

## REGULARITIES IN NEUTRAL AND ION LINE STARK BROADENING IN PLASMA

JAGOŠ PURIĆ, STEVANDJENIŽE, ALEKSANDAR SREČKOVIĆ and MILIVOJE ČUK

*Department of Physics and Meteorology, Faculty of Sciences and Mathematics, University of  
Belgrade, P. O. Box 550, 11001 Belgrade, Yugoslavia*

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Stark width simultaneous dependence on the upper level ionization potential of particular spectral lines and atomic charge number of the emitter (within homologous group of elements) or net core charge of the emitter (within several stages of ionization of a given element or within one isoelectronic sequence) has been evaluated and discussed.

### *I. Introduction*

The knowledge of systematic trends and regularities or similarities within Stark parameters has great importance because: (i) it enables a valuable and quick prediction of data not known before by interpolation or extrapolation for the series of spectral lines, multiplets, supermultiplets, transition arrays, the same type of transitions within homologous group of elements or within all elements from the Periodic table, for a given isoelectronic sequence or within several stages of ionization of the same elements; and (ii) represents a good base for estimation of the reliability of the performed measurements or calculations in different approximations of line broadening (for review see Refs. 1—5 and references therein).

The aim of this paper is (i) to evaluate Stark width (HWHM) dependence on the upper level ionization potential ( $I$ ) and net core charge ( $z$ ) of the emitter (within one isoelectronic sequence or several stages of ionization of the same element) and (ii) to present more evidence about general Stark broadening dependence

simultaneously on the upper level ionization potential ( $I$ ) and nuclear charge number ( $Z$ ) (within a given homologous group) or net core charge of the emitter ( $z$ ) (within several stages of ionization of the same element or within a given isoelectronic sequence).

It was found that for a given electron density of plasma the general form of the dependence for an isoelectronic sequence or several ionization stages of the same element is

$$\omega = a_1 (T)^{-1/2} z^2 I^{-b_1} \tag{1}$$

for width, and

$$d = c_1 (T)^{-1/2} z^2 I^{-d_1} \tag{2}$$

for shift. In Eqs. (1) and (2)  $T$  is electron temperature of the plasma; coefficients  $a_1$ ,  $b_1$  and  $c_1$  and  $d_1$  are independent of the upper level ionization potential  $I$  and net core charge  $z$  (e. g.  $z = 1, 2, 3, 4, 5$  for N I, N II, N III, N IV and N V, respectively).

In the case of the homologous group sequence it was found that

$$\omega = a'_1 (T)^{-1/2} Z^{-1} I^{-b'_1} \tag{1'}$$

$$d = c'_1 (T)^{-1/2} Z^{-1} I^{-d'_1} \tag{2'}$$

where  $Z$  is the atomic charge number of the corresponding emitter from the given homologous group.

## 2. Theory

Stark width ( $w$ ) and shift ( $d$ ) dependence on the lower or upper level ionization potential ( $I$ ) was firstly discussed by Purić et al.<sup>6,7</sup> and was found to be of the following form

$$w = \sum_{n=0}^{\infty} A_n I F^n \tag{3}$$

$$d = \sum_{n=0}^{\infty} B_n I^{-n} \tag{4}$$

in the case of neutral and singly charged ion resonances. In both cases it was found that one particular term in the series given by Eqs. (3) and (4) is predominant and the general forms of the above mentioned dependences are

$$w = A_k I^{-k} \tag{5}$$

$$d = B_k I^{-k} \tag{6}$$

where  $I$  is lower or upper level ionization potential.

Using similar procedure it was found by Purić et al.<sup>8,9)</sup> that the Eqs. (5) and (6) are of general importance in the case of multiplets, supermultiplets, transition arrays, same transition within a given homologous group of atoms or ions and for the same transition (for example resonances) of all elements (neutrals or ions) along the Periodic table of elements.

First attempt to find possible explicit Stark width dependence simultaneously on the upper level ionization potential and net charge of the emitter core »seen« by the electron undergoing optical transition was discussed by Purić et al.<sup>10)</sup>. In this work are presented several steps in the evaluation procedure of that dependence for the lines originating from the ns-np transition arrays of several stages of ionization of a given element. For the sake of simplicity it was done in the framework of semiempirical approach<sup>11)</sup>. The evaluation procedure in the case of ns-np transition array is similar to that done by Dimitrijević<sup>12)</sup> in searching for Stark

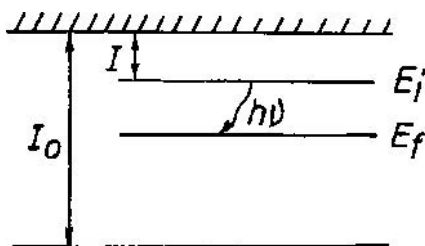


Fig. 1. Partial energy level diagram.

width and shift dependence on the lower level ionization potential. Namely, one has to start from Eqs. (16) and (22) given in Ref. 12, to use the notation given in Fig. 1 and following substitutions:

$$E_f = I_0 - I \tag{7}$$

$$E_i = \frac{hc}{\lambda} + I_0 - I \tag{8}$$

$$I' = I - \frac{hc}{\lambda} = I_0 - E_i \tag{9}$$

in order to get that the above

$$w = \sum_{n=1}^{\infty} A'_n(T, N, z) (I')^{-n} \tag{10}$$

$$d = - \sum_{n=1}^{\infty} C'_n(T, N, z) (I')^{-n} \tag{11}$$

where

$$A'_n = \frac{A N}{T^{1/2}} \begin{cases} \gamma - \sum_{L_c} (1-b) \eta, & n = 1 \\ \sum_{L_c} (1-b)^2 [\beta + K_{L_c} \eta] + \alpha, & n = 2 \\ A''_n, & n \geq 3 \end{cases} \quad (12)$$

with

$$A''_n = \sum_{L_c} \{(-1)^n (1-b)^n K_{L_c}^{n-2} [(n-1)\beta + K_{L_c} \eta]\}$$

and

$$C'_n = \frac{A N}{T^{1/2}} \begin{cases} \sum_{L_c} (1-b) \eta - \gamma, & n = 1 \\ \sum_{L_c} [-(1-b)^2 \eta K_{L_c} - (1-b)\beta] - \alpha, & n = 2 \\ C''_n, & n \geq 3 \end{cases} \quad (13)$$

with

$$C''_n = \sum_{L_c} (1-b)^{n-1} (K_{L_c})^{n-2} (-1)^{n+1} [(1-b) \eta K_{L_c} - \beta (n-1)].$$

The notation used here is the same as that used by Dimitrijević<sup>1,2)</sup> where one can find that  $\alpha$  explicitly depends on  $z^2$ . Analysing the obtained Eqs. (10) and (11) it has been concluded that in the case of the ns-np transition arrays within several stages of ionization of the selected group of ions or sequences particular terms with coefficients depending on  $z^2$  are predominant so that in general is

$$w = a'_1 (T)^{-1/2} z^2 I^{-b_1} \quad (14)$$

$$d = c'_1 (T)^{-1/2} z^2 I^{-d_1} \quad (15)$$

what will be discussed in chapter 3 of this paper.

In the case of homologous group of the emitters Eqs. (14) and (15) can be transformed to

$$w = a_1 (T)^{-1/2} Z^{-1} I^{-b'_1} \quad (14')$$

$$d = c_1 (T)^{-1/2} Z^{-1} I^{-d'_1} \quad (15')$$

where  $Z$  is the atomic charge number of the corresponding emitter<sup>1,3)</sup>.

### 3. Results and discussion

The Eqs. (14) and (14') were tested for the following:

#### I. Homologous sequences (using Eq. (1')):

- a) Ne II, Ar II, Kr II, and Xe II np-nd transitions (presented in Fig. 2);
- b) Ne III, Ar III, Kr III and Xe III ns-np transitions (presented in Fig. 2);

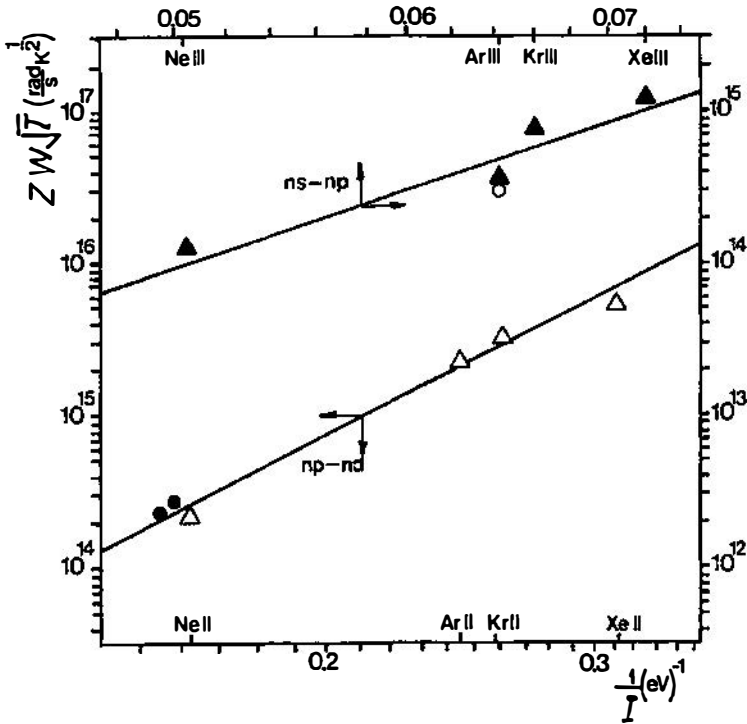


Fig. 2. Reduced Stark HWHM ( $Z\omega\sqrt{T}$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for homologous sequences at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 13; ○, Ref. 14; △, Ref. 15; ▲, Ref. 16; —, The best fit.

- c) Li I, Na I, K I, Rb I and Cs I ns-np transitions, (presented in Fig. 3);
- d) Be II, Mg II, Ca II, Sr II and Ba II ns-np transitions, (presented in Fig. 3);
- e) C II, Si II, Ge II, Sn II and Pb II ns-np and np-nd transitions, (presented in Fig. 4).

The coefficients  $a'_1$  and  $b'_1$  (from Eq. (1')) together with corresponding correlation factors, calculated for tested homologous sequences, are given in Table 1.

TABLE 1.

Emitter	Transition array	$a'_1$	$b'_1$	Correlation factor	Fig.
NeII, ArII, KrII, XeII	np-nd	$1.7 \times 10^{18}$	4.78	0.98	2
NeIII, ArIII, KrIII, XeIII	ns-np	$5.6 \times 10^{22}$	6.20	0.86	2
LiI, NaI, KI, RbI, CsI	ns-np	$8.6 \times 10^{19}$	11.6	0.96	3
BeII, MgII, CaII, SrII, BaII	ns-np	$3.7 \times 10^{19}$	5.19	0.98	3
CII, SiII, GeII, SnII, PbII	np-nd	$3.4 \times 10^{18}$	5.32	0.85	4
CII, SiII, GeII, SnII, PbII	ns-np	$3.6 \times 10^{21}$	8.06	0.83	4

Coefficients  $a'_1$  and  $b'_1$  (from Eq. (1')) together with corresponding correlation factors calculated for presented homologous sequences and transition arrays.

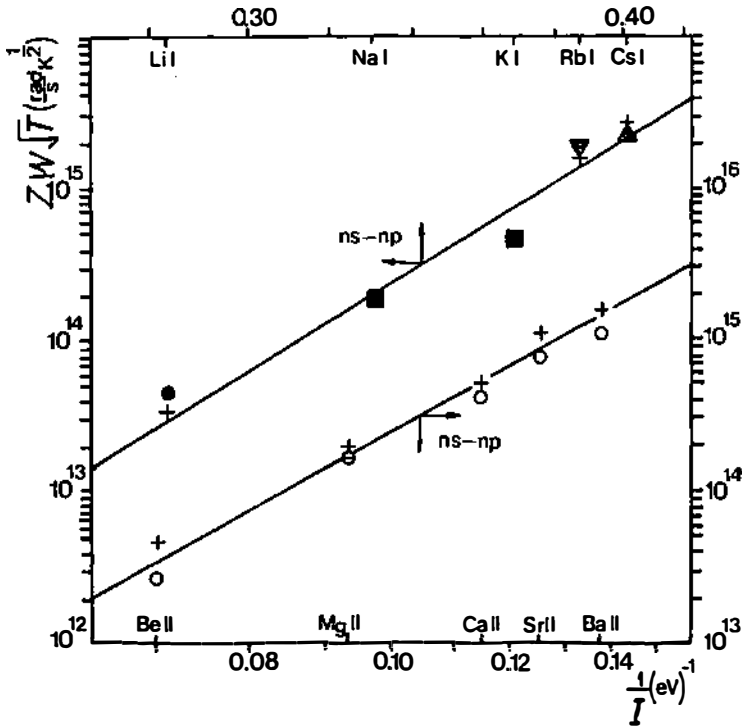


Fig. 3. Reduced Stark HWHM ( $Z\omega\sqrt{T}$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for homologous sequences at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 18; ■, Ref. 19; ▲, Ref. 20; ▼, Ref. 18; +, Ref. 1; ○, Ref. 17; —, The best fit.

II. Different ionization stages of the same element (using Eq. (1)):

- a) nitrogen (N I, N II, N III, N IV and N V) 3s-3p transitions (presented in Fig. 5);
- b) oxygen (O I, O II, O III, O IV and O V) 3s-3p transitions (presented in Fig. 5);
- c) fluorine (F I, F II and F III) 3s-3p transitions (presented in Fig. 6);
- d) chlorine (Cl I, Cl II, Cl III and Cl IV) 4s-4p transitions (presented in Fig. 6);
- e) neon (Ne I, Ne II, Ne III and Ne IV) 3s-3p and 3s'-3p' transitions (presented in Fig. 7);
- f) argon (Ar I, Ar II, Ar III and Ar IV) 4s-4p and 4s'-4p' transitions (presented in Fig. 8).

The coefficients  $a_1$  and  $b_1$  (from Eq. (1)) together with corresponding correlation factors, calculated for tested element, are given in Table 2.

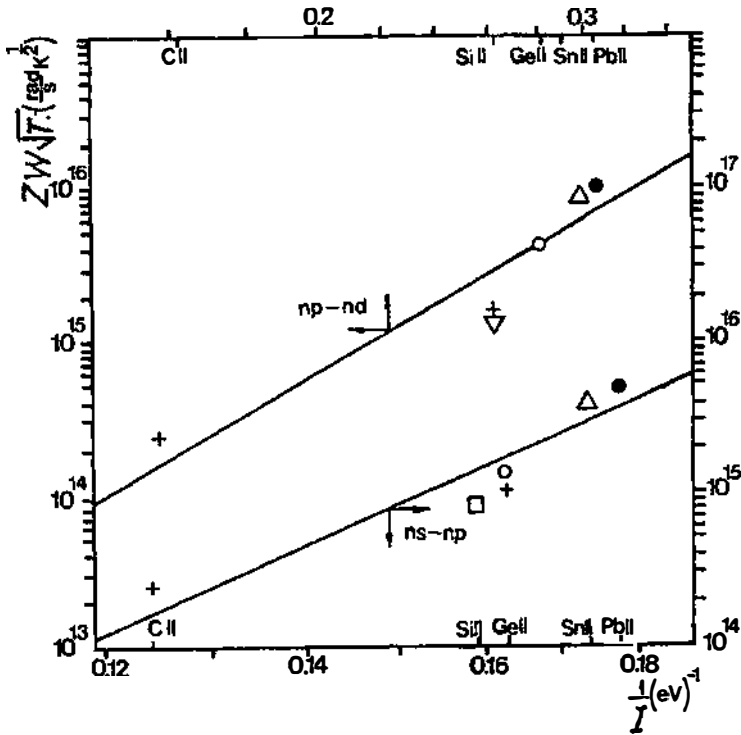


Fig. 4. Reduced Stark HWHM ( $Z\omega\sqrt{T}$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for homologous sequences at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: +, Ref. 1; □, Ref. 21; ∇, Ref. 22; ○, Ref. 23; △, Ref. 24; ●, Ref. 25; —, The best fit.

TABLE 2.

Emitter	Transition array	$a_1$	$b_1$	Correlation factor	Fig.
NI, NII, NIII, NIV, NV	3s-3p	$3.7 \times 10^{13}$	1.09	0.91	5
OI, OII, OIII, OIV, OV	3s-3p	$1.1 \times 10^{13}$	1.30	0.98	5
FI, FII, FIII	3s-3p	$8.9 \times 10^{13}$	1.31	0.99	6
CII, CIII, CIII, CIV	4s-4p	$1.8 \times 10^{14}$	1.58	0.98	6
NeI, NeII, NeIII, NeIV	3s-3p	$1.2 \times 10^{14}$	1.44	0.98	7
NeI, NeII, NeIII, NeIV	3s'-3p'	$1.4 \times 10^{14}$	1.65	0.98	7
ArI, ArII, ArIII, ArIV	4s-4p	$5.9 \times 10^{13}$	1.27	0.97	8
ArI, ArII, ArIII, ArIV	4s'-4p'	$5.6 \times 10^{13}$	1.32	0.99	8
BII, CIII, NIV, OV	3s-3p	$2.9 \times 10^{13}$	0.93	0.90	9
LiI, BeII, BIII, CIV, NV	3s-3p	$8.7 \times 10^{14}$	1.93	1.00	9
NI, OII, FIII, NeIV	3s-3p	$6.3 \times 10^{13}$	1.22	0.96	10
NaI, MgII, AlIII, SiIV	3s-3p	$7.1 \times 10^{13}$	1.18	0.97	10
PI, SiI, CIII, ArIV	4s-4p	$4.6 \times 10^{14}$	1.91	0.99	11
NaI, MgII, AlIII, SiIV	4s-4p	$1.1 \times 10^{14}$	1.27	0.96	11

Coefficients  $a_1$  and  $b_1$  (from Eq. (1)) together with corresponding correlation factors, calculated for different ionization stages of the same element and presented isoelectronic sequences. The transition arrays are also given.

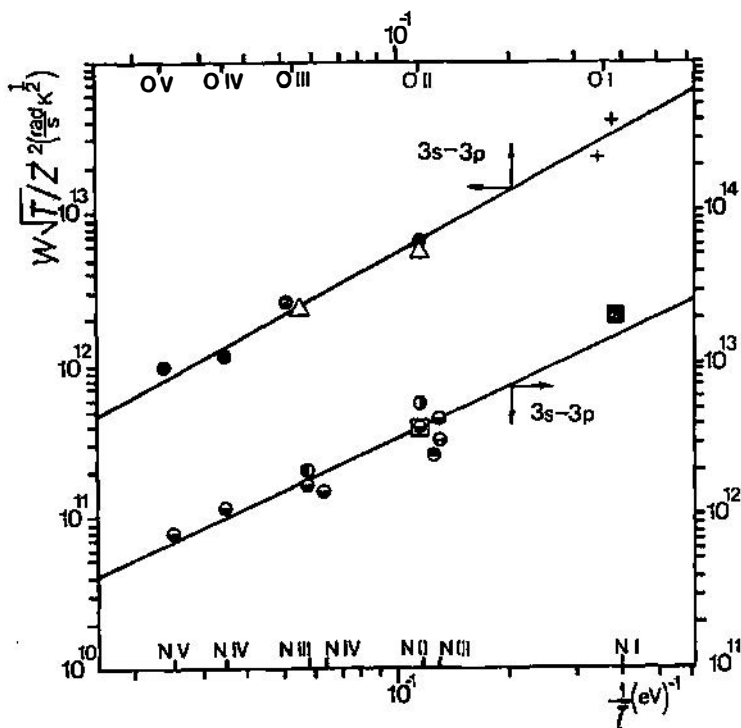


Fig. 5. Reduced Stark HWHM ( $w \sqrt{T}/z^2$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for different ionization stages of the nitrogen and oxygen at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density:  $\odot$ , Ref. 10;  $\bullet$ , Ref. 26;  $\odot$ , Ref. 27;  $\bullet$ , Ref. 28;  $\square$ , Ref. 29;  $\blacksquare$ , Ref. 30;  $\triangle$ , Ref. 31;  $+$ , Ref. 1;  $-$ , The best fit.

III. Isoelectronic sequences (using Eq. (1)):

- a) beryllium like (Be I, B II, C III, N IV and O V) 3s-3p transitions (presented in Fig. 9);
- b) lithium like (Li I, Be II, B III, C IV and N V) 3s-3p transitions (presented in Fig. 9);
- c) nitrogen like (N I, O II, F III and Ne IV) 3s-3p transitions (presented in Fig. 10);
- d) sodium like (Na I, Mg II, Al III and Si IV) 3s-3p and 4s-4p transitions (presented in Fig. 10 and Fig. 11, respectively);
- e) phosphorus like (P I, S II, Cl III and Ar IV) 4s-4p transitions (presented in Fig. 11).

The coefficients  $a_1$  and  $b_1$  (from Eq. (1)) together with corresponding correlation factors, calculated for tested isoelectronic sequences, are given in Table 2.

Analyzing the obtained data (presented in Figs. 2—10) one can conclude that the corresponding dependences are universal. Namely, in log-log scale  $w \sqrt{T}/z^2$  is linear function of inverse value of the upper level ionization potential for isoelectronic sequence and the same transition within several stages of ionization of the same element, and, also,  $w \sqrt{T} Z$  is linear function of inverse value of the upper level ionization potential in log-log scale for homologous sequences.

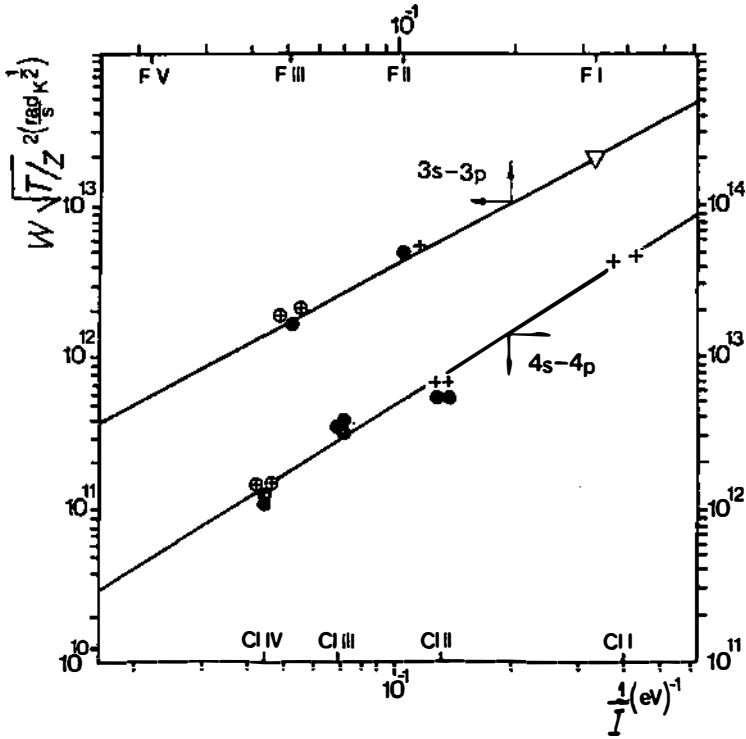


Fig. 6. Reduced Stark HWHM ( $\omega \sqrt{T/z^2}$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for different ionization stages of the fluorine and chlorine at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 32; ▽, Ref. 33; +, Ref. 1; ⊕, Ret. 5; —, The best fit.

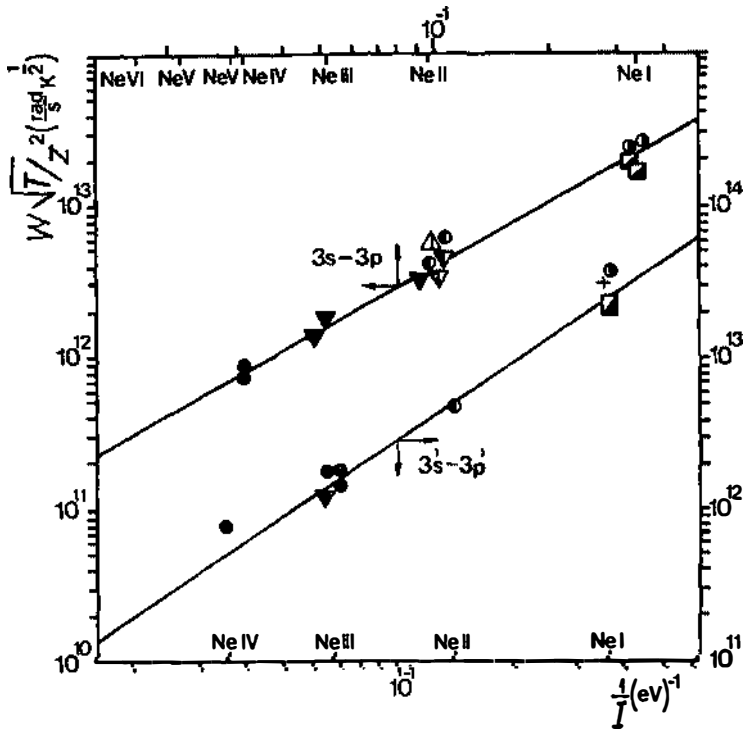


Fig. 7. Reduced Stark HWHM ( $\omega \sqrt{T}/z^2$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for different ionization stages of the neon at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 34; ○, Ref. 35; ◐, Ref. 13; ▼, Ref. 16; ▽, Ref. 36; △, Ref. 38; ◼, Ref. 37; +, Ref. 1; —, The best fit.

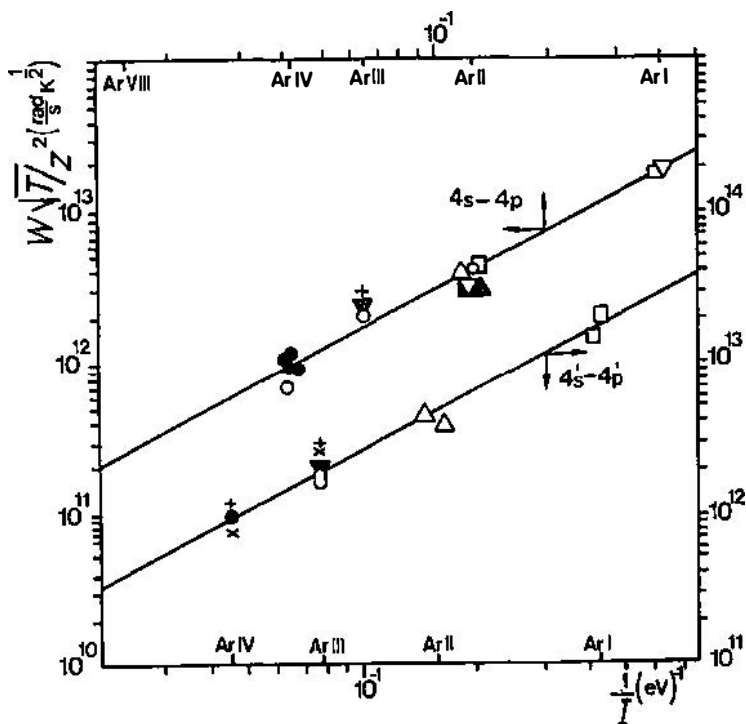


Fig. 8. Reduced Stark HWHM ( $w\sqrt{T}/z^2$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for different ionization stages of the argon at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 34; ○, Ref. 14; ■, Ref. 39; □, Ref. 40; ◼, Ref. 41; △, Ref. 42; ▽, Ref. 43; ▾, Ref. 16; ▲, Ref. 44; +, Ref. 1; ×, Ref. 5; —, The best fit.

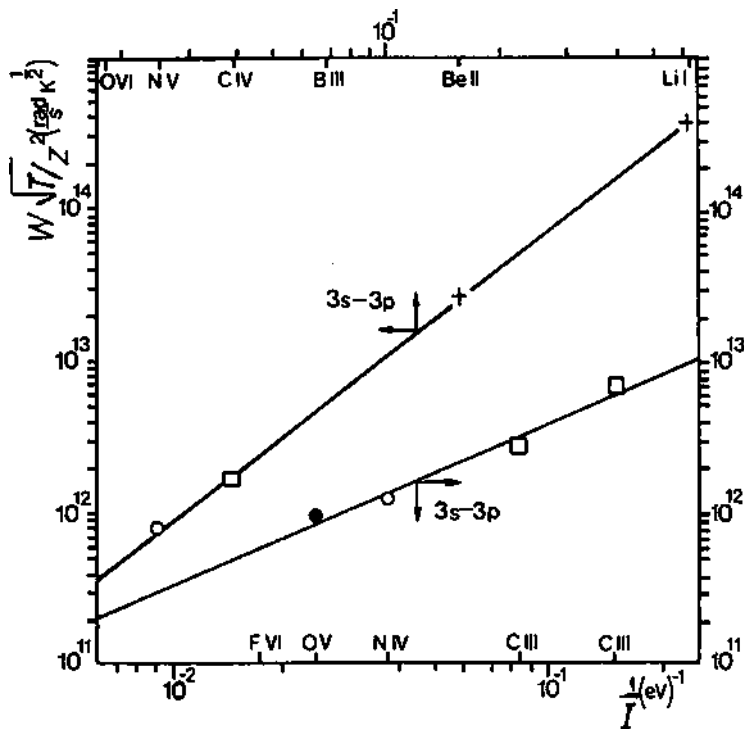


Fig. 9. Reduced Stark HWHM ( $\omega \sqrt{T/z^2}$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for lithium like and beryllium like isoelectronic sequences at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 26; ○, Ref. 10; □, Ref. 45; +, Ref. 1; —, The best fit.

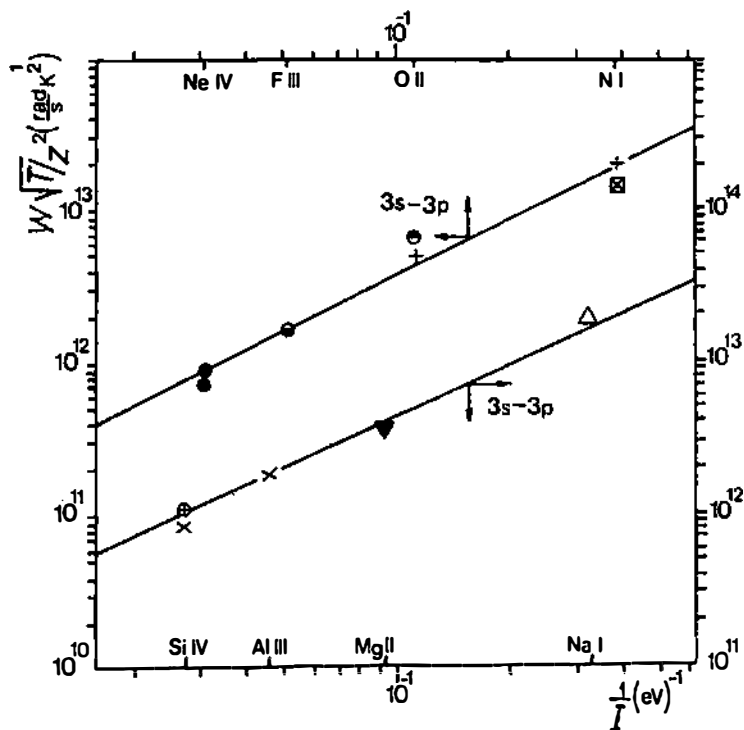


Fig. 10. Reduced Stark HWHM ( $\omega \sqrt{T}/z^2$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for nitrogen like and sodium like isoelectronic sequences at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 34; ○, Ref. 32; ⊙, Ref. 26; ⊠, Ref. 30; △, Ref. 46; ▼, Ref. 47; +, Ref. 1; ⊕ and ×, Ref. 3; —, The best fit.

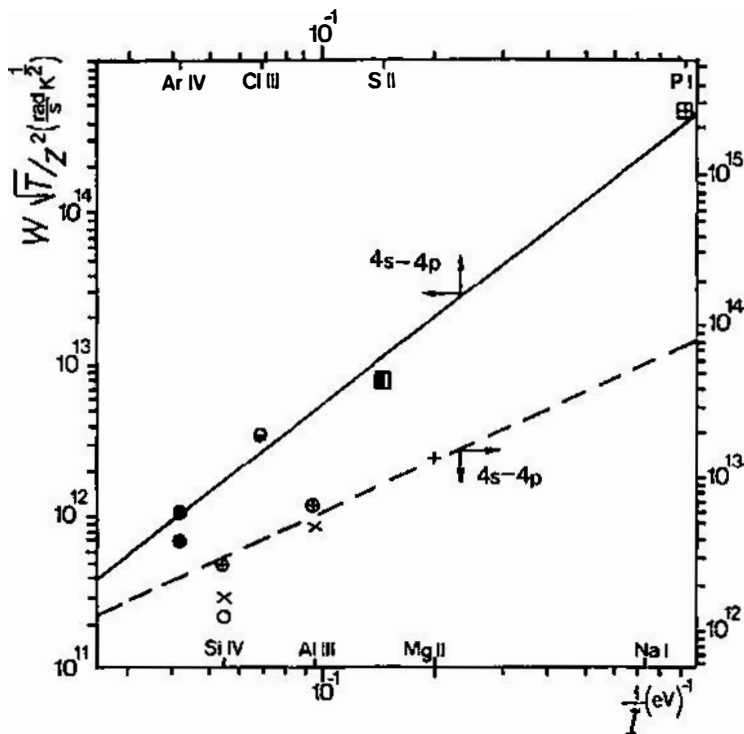


Fig. 11. Reduced Stark HWHM ( $\omega \sqrt{T}/z^2$ ) vs inverse value of the upper-level ionization potential ( $I$ ) for sodium like and phosphorus like isoelectronic sequences at  $N = 1 \times 10^{23} \text{ m}^{-3}$  electron density: ●, Ref. 34; ○, Ref. 32; ○, Ref. 50; ■, Ref. 48; ▣, Ref. 49; +, Ref. 1; ⊕ and ×, Ref. 5; —, The best fit.

## References

- 1) H. R. Griem, *Spectral line Broadening by Plasmas*, Academic Press, New York (1974);
- 2) M. S. Dimitrijević and N. Konjević, *J. Quant. Spectrosc. Radiat. Transfer* **30** (1983) 45;
- 3) M. S. Dimitrijević and N. Konjević, *Astron. Astrophys.* **172** (1987) 345;
- 4) M. S. Dimitrijević and N. Konjević, *J. Quant. Spectrosc. Radiat. Transfer* **24** (1980) 451;
- 5) M. S. Dimitrijević and N. Konjević, in *Spectral Line Shapes*, edited by B. Wende (de Gruyter, Berlin) (1981) 211;
- 6) J. Purić, I. S. Lakićević and V. Glavonjić, *Phys. Lett* **A76** (1980) 128;
- 7) J. Purić, M. Ćuk and I. S. Lakićević, *Phys. Rev.* **A32** (1985) 1106;
- 8) J. Purić, M. Ćuk and I. S. Lakićević, in *Spectral Line Shapes*, edited by F. Rostas (de Gruyter, Berlin) (1985) 41;
- 9) J. Purić, M. Ćuk, A. Srećković and S. Djeniže, *Proc. of Contr. Papers of 17-th ICPiG*, Swansea (1987) 482;
- 10) J. Purić, A. Srećković, S. Djeniže and M. Platiša, *Phys. Rev.* **A36** (1987) 3957;
- 11) H. R. Griem, *Phys. Rev.* **165** (1968) 258;
- 12) M. S. Dimitrijević, *Astron. Astrophys.* **145** (1985) 439;
- 13) J. Purić, S. Djeniže, A. Srećković, J. Labat and Lj. Ćirković, *Phys. Rev.* **A35** (1987) 2111;
- 14) M. Platiša, M. Popović, M. S. Dimitrijević and N. Konjević, *Z. Naturforsch.* **A30** (1975) 212;
- 15) T. L. Pittman and N. Konjević, *J. Quant. Spectrosc. Radiat. Transfer*, **35** (1986) 247;
- 16) N. Konjević and T. L. Pittman, *J. Quant. Spectrosc. Radiat. Transfer*, **37** (1987) 311;
- 17) D. Hadžiomerspahić, M. Platiša, N. Konjević and M. Popović, *Z. Phys.* **262** (1973) 169;
- 18) J. Purić, J. Labat, Lj. Ćirković, I. S. Lakićević and S. Djeniže, *J. Phys. B* **10** (1977) 2375;
- 19) J. Purić, J. Labat, S. Djeniže and Lj. Ćirković, *Proceedings of the Twelfth International Conference on Phenomena in Ionized Gases*, Part 1, North Holland, Amsterdam (1975) 368;
- 20) I. Lakićević, J. Purić and M. Ćuk, in *Spectral Line Shapes*, Edited by B. Wende (de Gruyter, Berlin) (1981) 253;
- 21) W. T. Chiang and H. R. Griem, *Phys. Rev.* **A18** (1978) 1169;
- 22) A. Lesage, S. Sahal-Brechot and M. H. Miller, *Phys. Rev.* **A16** (1977) 1617;
- 23) W. W. Jones and M. H. Miller, *Phys. Rev.* **A10** (1974) 1803;
- 24) M. H. Miller, R. A. Roig and R. D. Bengtson, *Phys. Rev.* **A20** (1979) 499;
- 25) M. H. Miller, R. D. Bengtson and J. M. Lindsay, *Phys. Rev.* **A20** (1979) 1997;
- 26) J. Purić, S. Djeniže, A. Srećković, M. Platiša and J. Labat, *Phys. Rev.* **A37** (1988);
- 27) M. Popović, M. Platiša and N. Konjević, *Astron. Astrophys.* **41** (1975) 463;
- 28) S. T. Parcell and A. J. Barnard, *J. Quant. Spectrosc. Radiat. Transfer* **32** (1984) 205;
- 29) N. Konjević, V. Mitrović, Lj. Ćirković and J. Labat, *Fizika* **2** (1970) 129;
- 30) J. M. Baronnet, J. Rakowitz, J. F. Condert, E. Bourdin, P. Fauchais, Erchov and E. Pavlov, *J. Phys. (Paris), Colloq C7, Suppl 7*, 40 (1979) 247;
- 31) M. Platiša, M. V. Popović and N. Konjević, *Astron. Astrophys.* **45** (1975) 325;
- 32) J. Purić, A. Srećković, S. Djeniže and M. Platiša, *Phys. Rev.* **A37** (1988);
- 33) J. Purić, I. Lakićević, J. Labat, S. Djeniže and Lj. Ćirković, *Phys. Lett.* **A63** (1977) 243;
- 34) J. Purić, S. Djeniže, A. Srećković, M. Ćuk, J. Labat and M. Platiša, *Z. Physik* **D8** (1988) 343;
- 35) J. Purić, A. Srećković, S. Djeniže, J. Labat and Lj. Ćirković, *Phys. Lett.* **A126** (1988) 280;
- 36) N. Konjević and T. L. Pittman, *J. Quant. Spectrosc. Radiat. Transfer* **35** (1986) 473;
- 37) J. Purić, M. Ćuk and B. A. Rathore, *Phys. Rev.* **A35** (1987) 1132;
- 38) M. Platiša, M. S. Dimitrijević and N. Konjević, *Astron. Astrophys.* **67** (1978) 103;
- 39) J. Sy. A. Chappelle, F. Cabannes and J. Balandin, *J. C. R. H. Acad. Sci. Ser B* **264** (1967) 853;
- 40) J. Sy. A. Chappelle, F. Cabannes and J. Balandin, *J. Quant. Spectrosc. Radiat. Transfer* **8** (1967) 1201;
- 41) Y. Vitel and M. Skowronek, in *Physics of Ionized Gases* (Contributions, Edited by M. V. Kurepa, Šibenik, Yugoslavia) (1986) 329;
- 42) J. Labat, S. Djeniže, Lj. Ćirković and J. Purić, *J. Phys.* **B7** (1974) 1134;
- 43) A. Tonejć, *J. Quant. Spectrosc. Radiat. Transfer* **12** (1972) 1713;
- 44) K. P. Nick and V. Helbig, *Phys. Scripta* **33** (1986) 55;
- 45) P. Bogen, *Z. Naturforsch. Teil A* **27** (1972) 210;
- 46) J. Purić, J. Labat, S. Djeniže, Lj. Ćirković and I. Lakićević, *Phys. Lett.* **A56** No. 2 (1976) 83;
- 47) W. W. Jones, A. Sanchez, J. R. Greig and H. R. Griem, *Phys. Rev.* **A5** (1972) 2318;
- 48) M. H. Miller, University of Maryland, Technical Note BN-550 (1968);
- 49) M. H. Miller and R. D. Bengtson, *Phys. Rev.* **A1** (1970) 983;
- 50) M. Platiša, M. S. Dimitrijević, M. Popović and N. Konjević, *J. Phys.* **B10** (1977) 2997.

PRAVILNOSTI KOD ŠTARKOVSKOG ŠIRENJA NEUTRALNIH  
I JONSKIH LINIJA U PLAZMI

JAGOŠ. PURIĆ, STEVAN DJENIŽE, ALEKSANDAR SREČKOVIĆ i MILIVOJE ĆUK  
*OOOR fizika i meteorologija, Prirodno-matematički fakultet, Univerzitet u Beogradu, P. O. Box 550,  
11001 Beograd*

UDK 533.9

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Izvedena je i diskutovana zavisnost štarkovih parametara spektralnih linija od potencijala jonizacije sa gornjeg nivoa spektralne linije i rednog broja emitera (unutar homologne grupe elemenata) kao i od naelektrisanja ostatka emitera (unutar nekoliko jonizacionih stanja datog elementa ili unutar jedne izoelektronske sekvence).