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Preliminary report

TABLES OF THE ELECTRON IMPACT BROADENING PARAMETERS: Mn II, Mn III, Ga III, Ge III and Ge IV LINES

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SUMMARY: In this paper the Tables of the electron - impact line widths and shifts for 16 Mn II, 3 Mn III, 10 Ga III, 8 Ge III and 14 Ge IV multiplets considered within a modified semiempirical approach are given. A Table with electron−, proton−, and He III-impact line widths and shifts for 3 Ge IV multiplets calculated by using semiclassical approach is given as well.

1. INTRODUCTION

Developement of spectral space observations, as e.g. with Goddard High Resolution Spectrograph (GHRS) on the Hubble Space Telescope (HST), provides good quality stellar spectra. Consequently, the number of spectral lines of astrophysical interest rapidly increases.

The lines of Mn II, Mn III, Ga III, Ge III and Ge IV are present in spectra of hot star atmospheres, where Stark broadening mechanism is main pressure broadening mechanism. The spectral lines of Mn II and Mn III are observed in atmosphere of hot stars (see e.g. Heacox 1979, Cowley 1980, Smith & Dworetsky 1993). It is well known that manganese is overabundant in atmospheres of Hg-Mn stars (see e.g. Heacox 1979, Cowley 1980, Smith & Dworetsky 1993 etc.) The analysis of Ga II and Ga III lines in high resolution IUE spectra observed for 53 B and A stars by Takada-Hidai et al. (1986) shows that gallium is overabundant in the magnetic Si and Si Cr Eu stars, in the non-magnetic Hg-Mn stars and in the He- weak PGa stars (for gallium overabundance analyses see also e.g. Heacox 1979 and Smith 1995). Also, the spectral lines of germanium (Ge II, Ge III) are present in hot star spectra, as e.g. in β Ori (Selvelli et al. 1977) spectrum. They may be additionally of interest for stellar interior physics since germanium is commonly associated with slow-neutron capture nucleosynthesis (Leckrone et al. 1993).

In Tables 1 – 3 the electron-impact broadening parameters for Mn II, Mn III, Ga III, Ge III and Ge IV spectral line, calculated within the modified semiempirical approach (Dimitrijević & Konjević 1980 and for ions with complex spectra see also Popović & Dimitrijević 1996) are given. Morover, the electron-, proton-, and He III-impact line widths and shifts for 3 Ge IV lines calculated within the semiclassical perturbation formalism (Sahal-Bréchot 1969ab) are given (Table 4).

2. RESULTS AND DISCUSSION

The analysis of obtained results, details of calculations and the comparison with other theoretical will be published in Popović and Dimitrijević (1997).

Here, we present only tables of Stark broadening parameters for astrophysical and laboratory plasma diagnostic purposes. These Tables in electronic form can be accessed by ftp at

cdsarc.u-strasb.fr
or on www at
http://cdsweb.u-strasbg.fr/abstract.html,

where they are related to Popović and Dimitrijević 1997.

Our results for Mn II, Mn III, Ga III Ge III and Ge IV lines/multiplets for a perturber density 10^{23} m^{-3} as a function of temperature (Popović and Dimitrijević 1997) are presented in Tables 1 – 4.

Table 1. Stark full width (FWHM) and shift for Mn II and Mn III multiplets as a function of temperature. The calculation was performed using the modified semiempirical approach. The electron density is $10^{23}\mathrm{m}^{-3}$. The avaraged wavelength of the multiplet is denoted by $\overline{\lambda}$.

Transition	T (K)	W (nm)	d (nm)
Mn II	5000.	.848E-02	-.183E-02
	10000.	.591E-02	-.130E-02
$a^7S - z^7P^0$	20000.	.409E-02	-.932E-03
	30000.	.330E-02	-.771E-03
$\overline{\lambda} = 258.97$ nm	40000.	.285E-02	-.674E-03
	50000.	.257E-02	-.609E-03
Mn II	5000.	.528E-02	.208E-03
	10000.	.368E-02	.181E-03
$a^7S - x^7P^0$	20000.	.267E-02	.182E-03
	30000.	.238E-02	.207E-03
$\overline{\lambda} = 116.30$ nm	40000.	.226E-02	.291E-03
	50000.	.221E-02	.309E-03
Mn II	5000.	.287E-01	.159E-01
	10000.	.199E-01	.119E-01
$z^7P^0 - e^7S$	20000.	.144E-01	.950E-02
	30000.	.125E-01	.906E-02
$\overline{\lambda} = 278.19$ nm	40000.	.118E-01	.888E-02
	50000.	.115E-01	.886E-02
Mn II	5000.	.132E-01	.842E-02
	10000.	.909E-02	.625E-02
$z^7P^0 - e^7D$	20000.	.641E-02	.488E-02
	30000.	.550E-02	.446E-02
$\overline{\lambda} = 244.24$ nm	40000.	.517E-02	.440E-02
	50000.	.504E-02	.461E-02
Mn II	5000.	.156E-01	.846E-02
	10000.	.112E-01	.675E-02
$z^7P^0 - w^7D$	20000.	.928E-02	.657E-02
	30000.	.906E-02	.664E-02
$\overline{\lambda} = 163.17$ nm	40000.	.927E-02	.675E-02
	50000.	.955E-02	.663E-02
Mn II	5000.	.489	-.129
	10000.	.340	-.954E-01
$e^7S - x^7P^0$	20000.	.248	-.750E-01
	30000.	.222	-.708E-01
$\overline{\lambda} = 875.16$ nm	40000.	.213	-.652E-01
	50000.	.210	-.645E-01
Mn II	5000.	1.18	-.250
	10000.	.820	-.182
$e^7D - x^7P^0$	20000.	.596	-.138
	30000.	.533	-.121
$\overline{\lambda} = 1555.25$ nm	40000.	.514	-.107
	50000.	.510	-.114
Mn II	5000.	1.04	.122E-01
	10000.	.760	.319E-01
$x^7P^0 - f^7D$	20000.	.627	.638E-01
	30000.	.607	.787E-01
$\overline{\lambda} = 1122.10$ nm	40000.	.598	.729E-01
	50000.	.596	.707E-01
Mn II	5000.	.122E-01	-.252E-02
	10000.	.851E-02	-.179E-02
$a^5S - z^5P^0$	20000.	.589E-02	-.129E-02
	30000.	.476E-02	-.107E-02
$\overline{\lambda} = 294.35$ nm	40000.	.413E-02	-.940E-03
	50000.	.374E-02	-.858E-03
Mn II	5000.	.622E-02	-.594E-03
	10000.	.433E-02	-.404E-03
$a^5S - w^5P^0$	20000.	.318E-02	-.261E-03
	30000.	.284E-02	-.188E-03
$\overline{\lambda} = 129.11$ nm	40000.	.271E-02	-.628E-04
	50000.	.266E-02	-.363E-04
Mn II	5000.	.362E-01	.194E-01
	10000.	.252E-01	.146E-01
$z^5P^0 - e^5S$	20000.	.183E-01	.118E-01
	30000.	.161E-01	.114E-01
$\overline{\lambda} = 303.69$ nm	40000.	.153E-01	.112E-01
	50000.	.149E-01	.111E-01
Mn II	5000.	.170E-01	.106E-01
	10000.	.118E-01	.794E-02
$z^5P^0 - e^5D$	20000.	.835E-02	.627E-02
	30000.	.726E-02	.582E-02
$\overline{\lambda} = 258.41$ nm	40000.	.687E-02	.590E-02
	50000.	.673E-02	.617E-02
Mn II	5000.	.182E-01	.122E-01
	10000.	.131E-01	.974E-02
$z^5P^0 - f^5D$	20000.	.112E-01	.950E-02
	30000.	.111E-01	.946E-02
$\overline{\lambda} = 174.70$ nm	40000.	.114E-01	.948E-02
	50000.	.118E-01	.928E-02
Mn II	5000.	.565	-.199
	10000.	.394	-.148
$e^5S - w^5P^0$	20000.	.290	-.118
	30000.	.263	-.112
$\overline{\lambda} = 947.97$ nm	40000.	.254	-.104
	50000.	.252	-.103
Mn II	5000.	2.15	-.748
	10000.	1.49	-.552
$e^7D - w^5P^0$	20000.	1.09	-.426
	30000.	.990	-.387
$\overline{\lambda} = 2092.61$ nm	40000.	.962	-.365
	50000.	.959	-.379
Mn II	5000.	.428	.209
	10000.	.306	.166
$w^5P^0 - f^5D$	20000.	.254	.161
	30000.	.249	.159
$\overline{\lambda} = 726.51$ nm	40000.	.256	.158
	50000.	.264	.153
Mn III	5000.	.455E-02	-.785E-03
	10000.	.319E-02	-.561E-03
$a^6D - z^6F^0$	50000.	.138E-02	-.253E-03
	100000.	.101E-02	-.175E-03
$\overline{\lambda} = 208.39$ nm	250000.	.832E-03	-.869E-04
	500000.	.829E-03	-.521E-04
Mn III	5000.	.440E-02	-.779E-03
	10000.	.308E-02	-.557E-03
$a^6D - z^6P^0$	50000.	.133E-02	-.251E-03
	100000.	.973E-03	-.173E-03
$\overline{\lambda} = 204.12$ nm	250000.	.804E-03	-.861E-04
	500000.	.801E-03	-.518E-04
Mn III	5000.	.416E-02	-.592E-03
	10000.	.292E-02	-.423E-03
$a^6D - z^6D^0$	50000.	.126E-02	-.189E-03
	100000.	.921E-03	-.127E-03
$\overline{\lambda} = 194.75$ nm	250000.	.761E-03	-.553E-04
	500000.	.758E-03	-.272E-04

Table 2. Same as in Table 1, but for Ga III multiplets.

Transition	T (K)	W (nm)	d (nm)
Ga III	5000.	.822E-03	-.565E-04
	10000.	.573E-03	-.390E-04
$4s^2S - 5p^2P^0$	50000.	.268E-03	-.982E-05
	100000.	.231E-03	.877E-05
$\overline{\lambda} = 62.06$ nm	250000.	.227E-03	.205E-04
	500000.	.214E-03	.169E-04
Ga III	5000.	.455E-02	.237E-02
	10000.	.318E-02	.171E-02
$4p^2P^0 - 5s^2S$	50000.	.148E-02	.842E-03
	100000.	.123E-02	.687E-03
$\overline{\lambda} = 134.35$ nm	250000.	.114E-02	.542E-03
	500000.	.108E-02	.427E-03
Ga III	5000.	.208E-02	.125E-02
	10000.	.145E-02	.905E-03
$4p^2P^0 - 4d^2D$	50000.	.635E-03	.455E-03
	100000.	.517E-03	.394E-03
$\overline{\lambda} = 128.47$ nm	250000.	.523E-03	.358E-03
	500000.	.541E-03	.294E-03
Ga III	5000.	.220E-02	.125E-02
	10000.	.153E-02	.920E-03
$4p^2P^0 - 5d^2D$	50000.	.821E-03	.574E-03
	100000.	.803E-03	.525E-03
$\overline{\lambda} = 81.36$ nm	250000.	.794E-03	.415E-03
	500000.	.735E-03	.317E-03
Ga III	5000.	.106	-.318E-01
	10000.	.742E-01	-.229E-01
$5s^2S - 5p^2P^0$	50000.	.348E-01	-.108E-01
	100000.	.296E-01	-.790E-02
$\overline{\lambda} = 490.73$ nm	250000.	.280E-01	-.558E-02
	500000.	.259E-01	-.438E-02
Ga III	5000.	.109	-.267E-01
	10000.	.761E-01	-.191E-01
$4d^2D - 5p^2P^0$	50000.	.351E-01	-.893E-02
	100000.	.299E-01	-.647E-02
$\overline{\lambda} = 589.27$ nm	250000.	.294E-01	-.515E-02
	500000.	.279E-01	-.430E-02
Ga III	5000.	.208E-01	-.404E-02
	10000.	.144E-01	-.277E-02
$4d^2D - 4f^2F^0$	50000.	.750E-02	-.455E-03
	100000.	.738E-02	.323E-03
$\overline{\lambda} = 242.24$ nm	250000.	.772E-02	.495E-03
	500000.	.753E-02	.346E-03
Ga III	5000.	.166E-01	-.111E-02
	10000.	.117E-01	-.467E-03
$4d^2D - 5f^2F^0$	50000.	.849E-02	.154E-02
	100000.	.848E-02	.162E-02
$\overline{\lambda} = 156.84$ nm	250000.	.804E-02	.107E-02
	500000.	.627E-02	.657E-03
Ga III	5000.	.614E-01	.202E-01
	10000.	.427E-01	.149E-01
$5p^2P^0 - 5D^2D$	50000.	.222E-01	.963E-02
	100000.	.214E-01	.884E-02
$\overline{\lambda} = 355.86$ nm	250000.	.215E-01	.697E-02
	500000.	.199E-01	.538E-02
Ga III	5000.	.253	-.453E-01
	10000.	.177	-.295E-01
$5d^2D - 5f^2F^0$	50000.	.123	.100E-02
	100000.	.125	.299E-02
$\overline{\lambda} = 535.12$ nm	250000.	.119	.720E-03
	500000.	.955E-01	-.971E-03

Table 3. Same as in Table 1, but for Ge III and Ge IV multiplets.

Transition	T (K)	W (nm)	d (nm)
Ge III	5000.	.441E-02	.237E-02
	10000.	.308E-02	.171E-02
$4p^1P^0 - 5s^1S$	50000.	.142E-02	.836E-03
	100000.	.118E-02	.679E-03
$\overline{\lambda}$= 139.55 nm	250000.	.110E-02	.537E-03
	500000.	.104E-02	.427E-03
Ge III	5000.	.187E-02	.149E-02
	10000.	.130E-02	.107E-02
$4p^1P^0 - 4d^1D$	50000.	.580E-03	.535E-03
	100000.	.488E-03	.468E-03
$\overline{\lambda}$= 115.92 nm	250000.	.470E-03	.403E-03
	500000.	.463E-03	.329E-03
Ge III	5000.	.956E-01	-.236E-01
	10000.	.668E-01	-.170E-01
$5s^1S - 5p^1P^0$	50000.	.311E-01	-.799E-02
	100000.	.262E-01	-.577E-02
$\overline{\lambda}$= 481.57 nm	250000.	.247E-01	-.399E-02
	500000.	.228E-01	-.310E-02
Ge III	5000.	.859	-.239
	10000.	.599	-.172
$4d^1D - 5p^1P^0$	50000.	.275	-.825E-01
	100000.	.234	-.657E-01
$\overline{\lambda}$= 1623.98 nm	250000.	.231	-.518E-01
	500000.	.219	-.421E-01
Ge III	5000.	.229E-02	.118E-02
	10000.	.160E-02	.850E-03
$4p^3P^0 - 5s^3S$	50000.	.728E-03	.412E-03
	100000.	.595E-03	.333E-03
$\overline{\lambda}$= 105.00 nm	250000.	.552E-03	.270E-03
	500000.	.519E-03	.214E-03
Ge III	5000.	.849E-03	.614E-03
	10000.	.590E-03	.443E-03
$4p^2P^0 - 4d^2D$	50000.	.255E-03	.224E-03
	100000.	.208E-03	.187E-03
$\overline{\lambda}$= 100.38 nm	250000.	.217E-03	.178E-03
	500000.	.232E-03	.150E-03
Ge III	5000.	.698E-01	-.207E-01
	10000.	.488E-01	-.149E-01
$5s^3S - 5p^3P^0$	50000.	.224E-01	-.689E-02
	100000.	.186E-01	-.496E-02
$\overline{\lambda}$= 421.96 nm	250000.	.175E-01	-.351E-02
	500000.	.162E-01	-.276E-02
Ge III	5000.	.720E-01	-.190E-01
	10000.	.502E-01	-.136E-01
$4d^2D - 5p^2P^0$	50000.	.227E-01	-.632E-02
	100000.	.190E-01	-.433E-02
$\overline{\lambda}$= 517.65 nm	250000.	.187E-01	-.345E-02
	500000.	.179E-01	-.293E-02
Ge IV	5000.	.844E-03	.389E-03
	10000.	.590E-03	.281E-03
$4p^2P^0 - 5d^2D$	50000.	.270E-03	.142E-03
	100000.	.225E-03	.123E-03
$\overline{\lambda}$= 54.24 nm	250000.	.214E-03	.101E-03
	500000.	.200E-03	.807E-04
Ge IV	5000.	.134E-02	.565E-03
	10000.	.938E-03	.413E-03
$4p^2P^0 - 6d^2D$	50000.	.501E-03	.243E-03
	100000.	.466E-03	.209E-03
$\overline{\lambda}$= 45.46 nm	250000.	.426E-03	.160E-03
	500000.	.373E-03	.121E-03

Transition	T (K)	W (nm)	d (nm)
Ge IV	5000.	.157E-01	-.250E-02
	10000.	.110E-01	-.178E-02
$4d^2D - 5p^2P^0$	50000.	.484E-02	-.792E-03
	100000.	.376E-02	-.528E-03
$\overline{\lambda}$= 275.26 nm	250000.	.341E-02	-.304E-03
	500000.	.337E-02	-.261E-03
Ge IV	5000.	.521E-02	-.135E-02
	10000.	.363E-02	-.949E-03
$4d^2D - 4f^2F^0$	50000.	.162E-02	-.370E-03
	100000.	.134E-02	-.145E-03
$\overline{\lambda}$= 149.83 nm	250000.	.133E-02	.290E-04
	500000.	.131E-02	.457E-04
Ge IV	5000.	.539E-02	-.112E-03
	10000.	.376E-02	-.672E-04
$4d^2D - 6p^2P^0$	50000.	.189E-02	.310E-04
	100000.	.169E-02	.971E-04
$\overline{\lambda}$= 108.03 nm	250000.	.156E-02	.102E-03
	500000.	.142E-02	.733E-04
Ge IV	5000.	.396E-01	-.101E-01
	10000.	.277E-01	-.722E-02
$5s^2S - 5p^2P^0$	50000.	.124E-01	-.320E-02
	100000.	.981E-02	-.226E-02
$\overline{\lambda}$= 359.48 nm	250000.	.884E-02	-.139E-02
	500000.	.828E-02	-.109E-02
Ge IV	5000.	.793E-02	-.774E-03
	10000.	.554E-02	-.541E-03
$5s^2S - 6p^2P^0$	50000.	.274E-02	-.166E-03
	100000.	.242E-02	-.310E-04
$\overline{\lambda}$= 118.97 nm	250000.	.223E-02	.280E-04
	500000.	.200E-02	.188E-04
Ge IV	5000.	.240E-01	.685E-02
	10000.	.168E-01	.495E-02
$5p^2P^0 - 5d^2D$	50000.	.763E-02	.248E-02
	100000.	.634E-02	.215E-02
$\overline{\lambda}$= 247.24 nm	250000.	.609E-02	.168E-02
	500000.	.574E-02	.131E-02

Transition	T (K)	W (nm)	d (nm)
Ge IV	5000.	.130E-01	.438E-02
	10000.	.912E-02	.320E-02
$5p^2P^0 - 6d^2D$	50000.	.476E-02	.190E-02
	100000.	.437E-02	.163E-02
$\overline{\lambda}$= 131.47 nm	250000.	.403E-02	.122E-02
	500000.	.357E-02	.910E-03
Ge IV	5000.	.416	.941E-01
	10000.	.290	.674E-01
$4f^2F^0 - 5d^2D$	50000.	.133	.325E-01
	100000.	.114	.261E-01
$\overline{\lambda}$= 996.63 nm	250000.	.114	.198E-01
	500000.	.109	.156E-01
Ge IV	5000.	.375E-01	.113E-01
	10000.	.262E-01	.827E-02
$4f^2F^0 - 6d^2D$	50000.	.136E-01	.490E-02
	100000.	.127E-01	.411E-02
$\overline{\lambda}$= 219.06 nm	250000.	.119E-01	.301E-02
	500000.	.107E-01	.225E-02
Ge IV	5000.	.723E-01	-.163E-01
	10000.	.514E-01	-.112E-01
$5d^2D - 5f^2F^0$	50000.	.272E-01	-.259E-02
	100000.	.253E-01	-.760E-03
$\overline{\lambda}$=332.9 nm	250000.	.244E-01	-.212E-03
	500000.	.202E-01	-.201E-03
Ge IV	5000.	.257	.585E-01
	10000.	.179	.427E-01
$6p^2P^0 - 6d^2D$	50000.	.950E-01	.246E-01
	100000.	.886E-01	.202E-01
$\overline{\lambda}$= 504.37 nm	250000.	.819E-01	.147E-01
	500000.	.721E-01	.109E-01
Ge IV	5000.	.550	-.161
	10000.	.384	-.115
$6s^2S - 6p^2P^0$	50000.	.199	-.516E-01
	100000.	.182	-.375E-01
$\overline{\lambda}$= 786.57 nm	250000.	.165	-.269E-01
	500000.	.142	-.201E-01

Table 4. The electron-, proton-, and He III- impact broadening, full widths (FWHM) and shifts, for 3 Ge IV multiplets as a function of temperature and perturber density. The calculation was performed using the semiclasical perturbation approach. The averaged wavelength of the multiplet is denoted by $\overline{\lambda}$.

PERTURBER DENSITY = 1.E+23m-3

PERTURBERS ARE:		ELECTRONS		PROTONS		He III	
Transition	T(K)	W (nm)	d (nm)	W (nm)	d (nm)	W (nm)	d (nm)
Ge IV $4s^2S - 4p^2P^0$	5000	.273E-02	.592E-03	.869E-06	-.282E-06	.137E-04	-.336E-06
$\overline{\lambda}$=120.23 nm	10000	.174E-02	.788E-04	.273E-05	-.816E-06	.514E-05	-.135E-05
C= .12E+21	50000	.786E-03	-.734E-05	.220E-04	-.476E-05	.435E-04	-.935E-05
	100000	.567E-03	-.876E-05	.367E-04	-.858E-05	.728E-04	-.171E-04
	250000	.392E-03	-.113E-04	.539E-04	-.145E-04	.108E-03	-.291E-04
	500000	.315E-03	-.991E-05	.614E-04	-.188E-04	.122E-03	-.377E-04
Ge IV $4p^2P^0 - 5s^2S$	5000	.352E-02	.187E-03	.507E-06	.351E-05	.816E-06	.417E-05
$\overline{\lambda}$= 86.14 nm	10000	.207E-02	.185E-03	.202E-05	.101E-04	.386E-05	.166E-04
C= .21E+20	50000	.832E-03	.789E-04	.295E-04	.426E-04	.588E-04	.833E-04
	100000	.617E-03	.833E-04	.504E-04	.592E-04	.101E-03	.118E-03
	250000	.452E-03	.817E-04	.784E-04	.762E-04	.157E-03	.153E-03
	500000	.373E-03	.749E-04	.994E-04	.908E-04	.198E-03	.183E-03
Ge IV $4p^2P^0 - 4d^2D$	5000	.319E-02	-.547E-03	.229E-05	.828E-06	.360E-05	.985E-06
$\overline{\lambda}$=92.95 nm	10000	.169E-02	-.821E-04	.707E-05	.239E-05	.133E-04	.395E-05
C= .31E+20	50000	.732E-03	.242E-04	.416E-04	.127E-04	.825E-04	.249E-04
	100000	.539E-03	.211E-04	.600E-04	.197E-04	.119E-03	.393E-04
	250000	.389E-03	.275E-04	.759E-04	.288E-04	.152E-03	.579E-04
	500000	.324E-03	.246E-04	.859E-04	.346E-04	.172E-03	.697E-04

PERTURBER DENSITY = 1.E+24m-3

Ge IV $4s^2S - 4p^2P^0$	5000	.278E-01	.591E-02	.418E-05	-.816E-06	.205E-05	-.266E-06
$\overline{\lambda}$=120.23 nm	10000	.174E-01	.105E-02	.233E-04	-.523E-05	.352E-04	-.578E-05
C=.12E+22	50000	.786E-02	-.708E-04	.220E-03	-.460E-04	.432E-03	-.864E-04
	100000	.567E-02	-.814E-04	.366E-03	-.850E-04	.727E-03	-.166E-03
	250000	.392E-02	-.113E-03	.539E-03	-.145E-03	.108E-02	-.291E-03
	500000	.315E-02	-.991E-04	.614E-03	-.188E-03	.122E-02	-.377E-03
Ge IV $4p^2P^0 - 5s^2S$	5000	.352E-01	.180E-02	.266E-05	.101E-04	.155E-05	.329E-05
$\overline{\lambda}$=86.14 nm	10000	.207E-01	.179E-02	.181E-04	.644E-04	.294E-04	.707E-04
C=.21E+21	50000	.832E-02	.777E-03	.295E-03	.405E-03	.587E-03	.745E-03
	100000	.616E-02	.822E-03	.505E-03	.582E-03	.101E-02	.112E-02
	250000	.452E-02	.811E-03	.784E-03	.760E-03	.157E-02	.153E-02
	500000	.373E-02	.748E-03	.994E-03	.908E-03	.198E-02	.183E-02
Ge IV $4p^2P^0 - 4d^2D$	5000	.319E-01	-.547E-02	.110E-04	.240E-05	.533E-05	.782E-06
$\overline{\lambda}$=92.95 nm	10000	.168E-01	-.111E-02	.601E-04	.153E-04	.902E-04	.170E-04
C=.31E+21	50000	.732E-02	.239E-03	.415E-03	.122E-03	.816E-03	.228E-03
	100000	.539E-02	.207E-03	.599E-03	.194E-03	.119E-02	.379E-03
	250000	.389E-02	.274E-03	.759E-03	.288E-03	.152E-02	.578E-03
	500000	.324E-02	.245E-03	.859E-03	.346E-03	.172E-02	.696E-03

PERTURBER DENSITY = 1.E+25m-3

Ge IV $4s^2S - 4p^2P^0$	5000						
$\overline{\lambda}$=120.23 nm	10000 .175	.954E-02	.107E-03	-.139E-04	.437E-04	-.372E-05	
C= .12E+23	50000	.786E-01	-.601E-03	.217E-02	-.407E-03	.410E-02	-.686E-03
	100000	.567E-01	-.778E-03	.365E-02	-.804E-03	.716E-02	-.151E-02
	250000	.392E-01	-.110E-02	.539E-02	-.143E-02	.107E-01	-.280E-02
	500000	.315E-01	-.978E-03	.614E-02	-.187E-02	.122E-01	-.376E-02
Ge IV $4p^2P^0 - 5s^2S$	5000						
$\overline{\lambda}$=86.14 nm	1000	*.207	*.156E-01	*.104E-03	*.167E-03	*.571E-04	*.378E-04
C=.21E+22	50000	.832E-01	.704E-02	.293E-02	.340E-02	*.572E-02	*.525E-02
	100000	.616E-01	.772E-02	.502E-02	.526E-02	*.100E-01	*.921E-02
	250000	.452E-01	.775E-02	.784E-02	.739E-02	*.157E-01	*.139E-01
	500000	.373E-01	.734E-02	.994E-02	.904E-02	*.198E-01	*.182E-01
Ge IV $4p^2P^0 - 4d^2D$	5000						
$\overline{\lambda}$=92.95 nm	1000	*.166	-.104E-01	*.270E-03	*.408E-04	*.973E-04	*.108E-04
C=.31E+22	50000	.732E-01	.220E-02	.406E-02	.107E-02	*.758E-02	*.176E-02
	100000	.539E-01	.195E-02	.596E-02	.181E-02	*.116E-01	*.333E-02
	250000	.389E-01	.266E-02	.759E-02	.283E-02	*.151E-01	*.544E-02
	500000	.324E-01	.242E-02	.859E-02	.345E-02	*.172E-01	*.693E-02

PERTURBER DENSITY = 1.E+26m-3

Ge IV $4s^2S - 4p^2P^0$	5000				
$\overline{\lambda}$=120.23 nm	10000				
C=.12E+24	50000	.786	-.405E-02	.184E-01	-.273E-02
	100000	.567	-.646E-02	.354E-01	-.696E-02
	250000	.392	-.103E-01	.536E-01	-.136E-01
	500000	.315	-.914E-02	.613E-01	-.183E-01
Ge IV $4p^2P^0 - 5s^2S$	5000				
$\overline{\lambda}$=86.14 nm	10000				
C=.21E+23	50000	* .832	*.448E-01	*.266E-01	*.174E-01
	100000	.616	.605E-01	*.496E-01	*.391E-01
	250000	.452	.674E-01	*.785E-01	*.643E-01
	500000	.373	.651E-01	*.998E-01	*.857E-01
Ge IV $4p^2P^0 - 4d^2D$	5000				
$\overline{\lambda}$=92.95 nm	10000				
C=.31E+23	50000	* .732	*.161E-01	*.320E-01	*.673E-02
	100000	.539	.156E-01	*.566E-01	*.149E-01
	250000	.389	.242E-01	*.750E-01	*.261E-01
	500000	.324	.222E-01	*.856E-01	*.335E-01

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ТАБЕЛЕ ПАРАМЕТАРА ЕЛЕКТРОНСКО-СУДАРНОГ ШИРЕЊА: Mn II, Mn III Ga III, Ge III И Ge IV ЛИНИЈА

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Претходно саопштење

У овом раду су дате Табеле ширина и померања линија услед судара емитера са електронима за 16 Mn II, 3 Mn III, 10 Ga III, 8 Ge III и 14 Ge IV мултиплета рачунатих у оквиру модификованог семиемпиријског прилаза. У табели 4 дате су ширине и помераји за три Ge IV линије услед судара емитера са електронима–, протонима– и двапут јонизованим хелијумом.