03 | 0.651E-03 | 0.716E-03 |
| C=0.50E+20 | 1000000. | 0.415E-02 | 0.245E-04 | 0.657E-03 | 0.555E-03 | 0.111E-02 | 0.108E-02 |
| | 2000000. | 0.320E-02 | 0.223E-04 | 0.107E-02 | 0.704E-03 | 0.162E-02 | 0.141E-02 |
| | 3000000. | 0.276E-02 | 0.203E-04 | 0.136E-02 | 0.787E-03 | 0.191E-02 | 0.160E-02 |
| | 5000000. | 0.232E-02 | 0.230E-04 | 0.179E-02 | 0.893E-03 | 0.230E-02 | 0.183E-02 |
| Na X 2S-4P | 200000. | 0.126E-01 | -0.287E-04 | *0.796E-03 | *0.863E-03 | | |
| 45.7 Å | 500000. | 0.885E-02 | 0.893E-04 | *0.177E-02 | *0.155E-02 | | |
| C=0.12E+20 | 1000000. | 0.690E-02 | 0.931E-04 | *0.261E-02 | *0.197E-02 | | |
| | 2000000. | 0.545E-02 | 0.941E-04 | *0.369E-02 | *0.241E-02 | | |
| | 3000000. | 0.477E-02 | 0.119E-03 | *0.448E-02 | *0.266E-02 | | |
| | 5000000. | 0.407E-02 | 0.122E-03 | *0.547E-02 | *0.293E-02 | | |
| Na X 3S-4P | 200000. | 0.209 | -0.211E-02 | *0.105E-01 | *0.111E-01 | | |
| 176.6 Å | 500000. | 0.148 | -0.809E-03 | *0.235E-01 | *0.202E-01 | | |
| C=0.17E+21 | 1000000. | 0.116 | -0.763E-03 | *0.356E-01 | *0.257E-01 | | |
| | 2000000. | 0.921E-01 | -0.658E-03 | *0.517E-01 | *0.316E-01 | | |
| | 3000000. | 0.807E-01 | -0.126E-03 | *0.641E-01 | *0.349E-01 | | |
| | 5000000. | 0.688E-01 | 0.172E-03 | *0.824E-01 | *0.383E-01 | | |
| Na X 2P-3S | 200000. | 0.548E-02 | 0.256E-03 | 0.138E-03 | 0.435E-03 | *0.265E-03 | *0.697E-03 |
| 65.2 Å | 500000. | 0.382E-02 | 0.340E-03 | 0.581E-03 | 0.886E-03 | *0.116E-02 | *0.164E-02 |
| C=0.10E+21 | 1000000. | 0.298E-02 | 0.341E-03 | 0.109E-02 | 0.126E-02 | *0.209E-02 | *0.245E-02 |
| | 2000000. | 0.235E-02 | 0.328E-03 | 0.163E-02 | 0.154E-02 | *0.299E-02 | *0.307E-02 |
| | 3000000. | 0.204E-02 | 0.305E-03 | 0.198E-02 | 0.170E-02 | 0.347E-02 | 0.346E-02 |
| | 5000000. | 0.171E-02 | 0.266E-03 | 0.254E-02 | 0.193E-02 | 0.414E-02 | 0.392E-02 |
| Na X 2P-4S | 200000. | 0.778E-02 | 0.414E-03 | *0.101E-02 | *0.128E-02 | | |
| 47.8 Å | 500000. | 0.574E-02 | 0.600E-03 | *0.223E-02 | *0.225E-02 | | |
| C=0.23E+20 | 1000000. | 0.462E-02 | 0.640E-03 | *0.313E-02 | *0.290E-02 | | |
| | 2000000. | 0.370E-02 | 0.566E-03 | *0.421E-02 | *0.357E-02 | | |
| | 3000000. | 0.323E-02 | 0.549E-03 | *0.490E-02 | *0.386E-02 | | |
| | 5000000. | 0.272E-02 | 0.513E-03 | *0.606E-02 | *0.430E-02 | | |
| Na X 2P-5S | 200000. | 0.144E-01 | 0.316E-03 | | | | |
| 42.6 Å | 500000. | 0.110E-01 | 0.989E-03 | | | | |
| C=0.92E+19 | 1000000. | 0.897E-02 | 0.103E-02 | | | | |
| | 2000000. | 0.720E-02 | 0.953E-03 | | | | |
| | 3000000. | 0.629E-02 | 0.104E-02 | | | | |
| | 5000000. | 0.528E-02 | 0.102E-02 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-6S | 200000. | *0.248E-01 | -0.329E-03 | | | | |
| 40.3 Å | 500000. | 0.197E-01 | 0.118E-02 | | | | |
| C=0.47E+19 | 1000000. | 0.162E-01 | 0.133E-02 | | | | |
| | 2000000. | 0.131E-01 | 0.145E-02 | | | | |
| | 3000000. | 0.114E-01 | 0.172E-02 | | | | |
| | 5000000. | 0.961E-02 | 0.185E-02 | | | | |
| Na X 2P-7S | 200000. | *0.387E-01 | -0.147E-02 | | | | |
| 39.0 Å | 500000. | 0.320E-01 | 0.111E-02 | | | | |
| C=0.28E+19 | 1000000. | 0.267E-01 | 0.157E-02 | | | | |
| | 2000000. | 0.217E-01 | 0.199E-02 | | | | |
| | 3000000. | 0.190E-01 | 0.256E-02 | | | | |
| | 5000000. | 0.161E-01 | 0.302E-02 | | | | |
| Na X 2P-8S | 200000. | *0.559E-01 | -0.287E-02 | | | | |
| 38.2 Å | 500000. | *0.482E-01 | *0.708E-03 | | | | |
| C=0.18E+19 | 1000000. | 0.407E-01 | 0.187E-02 | | | | |
| | 2000000. | 0.334E-01 | 0.251E-02 | | | | |
| | 3000000. | 0.295E-01 | 0.363E-02 | | | | |
| | 5000000. | 0.250E-01 | 0.450E-02 | | | | |
| Na X 3P-4S | 200000. | 0.177 | 0.621E-02 | *0.149E-01 | *0.190E-01 | | |
| 188.1 Å | 500000. | 0.127 | 0.869E-02 | *0.333E-01 | *0.335E-01 | | |
| C=0.36E+21 | 1000000. | 0.101 | 0.925E-02 | *0.472E-01 | *0.431E-01 | | |
| | 2000000. | 0.803E-01 | 0.815E-02 | *0.653E-01 | *0.526E-01 | | |
| | 3000000. | 0.701E-01 | 0.791E-02 | *0.784E-01 | *0.568E-01 | | |
| | 5000000. | 0.590E-01 | 0.737E-02 | *0.968E-01 | *0.632E-01 | | |
| Na X 3P-5S | 200000. | 0.154 | 0.272E-02 | | | | |
| 127.1 Å | 500000. | 0.116 | 0.852E-02 | | | | |
| C=0.82E+20 | 1000000. | 0.933E-01 | 0.884E-02 | | | | |
| | 2000000. | 0.746E-01 | 0.820E-02 | | | | |
| | 3000000. | 0.651E-01 | 0.901E-02 | | | | |
| | 5000000. | 0.547E-01 | 0.884E-02 | | | | |
| Na X 3P-6S | 200000. | *0.197 | -0.244E-02 | | | | |
| 108.2 Å | 500000. | 0.155 | 0.829E-02 | | | | |
| C=0.34E+20 | 1000000. | 0.127 | 0.938E-02 | | | | |
| | 2000000. | 0.102 | 0.103E-01 | | | | |
| | 3000000. | 0.892E-01 | 0.122E-01 | | | | |
| | 5000000. | 0.750E-01 | 0.132E-01 | | | | |
| Na X 3P-7S | 200000. | *0.267 | -0.962E-02 | | | | |
| 99.3 Å | 500000. | 0.219 | 0.704E-02 | | | | |
| C=0.18E+20 | 1000000. | 0.181 | 0.100E-01 | | | | |
| | 2000000. | 0.147 | 0.128E-01 | | | | |
| | 3000000. | 0.129 | 0.165E-01 | | | | |
| | 5000000. | 0.109 | 0.194E-01 | | | | |
| Na X 3P-8S | 200000. | *0.355 | -0.175E-01 | | | | |
| 94.3 Å | 500000. | *0.304 | *0.417E-02 | | | | |
| C=0.11E+20 | 1000000. | 0.256 | 0.113E-01 | | | | |
| | 2000000. | 0.210 | 0.152E-01 | | | | |
| | 3000000. | 0.185 | 0.220E-01 | | | | |
| | 5000000. | 0.157 | 0.273E-01 | | | | |
| Na X 4P-5S | 200000. | 2.22 | 0.301E-01 | | | | |
| 408.5 Å | 500000. | 1.65 | 0.817E-01 | | | | |
| C=0.85E+21 | 1000000. | 1.33 | 0.849E-01 | | | | |
| | 2000000. | 1.06 | 0.781E-01 | | | | |
| | 3000000. | 0.929 | 0.844E-01 | | | | |
| | 5000000. | 0.785 | 0.826E-01 | | | | |
| Na X 4P-6S | 200000. | *1.41 | -0.135E-01 | | | | |
| 261.5 Å | 500000. | 1.09 | 0.459E-01 | | | | |
| C=0.20E+21 | 1000000. | 0.889 | 0.522E-01 | | | | |
| | 2000000. | 0.715 | 0.574E-01 | | | | |
| | 3000000. | 0.626 | 0.677E-01 | | | | |
| | 5000000. | 0.529 | 0.736E-01 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 4P-7S | 200000. | *1.42 | -0.446E-01 | | | | |
| 215.1 Å | 500000. | *1.15 | *0.313E-01 | | | | |
| C=0.85E+20 | 1000000. | 0.951 | 0.451E-01 | | | | |
| | 2000000. | 0.771 | 0.581E-01 | | | | |
| | 3000000. | 0.677 | 0.748E-01 | | | | |
| | 5000000. | 0.572 | 0.888E-01 | | | | |
| Na X 4P-8S | 200000. | | | | | | |
| 192.9 Å | 500000. | *1.37 | *0.160E-01 | | | | |
| C=0.45E+20 | 1000000. | 1.15 | 0.458E-01 | | | | |
| | 2000000. | 0.942 | 0.620E-01 | | | | |
| | 3000000. | 0.831 | 0.902E-01 | | | | |
| | 5000000. | 0.705 | 0.112 | | | | |
| Na X 2P-3D | 200000. | 0.578E-02 | -0.706E-04 | 0.695E-04 | -0.188E-03 | 0.129E-03 | -0.305E-03 |
| 63.6 Å | 500000. | 0.380E-02 | -0.295E-04 | 0.307E-03 | -0.438E-03 | 0.562E-03 | -0.821E-03 |
| C=0.54E+20 | 1000000. | 0.282E-02 | -0.357E-04 | 0.612E-03 | -0.633E-03 | 0.104E-02 | -0.124E-02 |
| | 2000000. | 0.213E-02 | -0.141E-04 | 0.105E-02 | -0.804E-03 | 0.164E-02 | -0.161E-02 |
| | 3000000. | 0.183E-02 | -0.131E-04 | 0.133E-02 | -0.897E-03 | 0.196E-02 | -0.182E-02 |
| | 5000000. | 0.153E-02 | -0.106E-04 | 0.171E-02 | -0.102E-02 | 0.238E-02 | -0.207E-02 |
| Na X 2P-4D | 200000. | 0.102E-01 | -0.993E-04 | | | | |
| 47.5 Å | 500000. | 0.743E-02 | -0.109E-03 | | | | |
| C=0.93E+18 | 1000000. | 0.587E-02 | -0.733E-04 | | | | |
| | 2000000. | 0.465E-02 | -0.537E-04 | | | | |
| | 3000000. | 0.408E-02 | -0.406E-04 | | | | |
| | 5000000. | 0.347E-02 | -0.330E-05 | | | | |
| Na X 3P-4D | 200000. | 0.179 | -0.164E-02 | | | | |
| 182.7 Å | 500000. | 0.130 | -0.217E-02 | | | | |
| C=0.14E+20 | 1000000. | 0.103 | -0.169E-02 | | | | |
| | 2000000. | 0.823E-01 | -0.137E-02 | | | | |
| | 3000000. | 0.723E-01 | -0.115E-02 | | | | |
| | 5000000. | 0.616E-01 | -0.580E-03 | | | | |
| Na X 3D-4P | 200000. | 0.226 | 0.364E-03 | *0.149E-01 | *0.158E-01 | | |
| 189.3 Å | 500000. | 0.159 | 0.220E-02 | *0.327E-01 | *0.283E-01 | | |
| C=0.20E+21 | 1000000. | 0.125 | 0.232E-02 | *0.481E-01 | *0.361E-01 | | |
| | 2000000. | 0.985E-01 | 0.214E-02 | *0.680E-01 | *0.442E-01 | | |
| | 3000000. | 0.864E-01 | 0.255E-02 | *0.833E-01 | *0.483E-01 | | |
| | 5000000. | 0.738E-01 | 0.253E-02 | *0.105 | *0.544E-01 | | |
| PERTURBER DENSITY = 1.E+21cm-3 | | | | | | | |
| Na X 1S-2P | 200000. | 0.608E-03 | -0.146E-04 | 0.751E-06 | -0.181E-05 | 0.105E-05 | -0.187E-05 |
| 11.0 Å | 500000. | 0.389E-03 | -0.295E-05 | 0.387E-05 | -0.736E-05 | 0.716E-05 | -0.126E-04 |
| C=0.74E+20 | 1000000. | 0.280E-03 | -0.116E-05 | 0.112E-04 | -0.149E-04 | 0.208E-04 | -0.282E-04 |
| | 2000000. | 0.203E-03 | -0.123E-05 | 0.253E-04 | -0.245E-04 | 0.448E-04 | -0.482E-04 |
| | 3000000. | 0.170E-03 | -0.882E-06 | 0.355E-04 | -0.301E-04 | 0.594E-04 | -0.600E-04 |
| | 5000000. | 0.137E-03 | -0.350E-06 | 0.527E-04 | -0.367E-04 | 0.833E-04 | -0.747E-04 |
| Na X 1S-3P | 200000. | 0.177E-02 | 0.307E-04 | | | | |
| 9.4 Å | 500000. | 0.124E-02 | 0.582E-05 | | | | |
| C=0.32E+19 | 1000000. | 0.952E-03 | -0.693E-05 | | | | |
| | 2000000. | 0.740E-03 | -0.908E-05 | | | | |
| | 3000000. | 0.641E-03 | -0.129E-04 | | | | |
| | 5000000. | 0.540E-03 | -0.181E-04 | | | | |
| Na X 1S-4P | 200000. | *0.388E-02 | *0.155E-03 | | | | |
| 9.0 Å | 500000. | 0.292E-02 | 0.484E-04 | | | | |
| C=0.11E+19 | 1000000. | 0.236E-02 | 0.110E-04 | | | | |
| | 2000000. | 0.191E-02 | -0.655E-05 | | | | |
| | 3000000. | 0.169E-02 | -0.220E-04 | | | | |
| | 5000000. | 0.146E-02 | -0.481E-04 | | | | |
| Na X 2S-2P | 200000. | 17.4 | -0.131 | 0.293E-01 | -0.172 | 0.454E-01 | -0.178 |
| 1646.9 Å | 500000. | 11.4 | -0.290 | 0.240 | -0.659 | 0.459 | -1.11 |
| C=0.16E+25 | 1000000. | 8.39 | -0.296 | 0.740 | -1.17 | 1.41 | -2.20 |
| | 2000000. | 6.29 | -0.305 | 1.47 | -1.72 | 2.64 | -3.33 |
| | 3000000. | 5.36 | -0.303 | 2.16 | -2.00 | 3.71 | -3.98 |
| | 5000000. | 4.41 | -0.275 | 2.94 | -2.29 | 4.62 | -4.64 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2S-3P | 200000. | 0.860E-01 | 0.168E-02 | | | | |
| 63.6 Å | 500000. | 0.602E-01 | -0.687E-04 | | | | |
| C=0.15E+21 | 1000000. | 0.464E-01 | -0.717E-03 | | | | |
| | 2000000. | 0.362E-01 | -0.826E-03 | | | | |
| | 3000000. | 0.314E-01 | -0.101E-02 | | | | |
| | 5000000. | 0.265E-01 | -0.122E-02 | | | | |
| Na X 2S-4P | 200000. | *0.112 | *0.450E-02 | | | | |
| 47.5 Å | 500000. | 0.839E-01 | 0.117E-02 | | | | |
| C=0.31E+20 | 1000000. | 0.678E-01 | 0.820E-04 | | | | |
| | 2000000. | 0.549E-01 | -0.414E-03 | | | | |
| | 3000000. | 0.487E-01 | -0.851E-03 | | | | |
| | 5000000. | 0.420E-01 | -0.157E-02 | | | | |
| Na X 3S-4P | 200000. | *1.87 | *0.781E-01 | | | | |
| 182.2 Å | 500000. | 1.41 | 0.111E-01 | | | | |
| C=0.46E+21 | 1000000. | 1.14 | -0.116E-01 | | | | |
| | 2000000. | 0.926 | -0.199E-01 | | | | |
| | 3000000. | 0.820 | -0.263E-01 | | | | |
| | 5000000. | 0.706 | -0.379E-01 | | | | |
| Na X 2P-3S | 200000. | 0.589E-01 | -0.139E-02 | *0.236E-02 | *0.357E-02 | | |
| 66.9 Å | 500000. | 0.423E-01 | 0.129E-02 | *0.834E-02 | *0.101E-01 | | |
| C=0.79E+21 | 1000000. | 0.334E-01 | 0.221E-02 | *0.161E-01 | *0.151E-01 | | |
| | 2000000. | 0.264E-01 | 0.236E-02 | *0.233E-01 | *0.201E-01 | | |
| | 3000000. | 0.230E-01 | 0.236E-02 | *0.285E-01 | *0.229E-01 | | |
| | 5000000. | 0.194E-01 | 0.246E-02 | 0.358E-01 | 0.258E-01 | | |
| Na X 2P-4S | 200000. | 0.655E-01 | -0.657E-02 | | | | |
| 49.1 Å | 500000. | 0.539E-01 | -0.253E-03 | | | | |
| C=0.18E+21 | 1000000. | 0.450E-01 | 0.187E-02 | | | | |
| | 2000000. | 0.369E-01 | 0.229E-02 | | | | |
| | 3000000. | 0.325E-01 | 0.285E-02 | | | | |
| | 5000000. | 0.276E-01 | 0.364E-02 | | | | |
| Na X 2P-5S | 200000. | *0.903E-01 | -0.130E-01 | | | | |
| 43.7 Å | 500000. | 0.836E-01 | -0.235E-02 | | | | |
| C=0.72E+20 | 1000000. | 0.735E-01 | 0.107E-02 | | | | |
| | 2000000. | 0.619E-01 | 0.253E-02 | | | | |
| | 3000000. | 0.552E-01 | 0.397E-02 | | | | |
| | 5000000. | 0.473E-01 | 0.578E-02 | | | | |
| Na X 2P-6S | 200000. | *0.123 | -0.208E-01 | | | | |
| 41.3 Å | 500000. | *0.126 | -0.534E-02 | | | | |
| C=0.37E+20 | 1000000. | 0.115 | -0.405E-03 | | | | |
| | 2000000. | 0.998E-01 | 0.301E-02 | | | | |
| | 3000000. | 0.902E-01 | 0.546E-02 | | | | |
| | 5000000. | 0.782E-01 | 0.902E-02 | | | | |
| Na X 2P-7S | 200000. | | | | | | |
| 39.9 Å | 500000. | *0.178 | -0.863E-02 | | | | |
| C=0.22E+20 | 1000000. | *0.170 | -0.130E-02 | | | | |
| | 2000000. | 0.152 | 0.362E-02 | | | | |
| | 3000000. | 0.139 | 0.691E-02 | | | | |
| | 5000000. | 0.122 | 0.128E-01 | | | | |
| Na X 3P-4S | 200000. | *1.53 | -0.116 | | | | |
| 190.9 Å | 500000. | 1.20 | -0.710E-02 | | | | |
| C=0.13E+22 | 1000000. | 0.986 | 0.307E-01 | | | | |
| | 2000000. | 0.798 | 0.379E-01 | | | | |
| | 3000000. | 0.703 | 0.481E-01 | | | | |
| | 5000000. | 0.597 | 0.623E-01 | | | | |
| Na X 3P-5S | 200000. | *1.04 | -0.122 | | | | |
| 129.2 Å | 500000. | *0.908 | -0.220E-01 | | | | |
| C=0.60E+21 | 1000000. | 0.781 | 0.105E-01 | | | | |
| | 2000000. | 0.651 | 0.236E-01 | | | | |
| | 3000000. | 0.579 | 0.370E-01 | | | | |
| | 5000000. | 0.495 | 0.538E-01 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3P-6S | 200000. | *1.05 | -0.153 | | | | |
| 110.0 Å | 500000. | *1.02 | -0.390E-01 | | | | |
| C=0.26E+21 | 1000000. | *0.919 | -0.205E-02 | | | | |
| | 2000000. | 0.788 | 0.225E-01 | | | | |
| | 3000000. | 0.710 | 0.404E-01 | | | | |
| | 5000000. | 0.614 | 0.664E-01 | | | | |
| Na X 3P-7S | 200000. | | | | | | |
| 100.9 Å | 500000. | *1.24 | -0.560E-01 | | | | |
| C=0.14E+21 | 1000000. | *1.17 | -0.759E-02 | | | | |
| | 2000000. | *1.04 | *0.240E-01 | | | | |
| | 3000000. | 0.944 | 0.455E-01 | | | | |
| | 5000000. | 0.827 | 0.840E-01 | | | | |
| Na X 2P-3D | 200000. | 0.597E-01 | -0.812E-03 | | | | |
| 66.3 Å | 500000. | 0.405E-01 | 0.303E-03 | | | | |
| C=0.16E+21 | 1000000. | 0.305E-01 | 0.511E-03 | | | | |
| | 2000000. | 0.233E-01 | 0.757E-03 | | | | |
| | 3000000. | 0.201E-01 | 0.814E-03 | | | | |
| | 5000000. | 0.168E-01 | 0.910E-03 | | | | |
| Na X 2P-4D | 200000. | *0.859E-01 | -0.121E-02 | | | | |
| 49.0 Å | 500000. | 0.651E-01 | 0.430E-04 | | | | |
| C=0.94E+18 | 1000000. | 0.531E-01 | 0.580E-03 | | | | |
| | 2000000. | 0.432E-01 | 0.827E-03 | | | | |
| | 3000000. | 0.384E-01 | 0.990E-03 | | | | |
| | 5000000. | 0.332E-01 | 0.126E-02 | | | | |
| Na X 3P-4D | 200000. | *1.53 | -0.345E-01 | | | | |
| 188.7 Å | 500000. | 1.17 | -0.256E-02 | | | | |
| C=0.14E+20 | 1000000. | 0.962 | 0.110E-01 | | | | |
| | 2000000. | 0.788 | 0.155E-01 | | | | |
| | 3000000. | 0.700 | 0.196E-01 | | | | |
| | 5000000. | 0.605 | 0.259E-01 | | | | |
| Na X 3D-4P | 200000. | *1.80 | *0.778E-01 | | | | |
| 186.9 Å | 500000. | 1.36 | 0.194E-01 | | | | |
| C=0.48E+21 | 1000000. | 1.10 | 0.102E-02 | | | | |
| | 2000000. | 0.894 | -0.850E-02 | | | | |
| | 3000000. | 0.793 | -0.157E-01 | | | | |
| | 5000000. | 0.685 | -0.280E-01 | | | | |
| Na X 2S-2P | 200000. | 7.68 | -0.402E-01 | 0.936E-02 | -0.520E-01 | 0.139E-01 | -0.539E-01 |
| 1126.1 Å | 500000. | 4.99 | -0.114 | 0.693E-01 | -0.204 | 0.132 | -0.347 |
| C=0.11E+25 | 1000000. | 3.65 | -0.123 | 0.215 | -0.381 | 0.412 | -0.713 |
| | 2000000. | 2.72 | -0.126 | 0.459 | -0.571 | 0.853 | -1.11 |
| | 3000000. | 2.31 | -0.127 | 0.672 | -0.686 | 1.21 | -1.37 |
| | 5000000. | 1.90 | -0.116 | 0.944 | -0.787 | 1.57 | -1.60 |
| Na X 2S-3P | 200000. | 0.788E-01 | -0.767E-03 | *0.889E-03 | *0.100E-02 | | |
| 60.7 Å | 500000. | 0.536E-01 | -0.266E-03 | *0.352E-02 | *0.329E-02 | | |
| C=0.50E+21 | 1000000. | 0.407E-01 | -0.823E-04 | *0.654E-02 | *0.509E-02 | | |
| | 2000000. | 0.314E-01 | -0.231E-04 | *0.107E-01 | *0.686E-02 | | |
| | 3000000. | 0.272E-01 | -0.156E-04 | *0.136E-01 | *0.784E-02 | | |
| | 5000000. | 0.229E-01 | 0.101E-03 | *0.179E-01 | *0.890E-02 | | |
| Na X 2S-4P | 200000. | *0.108 | -0.161E-02 | | | | |
| 45.7 Å | 500000. | 0.790E-01 | -0.329E-03 | | | | |
| C=0.12E+21 | 1000000. | 0.626E-01 | 0.214E-04 | | | | |
| | 2000000. | 0.501E-01 | 0.179E-03 | | | | |
| | 3000000. | 0.441E-01 | 0.420E-03 | | | | |
| | 5000000. | 0.379E-01 | 0.619E-03 | | | | |
| Na X 3S-4P | 200000. | *1.82 | -0.189E-01 | | | | |
| 176.6 Å | 500000. | 1.33 | -0.140E-01 | | | | |
| C=0.17E+22 | 1000000. | 1.06 | -0.128E-01 | | | | |
| | 2000000. | 0.852 | -0.117E-01 | | | | |
| | 3000000. | 0.752 | -0.797E-02 | | | | |
| | 5000000. | 0.645 | -0.473E-02 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-3S | 200000. | 0.534E-01 | -0.581E-03 | *0.134E-02 | *0.256E-02 | | |
| 65.2 Å | 500000. | 0.375E-01 | 0.161E-02 | *0.582E-02 | *0.736E-02 | | |
| C=0.10E+22 | 1000000. | 0.293E-01 | 0.219E-02 | *0.109E-01 | *0.114E-01 | | |
| | 2000000. | 0.231E-01 | 0.238E-02 | *0.163E-01 | *0.149E-01 | | |
| | 3000000. | 0.202E-01 | 0.236E-02 | *0.198E-01 | *0.170E-01 | | |
| | 5000000. | 0.169E-01 | 0.229E-02 | 0.254E-01 | 0.192E-01 | | |
| Na X 2P-4S | 200000. | 0.629E-01 | -0.512E-02 | | | | |
| 47.8 Å | 500000. | 0.498E-01 | 0.389E-03 | | | | |
| C=0.23E+21 | 1000000. | 0.411E-01 | 0.242E-02 | | | | |
| | 2000000. | 0.334E-01 | 0.270E-02 | | | | |
| | 3000000. | 0.295E-01 | 0.299E-02 | | | | |
| | 5000000. | 0.249E-01 | 0.363E-02 | | | | |
| Na X 2P-5S | 200000. | *0.892E-01 | -0.127E-01 | | | | |
| 42.6 Å | 500000. | 0.797E-01 | -0.162E-02 | | | | |
| C=0.92E+20 | 1000000. | 0.691E-01 | 0.187E-02 | | | | |
| | 2000000. | 0.577E-01 | 0.289E-02 | | | | |
| | 3000000. | 0.513E-01 | 0.424E-02 | | | | |
| | 5000000. | 0.439E-01 | 0.584E-02 | | | | |
| Na X 2P-6S | 200000. | *0.122 | -0.215E-01 | | | | |
| 40.3 Å | 500000. | *0.121 | -0.506E-02 | | | | |
| C=0.47E+20 | 1000000. | 0.110 | 0.443E-03 | | | | |
| | 2000000. | 0.943E-01 | 0.339E-02 | | | | |
| | 3000000. | 0.848E-01 | 0.588E-02 | | | | |
| | 5000000. | 0.733E-01 | 0.913E-02 | | | | |
| Na X 2P-7S | 200000. | | | | | | |
| 39.0 Å | 500000. | *0.173 | -0.888E-02 | | | | |
| C=0.28E+20 | 1000000. | *0.163 | -0.153E-02 | | | | |
| | 2000000. | 0.144 | 0.395E-02 | | | | |
| | 3000000. | 0.131 | 0.762E-02 | | | | |
| | 5000000. | 0.115 | 0.135E-01 | | | | |
| Na X 3P-4S | 200000. | *1.51 | -0.730E-01 | | | | |
| 188.1 Å | 500000. | 1.14 | 0.538E-02 | | | | |
| C=0.36E+22 | 1000000. | 0.924 | 0.348E-01 | | | | |
| | 2000000. | 0.743 | 0.385E-01 | | | | |
| | 3000000. | 0.652 | 0.429E-01 | | | | |
| | 5000000. | 0.552 | 0.519E-01 | | | | |
| Na X 3P-5S | 200000. | *1.04 | -0.110 | | | | |
| 127.1 Å | 500000. | *0.880 | -0.147E-01 | | | | |
| C=0.82E+21 | 1000000. | 0.746 | 0.154E-01 | | | | |
| | 2000000. | 0.616 | 0.242E-01 | | | | |
| | 3000000. | 0.546 | 0.362E-01 | | | | |
| | 5000000. | 0.466 | 0.500E-01 | | | | |
| Na X 3P-6S | 200000. | *1.06 | -0.153 | | | | |
| 108.2 Å | 500000. | *1.00 | -0.368E-01 | | | | |
| C=0.34E+21 | 1000000. | *0.889 | *0.231E-02 | | | | |
| | 2000000. | 0.756 | 0.234E-01 | | | | |
| | 3000000. | 0.678 | 0.413E-01 | | | | |
| | 5000000. | 0.585 | 0.645E-01 | | | | |
| Na X 3P-7S | 200000. | | | | | | |
| 99.3 Å | 500000. | *1.23 | -0.579E-01 | | | | |
| C=0.18E+21 | 1000000. | *1.14 | -0.107E-01 | | | | |
| | 2000000. | *0.999 | *0.247E-01 | | | | |
| | 3000000. | 0.908 | 0.486E-01 | | | | |
| | 5000000. | 0.793 | 0.866E-01 | | | | |
| Na X 2P-3D | 200000. | 0.564E-01 | 0.449E-03 | *0.628E-03 | -0.116E-02 | | |
| 63.6 Å | 500000. | 0.374E-01 | 0.330E-03 | *0.305E-02 | -0.377E-02 | | |
| C=0.54E+21 | 1000000. | 0.278E-01 | 0.777E-04 | *0.609E-02 | -0.582E-02 | | |
| | 2000000. | 0.210E-01 | 0.183E-03 | *0.105E-01 | -0.783E-02 | | |
| | 3000000. | 0.181E-01 | 0.133E-03 | *0.133E-01 | -0.893E-02 | | |
| | 5000000. | 0.151E-01 | 0.439E-04 | *0.171E-01 | -0.102E-01 | *0.238E-01 | -0.206E-01 |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-4D | 200000. | *0.849E-01 | *0.178E-02 | | | | |
| 47.5 Å | 500000. | 0.631E-01 | 0.621E-03 | | | | |
| C=0.93E+19 | 1000000. | 0.507E-01 | 0.388E-03 | | | | |
| | 2000000. | 0.409E-01 | 0.309E-03 | | | | |
| | 3000000. | 0.362E-01 | 0.133E-03 | | | | |
| | 5000000. | 0.311E-01 | -0.560E-04 | | | | |
| Na X 3P-4D | 200000. | *1.51 | *0.323E-01 | | | | |
| 182.7 Å | 500000. | 1.13 | 0.861E-02 | | | | |
| C=0.14E+21 | 1000000. | 0.908 | 0.323E-02 | | | | |
| | 2000000. | 0.735 | 0.147E-02 | | | | |
| | 3000000. | 0.651 | -0.122E-02 | | | | |
| | 5000000. | 0.560 | -0.481E-02 | | | | |
| Na X 3D-4P | 200000. | *1.94 | -0.306E-01 | | | | |
| 189.3 Å | 500000. | 1.42 | -0.535E-02 | | | | |
| C=0.20E+22 | 1000000. | 1.13 | 0.317E-02 | | | | |
| | 2000000. | 0.907 | 0.501E-02 | | | | |
| | 3000000. | 0.800 | 0.961E-02 | | | | |
| | 5000000. | 0.688 | 0.135E-01 | | | | |
| PERTURBER DENSITY = 1.E+22cm-3 | | | | | | | |
| Na X 1S-2P | 200000. | 0.599E-02 | -0.875E-04 | 0.344E-05 | -0.447E-05 | *0.127E-05 | -0.100E-05 |
| 11.0 Å | 500000. | 0.386E-02 | 0.109E-04 | 0.355E-04 | -0.509E-04 | *0.560E-04 | -0.617E-04 |
| C=0.74E+21 | 1000000. | 0.278E-02 | 0.118E-04 | 0.111E-03 | -0.131E-03 | *0.201E-03 | -0.215E-03 |
| | 2000000. | 0.202E-02 | 0.342E-05 | 0.252E-03 | -0.229E-03 | 0.444E-03 | -0.423E-03 |
| | 3000000. | 0.169E-02 | 0.497E-05 | 0.355E-03 | -0.287E-03 | 0.592E-03 | -0.545E-03 |
| | 5000000. | 0.137E-02 | 0.819E-05 | 0.527E-03 | -0.361E-03 | 0.831E-03 | -0.704E-03 |
| Na X 1S-3P | 200000. | *0.151E-01 | *0.433E-03 | | | | |
| 9.4 Å | 500000. | *0.106E-01 | *0.302E-03 | | | | |
| C=0.32E+20 | 1000000. | 0.830E-02 | 0.142E-03 | | | | |
| | 2000000. | 0.654E-02 | 0.759E-04 | | | | |
| | 3000000. | 0.572E-02 | 0.449E-04 | | | | |
| | 5000000. | 0.486E-02 | 0.262E-04 | | | | |
| Na X 1S-4P | 200000. | | | | | | |
| 9.0 Å | 500000. | *0.226E-01 | *0.695E-03 | | | | |
| C=0.11E+20 | 1000000. | *0.187E-01 | *0.419E-03 | | | | |
| | 2000000. | 0.155E-01 | 0.232E-03 | | | | |
| | 3000000. | 0.140E-01 | 0.162E-03 | | | | |
| | 5000000. | 0.123E-01 | 0.106E-03 | | | | |
| Na X 2S-3P | 200000. | *0.733 | *0.300E-01 | | | | |
| 63.6 Å | 500000. | *0.520 | *0.142E-01 | | | | |
| C=0.15E+22 | 1000000. | 0.407 | 0.501E-02 | | | | |
| | 2000000. | 0.322 | 0.104E-02 | | | | |
| | 3000000. | 0.282 | -0.676E-03 | | | | |
| | 5000000. | 0.240 | -0.151E-02 | | | | |
| Na X 2S-4P | 200000. | | | | | | |
| 47.5 Å | 500000. | *0.653 | *0.197E-01 | | | | |
| C=0.31E+21 | 1000000. | *0.539 | *0.109E-01 | | | | |
| | 2000000. | 0.449 | 0.514E-02 | | | | |
| | 3000000. | 0.404 | 0.301E-02 | | | | |
| | 5000000. | 0.355 | 0.147E-02 | | | | |
| Na X 3S-4P | 200000. | | | | | | |
| 182.2 Å | 500000. | | | | | | |
| C=0.46E+22 | 1000000. | *8.93 | *0.198 | | | | |
| | 2000000. | *7.49 | *0.563E-01 | | | | |
| | 3000000. | 6.75 | 0.142E-01 | | | | |
| | 5000000. | 5.94 | -0.185E-01 | | | | |
| Na X 2P-3S | 200000. | *0.406 | -0.544E-01 | | | | |
| 66.9 Å | 500000. | 0.327 | -0.212E-01 | | | | |
| C=0.79E+22 | 1000000. | 0.272 | -0.389E-02 | | | | |
| | 2000000. | 0.223 | 0.514E-02 | | | | |
| | 3000000. | 0.197 | 0.687E-02 | | | | |
| | 5000000. | 0.168 | 0.809E-02 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 2P-4S | 200000. | *0.302 | -0.755E-01 | | | | |
| 49.1 Å | 500000. | *0.303 | -0.329E-01 | | | | |
| C=0.18E+22 | 1000000. | 0.286 | -0.109E-01 | | | | |
| | 2000000. | 0.255 | 0.279E-03 | | | | |
| | 3000000. | 0.233 | 0.432E-02 | | | | |
| | 5000000. | 0.205 | 0.814E-02 | | | | |
| Na X 2P-5S | 200000. | *0.279 | -0.107 | | | | |
| 43.7 Å | 500000. | *0.364 | -0.483E-01 | | | | |
| C=0.72E+21 | 1000000. | *0.384 | -0.184E-01 | | | | |
| | 2000000. | 0.367 | -0.219E-02 | | | | |
| | 3000000. | 0.347 | 0.543E-02 | | | | |
| | 5000000. | 0.314 | 0.987E-02 | | | | |
| Na X 3P-4S | 200000. | | | | | | |
| 190.9 Å | 500000. | *7.76 | -0.618 | | | | |
| C=0.13E+23 | 1000000. | *6.88 | -0.219 | | | | |
| | 2000000. | 5.91 | -0.258E-01 | | | | |
| | 3000000. | 5.35 | 0.483E-01 | | | | |
| | 5000000. | 4.67 | 0.115 | | | | |
| Na X 3P-5S | 200000. | | | | | | |
| 129.2 Å | 500000. | *4.64 | -0.477 | | | | |
| C=0.60E+22 | 1000000. | *4.52 | -0.186 | | | | |
| | 2000000. | *4.16 | -0.329E-01 | | | | |
| | 3000000. | 3.87 | 0.396E-01 | | | | |
| | 5000000. | 3.47 | 0.823E-01 | | | | |
| Na X 2P-3D | 200000. | *0.551 | -0.104E-01 | | | | |
| 66.3 Å | 500000. | 0.371 | -0.643E-03 | | | | |
| C=0.16E+22 | 1000000. | 0.280 | 0.187E-02 | | | | |
| | 2000000. | 0.215 | 0.481E-02 | | | | |
| | 3000000. | 0.186 | 0.504E-02 | | | | |
| | 5000000. | 0.157 | 0.518E-02 | | | | |
| Na X 2P-4D | 200000. | | | | | | |
| 49.0 Å | 500000. | *0.527 | -0.195E-02 | | | | |
| C=0.94E+19 | 1000000. | *0.431 | *0.305E-02 | | | | |
| | 2000000. | 0.358 | 0.533E-02 | | | | |
| | 3000000. | 0.322 | 0.604E-02 | | | | |
| | 5000000. | 0.283 | 0.622E-02 | | | | |
| Na X 3P-4D | 200000. | | | | | | |
| 188.7 Å | 500000. | *9.21 | -0.147 | | | | |
| C=0.14E+21 | 1000000. | *7.66 | -0.817E-02 | | | | |
| | 2000000. | 6.43 | 0.498E-01 | | | | |
| | 3000000. | 5.81 | 0.733E-01 | | | | |
| | 5000000. | 5.12 | 0.843E-01 | | | | |
| Na X 3D-4P | 200000. | | | | | | |
| 186.9 Å | 500000. | *10.4 | *0.303 | | | | |
| C=0.48E+22 | 1000000. | *8.67 | *0.163 | | | | |
| | 2000000. | 7.25 | 0.612E-01 | | | | |
| | 3000000. | 6.55 | 0.285E-01 | | | | |
| | 5000000. | 5.78 | 0.245E-02 | | | | |
| Na X 2S-3P | 200000. | *0.678 | -0.434E-03 | | | | |
| 60.7 Å | 500000. | *0.477 | -0.823E-03 | | | | |
| C=0.50E+22 | 1000000. | 0.369 | -0.822E-03 | | | | |
| | 2000000. | 0.289 | -0.478E-03 | | | | |
| | 3000000. | 0.252 | -0.676E-03 | | | | |
| | 5000000. | 0.213 | -0.981E-04 | | | | |
| Na X 2S-4P | 200000. | | | | | | |
| 45.7 Å | 500000. | *0.615 | -0.165E-02 | | | | |
| C=0.12E+22 | 1000000. | *0.504 | *0.264E-03 | | | | |
| | 2000000. | 0.415 | 0.994E-03 | | | | |
| | 3000000. | 0.372 | 0.217E-02 | | | | |
| | 5000000. | 0.326 | 0.236E-02 | | | | |

| PERTURBERS ARE: | | ELECTRONS | | PROTONS | | He III | |
|---|---|---|---|---|---|---|---|
| TRANSITION | T(K) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) | WIDTH(Å) | SHIFT(Å) |
| Na X 3S-4P | 200000. | | | | | | |
| 176.6 Å | 500000. | | | | | | |
| C=0.17E+23 | 1000000. | *8.49 | *0.317E-01 | | | | |
| | 2000000. | *7.04 | -0.182E-01 | | | | |
| | 3000000. | 6.32 | -0.106E-01 | | | | |
| | 5000000. | 5.53 | -0.109E-01 | | | | |
| Na X 2P-3S | 200000. | *0.393 | -0.516E-01 | | | | |
| 65.2 Å | 500000. | 0.308 | -0.176E-01 | | | | |
| C=0.10E+23 | 1000000. | 0.252 | -0.199E-02 | | | | |
| | 2000000. | 0.204 | 0.710E-02 | | | | |
| | 3000000. | 0.179 | 0.873E-02 | | | | |
| | 5000000. | 0.152 | 0.903E-02 | | | | |
| Na X 2P-4S | 200000. | *0.297 | -0.777E-01 | | | | |
| 47.8 Å | 500000. | *0.292 | -0.335E-01 | | | | |
| C=0.23E+22 | 1000000. | 0.272 | -0.953E-02 | | | | |
| | 2000000. | 0.239 | 0.193E-02 | | | | |
| | 3000000. | 0.218 | 0.487E-02 | | | | |
| | 5000000. | 0.190 | 0.897E-02 | | | | |
| Na X 2P-5S | 200000. | *0.275 | -0.117 | | | | |
| 42.6 Å | 500000. | *0.353 | -0.519E-01 | | | | |
| C=0.92E+21 | 1000000. | *0.369 | -0.192E-01 | | | | |
| | 2000000. | 0.350 | -0.313E-02 | | | | |
| | 3000000. | 0.328 | 0.517E-02 | | | | |
| | 5000000. | 0.296 | 0.106E-01 | | | | |
| Na X 3P-4S | 200000. | | | | | | |
| 188.1 Å | 500000. | *7.71 | -0.512 | | | | |
| C=0.36E+23 | 1000000. | *6.73 | -0.154 | | | | |
| | 2000000. | 5.72 | 0.127E-01 | | | | |
| | 3000000. | 5.14 | 0.579E-01 | | | | |
| | 5000000. | 4.46 | 0.117 | | | | |
| Na X 3P-5S | 200000. | | | | | | |
| 127.1 Å | 500000. | *4.60 | -0.459 | | | | |
| C=0.82E+22 | 1000000. | *4.44 | -0.174 | | | | |
| | 2000000. | *4.03 | -0.356E-01 | | | | |
| | 3000000. | 3.73 | 0.380E-01 | | | | |
| | 5000000. | 3.33 | 0.843E-01 | | | | |
| Na X 2P-3D | 200000. | *0.518 | *0.656E-02 | | | | |
| 63.6 Å | 500000. | 0.348 | 0.773E-02 | | | | |
| C=0.54E+22 | 1000000. | 0.261 | 0.482E-02 | | | | |
| | 2000000. | 0.199 | 0.480E-02 | | | | |
| | 3000000. | 0.171 | 0.420E-02 | | | | |
| | 5000000. | 0.144 | 0.357E-02 | | | | |
| Na X 2P-4D | 200000. | | | | | | |
| 47.5 Å | 500000. | *0.508 | *0.101E-01 | | | | |
| C=0.93E+20 | 1000000. | *0.414 | *0.835E-02 | | | | |
| | 2000000. | 0.341 | 0.682E-02 | | | | |
| | 3000000. | 0.305 | 0.575E-02 | | | | |
| | 5000000. | 0.267 | 0.482E-02 | | | | |
| Na X 3P-4D | 200000. | | | | | | |
| 182.7 Å | 500000. | *8.93 | *0.156 | | | | |
| C=0.14E+22 | 1000000. | *7.35 | *0.117 | | | | |
| | 2000000. | 6.10 | 0.849E-01 | | | | |
| | 3000000. | 5.49 | 0.688E-01 | | | | |
| | 5000000. | 4.81 | 0.507E-01 | | | | |
| Na X 3D-4P | 200000. | | | | | | |
| 189.3 Å | 500000. | *11.0 | -0.953E-01 | | | | |
| C=0.20E+23 | 1000000. | *9.07 | -0.231E-01 | | | | |
| | 2000000. | 7.50 | -0.350E-02 | | | | |
| | 3000000. | 6.74 | 0.244E-01 | | | | |
| | 5000000. | 5.91 | 0.320E-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+23cm-3 | | | | | | | |
| Na X 1S-2P | 200000. | | | | | | |
| 11.0 Å | 500000. | *0.370E-01 | *0.404E-03 | *0.187E-03 | -0.145E-03 | | |
| C=0.74E+22 | 1000000. | 0.268E-01 | 0.409E-03 | *0.982E-03 | -0.807E-03 | | |
| | 2000000. | 0.196E-01 | 0.261E-03 | *0.248E-02 | -0.188E-02 | | |
| | 3000000. | 0.164E-01 | 0.236E-03 | *0.352E-02 | -0.249E-02 | | |
| | 5000000. | 0.133E-01 | 0.229E-03 | *0.526E-02 | -0.333E-02 | | |
| Na X 1S-3P | 200000. | | | | | | |
| 9.4 Å | 500000. | | | | | | |
| C=0.32E+21 | 1000000. | *0.697E-01 | *0.140E-02 | | | | |
| | 2000000. | *0.553E-01 | *0.111E-02 | | | | |
| | 3000000. | 0.488E-01 | 0.866E-03 | | | | |
| | 5000000. | 0.420E-01 | 0.698E-03 | | | | |
| Na X 2P-3S | 200000. | | | | | | |
| 66.9 Å | 500000. | *1.98 | -0.244 | | | | |
| C=0.79E+23 | 1000000. | *1.74 | -0.133 | | | | |
| | 2000000. | 1.53 | -0.469E-01 | | | | |
| | 3000000. | 1.40 | -0.189E-01 | | | | |
| | 5000000. | 1.24 | 0.223E-02 | | | | |
| Na X 2P-3D | 200000. | | | | | | |
| 66.3 Å | 500000. | | | | | | |
| C=0.16E+23 | 1000000. | *2.56 | -0.142E-01 | | | | |
| | 2000000. | 1.96 | 0.223E-01 | | | | |
| | 3000000. | 1.71 | 0.270E-01 | | | | |
| | 5000000. | 1.45 | 0.323E-01 | | | | |
| Na X 2P-3S | 200000. | | | | | | |
| 65.2 Å | 500000. | *1.87 | -0.258 | | | | |
| C=0.10E+24 | 1000000. | *1.64 | -0.139 | | | | |
| | 2000000. | 1.43 | -0.465E-01 | | | | |
| | 3000000. | 1.31 | -0.148E-01 | | | | |
| | 5000000. | 1.15 | 0.494E-02 | | | | |
| Na X 2P-3D | 200000. | | | | | | |
| 63.6 Å | 500000. | | | | | | |
| C=0.54E+23 | 1000000. | *2.37 | *0.241E-01 | | | | |
| | 2000000. | 1.82 | 0.391E-01 | | | | |
| | 3000000. | 1.57 | 0.364E-01 | | | | |
| | 5000000. | 1.33 | 0.344E-01 | | | | |
| PERTURBER DENSITY = 1.E+24cm-3 | | | | | | | |
| Na X 1S-2P | 200000. | | | | | | |
| 11.0 Å | 500000. | | | | | | |
| C=0.74E+23 | 1000000. | | | | | | |
| | 2000000. | *0.186 | *0.185E-02 | | | | |
| | 3000000. | *0.156 | *0.216E-02 | | | | |
| | 5000000. | 0.126 | 0.232E-02 | | | | |

tions not tabulated for perturber densities lower than $10^{19}$ cm$^{-3}$, 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 divided by the corresponding full width at half maximum. For each value given in Table 1, the collision volume (V) multiplied by the perturber density (N) is much less than one and the impact approximation is valid (Sahal−Bréchot 1969ab). Values for NV $>$ 0.5 are not given and values for $0.1 <$ NV $\leq 0.5$ 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 formula for such a case is given. The accuracy of the results obtained decreases when broadening by ion interactions becomes important.

We hope that the presented results will be of help for analysis, modeling and diagnostics of astrophysical, laser produced and laboratory plasmas.

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## ТАБЕЛЕ ПАРАМЕТАРА ШТАРКОВОГ ШИРЕЊА СПЕКТРАЛНИХ ЛИНИЈА Na X

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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 57 мултиплета Na X. Резултати су дати у функцији температуре и концентрације пертурбера.