Article 23
Orbital capacity governed by advancement of numbers
Electron Probability: PUB C_{PEP} III: "Flui BAR" II and C_{PEP-i}

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ABSTRACT

This is 23rd article of 24 dedicated to atomic model based on Victoria equation (Articles index is at end).First part is centred on orbital capacity where advancement of numbers must be accomplished; simple trend that also allows predicting electrons can fit into future orbitals. Advancement of numbers is with orbitals present in each period and also in consecutive order [11] where all lower n orbitals are filled before proceeding with upper n. Base structure of electron with two electronic extremes governed by Victoria equation is right-angle triangle whose three sides are: H_i, c_i and r_i [1,2]. This geometric figure also appears in advancement of numbers because orbital capacity is conditioned by triangular number that can be recomposed in equilateral triangle an in turn in two equal right triangles.

Already in field dedicated to NIN concept into electronic extremes [1,9], following parts conclude PUB C_{PEP} introduction [10] and [11] with Flui BAR extension to find connection between different principal quantum numbers and first contact with C_{PEP-i} and its corresponding Individual Advance (A_i).

Keywords

Orbital Capacity, Points of nativity (PN), PUB C_{PEP}, Flui n BAR Centre, Global Advance (A), $C_{PEP.i}$, Individual Advance (A_i).

Abbreviations Table is at end article.

First part: P81 Orbital capacity by advancement of numbers

Orbital capacity by advancement of numbers provides simple numerical rule that relates new birth points or here called PN (points of nativity). Birth points or PN are points where two electronic extremes with infinite λ division and fulfilling Victoria equation [1], geometry and probability [2,11] are created. PN is known as charge density between nodes.

P81.A Orbital capacity by advancement of numbers I - Initial situation in periodic Table

When electrons are located in order indicated by periodic table, orbital capacity of new orbital must comply that amount of new PN created by new period (PN_P) minus PN created by immediately innermost period (PN_{P-1}) must be equal to $2*X_P^2$ (1). Where X_P=1 for period=1 and increases one unit each time new even number is reached.

$$(1)\ \text{New PN between periods} = PN_P – PN_{P-1} = 2X_P^2$$

Initial situation in periodic Table is referred to indicated order of filling by periodic Table and that provides atoms amount that is in each period. There are two atoms in first period (H and He), eight atoms in second (from Li to Ne), eighteen in third (from Na to Ar)...

A) First and second periods

New PN by new period (PN_P) for 1s electrons are one for each electron, therefore is 2. When passing to next period, period=2, 2s electron has two charge densities separated by one node: 2 electrons 2s * 2 PN_P/electron = 4 PN_P. First p orbitals are on this same period=2 and there are 6 electron type p: 6 electrons 2p * 1 PN_P/electron = 6PN_P are supplied by 2p.

Difference in PN between period=1 and period=0 is 2 PN_P: period=0 has 0 PN_P and period=1 has 2 PN_P. 2 PN_P coincides with applying (1):

period=1 (X_p=1) New PN between periods = $2X_P^2 = 2*1^2 = 2\ PN_P$

PN_P created by period=2 are 6PN_P (from 6 electrons 2p) + 4 PN_P (from 2 electrons 2s) = 10 PN_P. 10 PN_P from period=2 minus 2 PN_{P-1} from period=1 equals 8 PN_P. On the other hand, X_p=2=1+1 since new even number is reached (period=2). Result of both calculations is identical. 8 PN_P:

period=2 (X_p=2) New PN between periods = $2X_P^2 = 2*2^2 = 8\ PN_P$

B) Third period

PN_P sum is:

3s 2 electrons * 3 PN_P/electron = 6
3p 6 electrons * 2 PN_P/electron = 12
PN_P sum = 18

PN_{P-1}=10 since PN_{P-1} is in this case PN created by second period:

$$PN_P - PN_{P-1} = 18 - 10 = 8\ PN_P$$

X_P=2 for period=3 maintains value because 3 is odd number. Result of both calculations is identical and equal to that obtained in previous period: 8 PN_P

period=3 (X_p=2) New PN between periods = $2X_P^2 = 2*2^2 = 8\ PN_P$

Table 1 - Orbital capacity by advancement of numbers I - Initial situation in periodic Table

Period	PN by orbital and period				PN_P Sum	PN_P–PN_{P-1}	X_P value
	s	p	d	f			
1	2				2	2	1
2	4	6			10	8	2
3	6	12			18	8	2

4	8	18	10		36	18	3
5	10	24	20		54	18	3
6	12	30	30	14	86	32	4
7	14	36	40	28	118	32	4

Table 1 includes first three periods detailed above along with subsequent ones. Period 4 has new even number (number 4) and PNp calculation using $X_P=2+1=3$ is:

period=4 (X_p=3) New PN between periods = $2X_P^2 = 2*3^2 = 18\ PN_P$

As both calculations must be identical and now PN_P is fourt period and PN_{P-1} is third period:

$$PN_P - PN_{P-1} = PN_P - 18 = 18\ PN_P \rightarrow PN_P = 36\ PN_P$$

36 PN_P for fourth period can be achieved if 3d is inserted:

PN_P sum in period=4 is:

4s	2 electrons * 4 PN_P/electron =	8
4p	6 electrons * 3 PN_P/electron =	18
3d	10 electrons * 1 PN_P/electron =	10
	PN_P sum =	36

Orbital capacity by these calculations, 2 (s), 6 (p), 10 (d) y 14 (f), is well-known. **Table 2** (**Annex**) shows same trend for hypothetical orbitals: sum of 4 electron capacity for each new orbital.

Initial situation in periodic Table for order of filling allows observing relation between periods pairs that have same X_P: second with third, fourth with fifth...

P81.B Orbital capacity by advancement of numbers II - Final situation: Filled by consecutive order.

When electrons are located in order indicated by consecutive order, orbital capacity of new orbital must comply that amount of new PN created by new n (PN) minus PN created by immediately innermost n (PN_{n-1}) must be equal to $2*X^2$ where X=n (2).

(2) New PN between n = $PN–PN_{n-1} = 2X^2$ where X=n

Filled indicated by periodic table turn to consecutive order when electron charge increases (z_s). Pu XVI [11] is example explained in [11]:

Consecutive order of Pu XVI (78 electrons) is given by (3):

(3) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 4f^{14}\ 5s^2\ 5p^6\ 5d^{10}$

And consecutive order is not indicated by periodic table (4):

(4) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{14}\ 5d^8$

Expanded consecutive order of (3) is in (5) and is achieved when intern electron charge increases:

(5) $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^6$ $3d^{10}$ $4s^2$ $4p^6$ $4d^{10}$ $4f^{14}$ $5s^2$ $5p^6$ $5d^{10}$ $5f^{14}$ $5g^{18}$ $6s^2$ $6p^6$ $6d^{10}$ $6f^{14}$ $6g^{18}$…

Table 3 is obtained applying seen in P51.A but now, when filling follows consecutive order (5). Main modification is that X=n (6) in so-called "Acceleration due to configuration order turn" and where "Acceleration" is referred to largest increase per n or period unit of X vs X_P:

Periodic table order:
X_P = 1 and increases one unit each time new even number is reached

(6) Consecutive order:
X = n

Table 3 - Orbital capacity by advancement of numbers II - Final situation: Filled by consecutive order.

n	**PN by orbital and n**							**PN Sum**	**$PN–PN_{n-1}$**	**X value**
	s	**p**	**d**	**f**	**g**	**h**	**i**			
1	2							2	2	1
2	4	6						10	8	2
3	6	12	10					28	18	3
4	8	18	20	14				60	32	4
5	10	24	30	28	18			110	50	5
6	12	30	40	42	36	22		182	72	6
7	14	36	50	56	54	44	26	280	98	7

(6) deduction, that is when filling follows consecutive order, is initiated with X knowledge from (2).

$$(7)X = \left(\frac{PN - PN_{n-1}}{2}\right)^{1/2}$$

$PN–PN_{n-1}$ is equal to (8) as can be seen in Table 3.

$$(8)PN - PN_{n-1} = 2 + 2(n-1) + 4\sum_{n=1}^{n}(n-1)$$

(7) is transformed into (9) with (8) inclusion:

$$(9)X = \left(\frac{2 + 2(n-1) + 4\sum_{n=1}^{n}(n-1)}{2} \right)^{1/2}$$

The nth partial sum of the series is the triangular number (10). Triangular number counts objects arranged in equilateral triangle:

$$(10)\sum_{K=1}^{m} K = \frac{m(m+1)}{2}$$

(10) is rewritten as (11) because summation is done with m=n-1:

$$(11)\sum_{K=1}^{n} K = \frac{(n-1)n}{2}$$

nth partial sum (11) inclusion allows to arrive at (12) and, after simplification, (6) is obtained that is condition exposed in (2):

$$(12)X = \left(\frac{2 + 2(n-1) + 4\frac{(n-1)n}{2}}{2} \right)^{1/2} = \left(1 + n - 1 + n^2 - n\right)^{1/2} = n$$

By other hand, (1) New PN between periods = $PN_P – PN_{P-1} = 2X_P^2$ with $X_P = 1$ and increases one unit each two periods. These two periods can be considered as single double-period with PN_{2P} y X_{2P} remarking that are two periods and Table 1 becomes **Table 2** 1s is the only one that not comply because has no partner.

(1B) New PN between odd periods = $PN_P – PN_{P-2} = 4X_{2P}^2$

Table 2 - Orbital capacity by advancement of numbers I - Initial situation in periodic Table: PN_{2P}

Period	PN by orbital and period				PN_{2P} Sum	$PN_P – PN_{P-2}$	X_{2P} Value
	s	p	d	f			
1	2				2	2	---
2	4	6			10	8+8=16	2
3	6	12			18		
4	8	18	10		36	18+18=36	3
5	10	24	20		54		
6	12	30	30	14	86	32+32=64	4
7	14	36	40	28	118		

Example is new PN between periods 5 and 7 = $4(4)^2$ = 64 = 32+32 = 118 - 54. Jump between odd periods is performed by two jumps of identical $PN_P – PN_{P-1}$ (1C): in this case, two jumps of 32 points of nativity:

(1C) New PN between odd periods = $PN_{P}–PN_{P-2}$ = $2(PN_{P}–PN_{P-1}) = 4X_{2P}^{2}$

Completion of PUB C_{PEP} introduction

P44 Necessary NIN Relationships is introduced with $C_{POTI-AL}$ division as a line to be deepened and implies that Electronic Systems values [6-9] follows trends along nuclear charge. This article is the third part for PUB C_{PEP} treatment and is closure for this introduction to C_{PEP} as NIN relationship factor and whose two previous articles are [10] y [11].

After first part where Orbital capacity by advancement of numbers has been treated, following three parts are used to conclude introduction of C_{PEP} as NIN relationship factor:

* Second part. Global Advance is expanded with Flui n BAR centre which is $Z_{A\rightarrow 0}$ combination of blocks with same n.
* Third part. After C_{PEP} global or C_{PEP} and its corresponding Global Advance (A), Individual C_{PEP} or C_{PEP-i} and its Individual Advance (A_i) are studied: distinctive behaviour of electron in half-full orbital is corroborated and P79 application [11] is seen.
* Fourth part. Individual Advance (A_i) is important because can be catalogued as most sensitive and individual factor among four (C_{PEP} A C_{PEP-i} and A_i). BES have different A_i vs Z curves that can also create association (P79 application) and are endowed with high sensibility to energetic variations that allow to find compensable discontinuities.

Second part: Flui n BAR centre

P82 Flui n BAR centre: Average of Global Advances of block in each n

Average of Global Advances of block in one n has relation with average of other n. In addition, internal Global Advances (A_{ii}) are also located in Flui BAR [11] where A_{ii} is consequence of internal lobes.

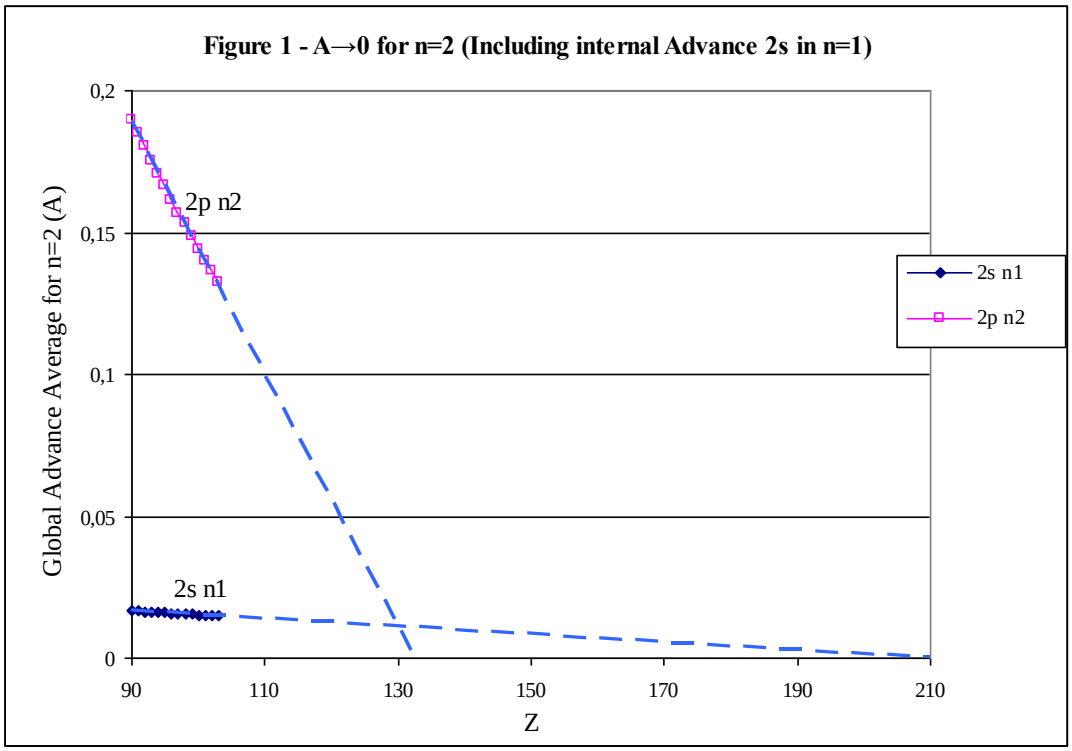
Simplest case is n=2 where there are only two average Global Advance possibilities:

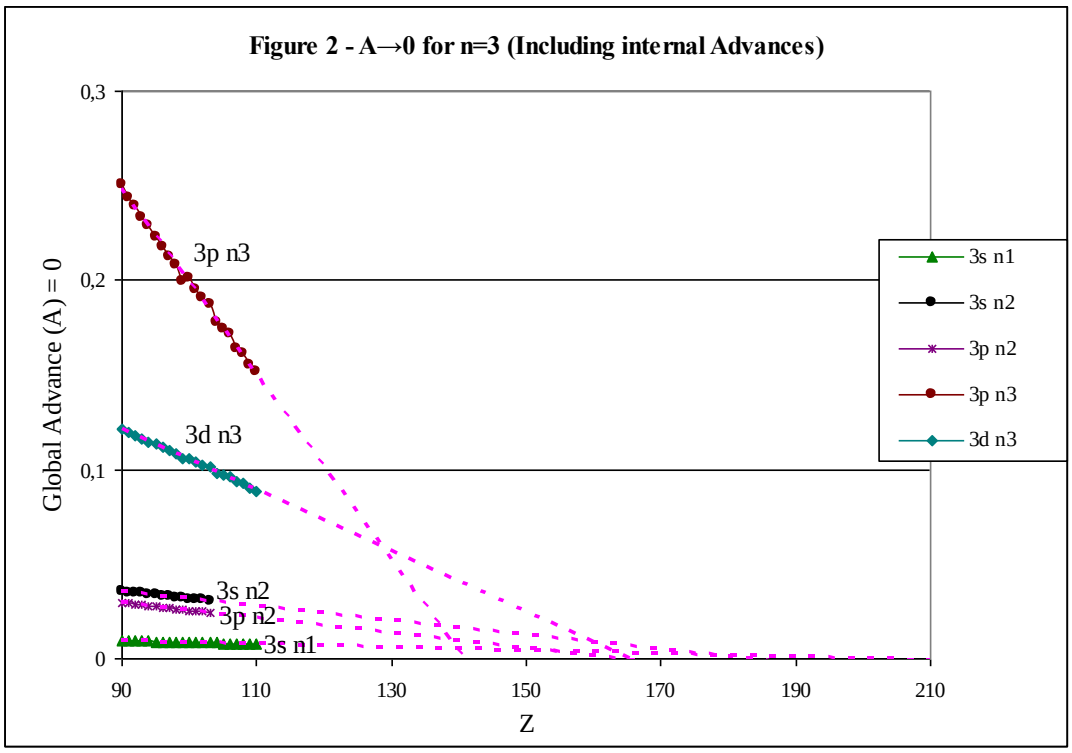
a) $2p^{3-6}$ block. Linear regression extrapolation till A→0 when Z≥90 of average points (from $2p^3$ to $2p^6$) with reference data [12] gives Average Global Advance of 132.5 This is expressed as $Z_{A\rightarrow 0}$ ($2p^{3-6}$) = 132.5 [11].

b) 2s Block in n=1. 2s is OES (Origin electronic system) in n=2 and consequently does not have Advance because C_{PEP} is referred to OES. Instead, 2s is BES in n=1 because 1s is OES in n=1 and there is only one OES in each n and is the most energetic (that is, internal) ns. Extrapolation till A→0 for 2s BES in n=1 is 209.7: $Z_{A\rightarrow 0}$ (2s in n=1) = 209.7

Average Z of n=2 provided by two blocks ($2p^{3-6}$ and 2s in n=1) with A→0 is given by (13) and represented in **Figure 1**.

$$(13) Z_{A \to 0}(n=2) = \frac{Z_{A \to 0}(2p_{n=2}) + Z_{A \to 0}(2s_{n=1})}{2} = \frac{132{,}5 + 209{,}7}{2} = 171{,}1$$





When n=3, blocks of Global Advances are $3p^{3\text{-}6}$ and $3d^{5\text{-}10}$ in n=3 studied in [11] together with average of internal lobes: $3p^{3\text{-}6}$ in n=2 and 3s in n=1 and n=2. Z Average

when A→0 of n=3 with these five blocks is 170.7 (14) and is practically equal to Z average of n=2. Five blocks are represented in **Figure 2**.

$$(14) Z_{A\to 0}(n=3)=\frac{Z_{A\to 0}(3d_{n=3})+Z_{A\to 0}(3p_{n=3})+Z_{A\to 0}(3p_{n=2})+Z_{A\to 0}(3s_{n=2})+Z_{A\to 0}(3s_{n=1})}{5}=$$

$$\frac{165{,}4+140{,}8+164{,}4+183{,}2+199{,}9}{5}=170{,}7$$

Same five blocks seen for n=3 (14) are calculated for n=4 and n=5. Joint average of n=4 and n=5 with five blocks of n=3 is also located at Z≈171 (**Table 4**) and therefore, relation (15) is fulfilled.

$$(15)\ Z_{A\to 0}(n=2)=Z_{A\to 0}(n=3)=\frac{Z_{A\to 0}(n=4\ \text{in}\ n=3)+Z_{A\to 0}(n=5\ \text{in}\ n=3)}{2}$$

Table 4 - Five Blocks of $Z_{A\to 0}$(n=3) calculated when n=[4,5]

Block → / **n ↓**	nd^{5-10} in n=3	np^{3-6} in n=3	np^{3-6} in n=2	ns in n=2	ns in n=1	**Average**
$Z_{A\to 0}$ n=4	183	179	172	185	187	**181.2**
$Z_{A\to 0}$ n=5	170	161	153	160	158	**160.4**
					Average n=4 and n=5	**171**

At the same time, n=4 and n=5 are matched if all blocks are considered (**Table 5** and **Table 6**) (16)

$$(16)\ Z_{A\to 0}(n=4)=Z_{A\to 0}(n=5)$$

Table 5 - $Z_{A\to 0}$(n=4) blocks not included as $Z_{A\to 0}$(n=4 in n=3) (Table 4) (*)

Block	$4f^{7-14}$ in n=4	$4d^{5-10}$ in n=4	$4p^{3-6}$ in n=4	4s in n=3	5 blocks of Table 4	**Average**
$Z_{A\to 0}$	203	180	148	206	906	**183**

Table 6 - $Z_{A\to 0}$(n=5) blocks not included as $Z_{A\to 0}$(n=5 in n=3) (Table 4) (**)

Block	$5g^{9-18}$ n=5	$5f^{7-14}$ n=5	$5f^{7-14}$ n=4	$5d^{5-10}$ n=5	$5d^{5-10}$ n=4	$5p^{3-6}$ n=5	$5p^{3-6}$ n=4	5s n=4	5s n=3	5 blocks Table 4	**Av.**
$Z_{A\to 0}$	243	217	217	230	180	155	169	174	169	802	**183**

(*) and (**) $4f^{7-14}$ in n=4, $5g^{9-18}$ in n=5 and $5f^{7-14}$ in n=5 averages are taken from Table 2 of Flui BAR [11]:

- From theoretical values: $4f^{7-14}$ in n=4 because reference data give linear regressions with somewhat low R^2 values.
- From hypothetical values: $5g^{9-18}$ in n=5 and $5f^{7-14}$ in n=5 because there is no data [12] with consecutive order for these BES.

$5f^{7-14}$ n=5 has one internal BES, $5f^{7-14}$ n=4, and same $Z_{A\rightarrow 0}$ has been asigned to both (217). This equality has been made because same fact occurs with previous n and l (4d vs. 5f) for which there are reference data:

$$Z_{A\rightarrow 0}\ (4d^{5-10} \text{ en n=4})\ 180 \approx 183 = Z_{A\rightarrow 0}\ (4d^{5-10} \text{ en n=3})$$

Third part: $C_{PEP\text{-}i}$ behaviour and P79 application [11]

Coupling probabilistic factor between electronic system (or lobe) and immediately adjacent one is observed in detail thanks to $C_{PEP\text{-}i}$.

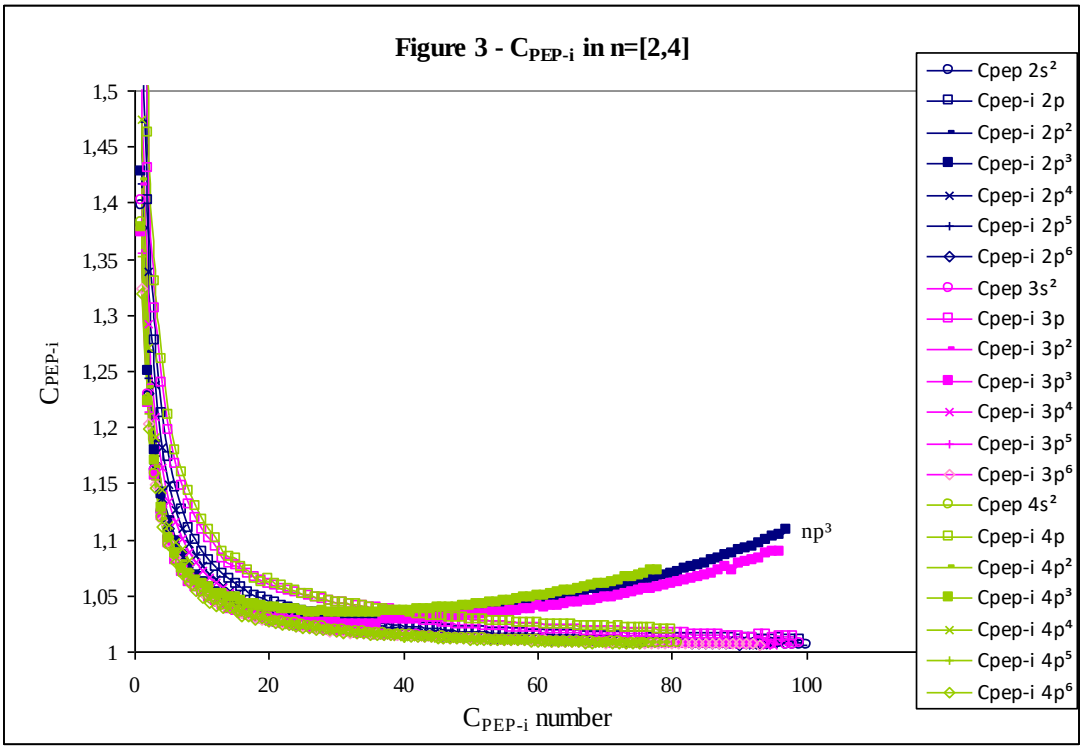
C_{PEP} or C_{PEP} global is always referred to OES in which BES is studied. In contrast, $C_{PEP\text{-}i}$ compares BES in question with energetically adjoining electronic system [10]. Comparison is BES studied with energetic immediately superior and consequently $C_{PEP\text{-}i}>1$.

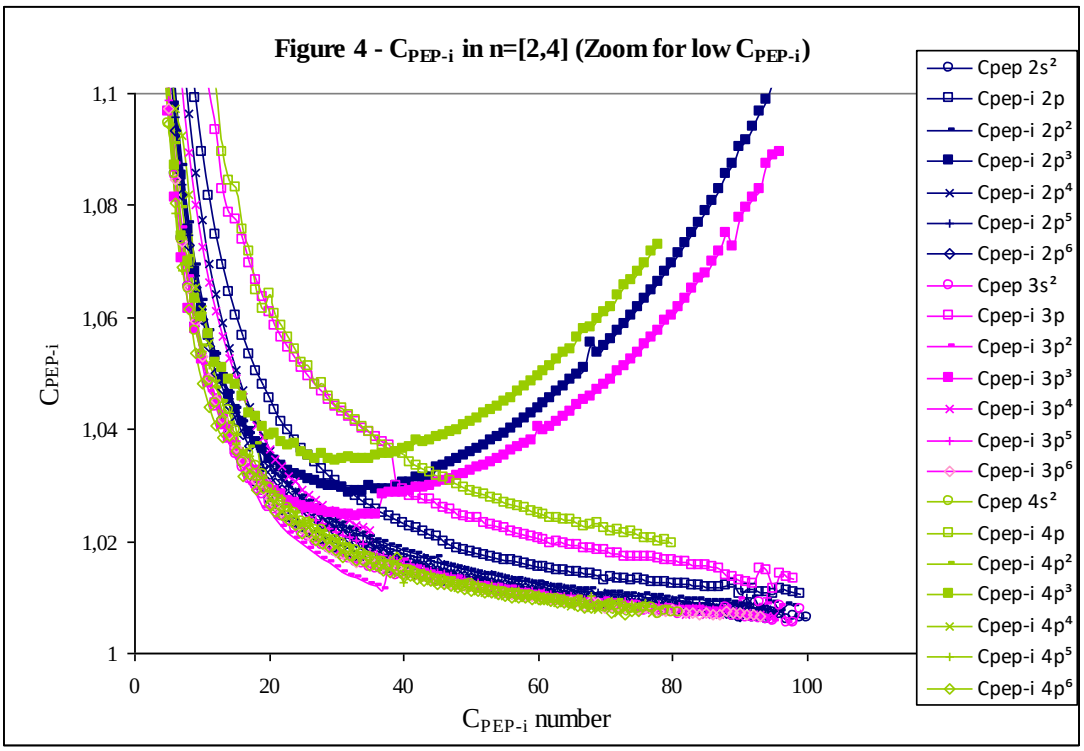
Change produced when orbital is half-full has been observed with C_{PEP} and its Global Advance (A). Alteration generated by BES of half-full orbital (for example nd^5) implies that subsequent BES up to full orbital (from nd^6 to nd^{10}) are dragged in alteration and curves of C_{PEP} or A converge when Z increases [10] and [11]. These groups that converge are called blocks: from np^3 to np^6, nd^5 to nd^{10}, nf^7 to nf^{14}... BES that make up block unite their tendencies around concrete Z when Global Advance→0: location of those Z in Flui BAR and Z relation between n have been exposed in [11] and previous point.

$C_{PEP\text{-}i}$ vs. $C_{PEP\text{-}i}$ number for ns^2 and np^y with n=[2,4] and y=[1,6] is represented in **Figure 3**. Low $C_{PEP\text{-}i}$ zone is expanded in **Figure 4**. Main observed behaviours with two figures:

a) Curves are initially similar for all BES and n with rapid decrease as $C_{PEP\text{-}i}$ number increases.

b) np^3 (half-full orbital) show minimum over intermediate $C_{PEP\text{-}i}$ number (≈30) and begin their ascent as opposed to behaviour of remaining BES that are directed asymptotically to 1. np^3 are the only ones with their colored dots for more direct impression. Therefore and unlike what happened with C_{PEP} or A, half-full orbital only causes alteration in their own $C_{PEP\text{-}i}$ because $C_{PEP\text{-}i}$ is individual.





c) Figure 4 is Figure 3 zoom and allows intuit simple arithmetic relationships between same BES in different n as has been introduced in [11]: P79 C_{PEP}, C_{PEP-i}, A and A_i: Linear relations between n. [11] works P79 with C_{PEP} and C_{PEP-i} relations are simply cited and now remembered in **Table 7**. P79 application goodness is endorsed in C_{PEP-i} vs. C_{PEP-i} number for np and np^3 by **Figure 5** and **Figure 6** respectively. Actually and in the beginning, C_{PEP-i} 3p ≈ C_{PEP-i} 4p and (17) is fulfilled when C_{PEP-i} number ≈ 40.

Figure 5 - 2p C_{PEP-i} in n=[2,4]

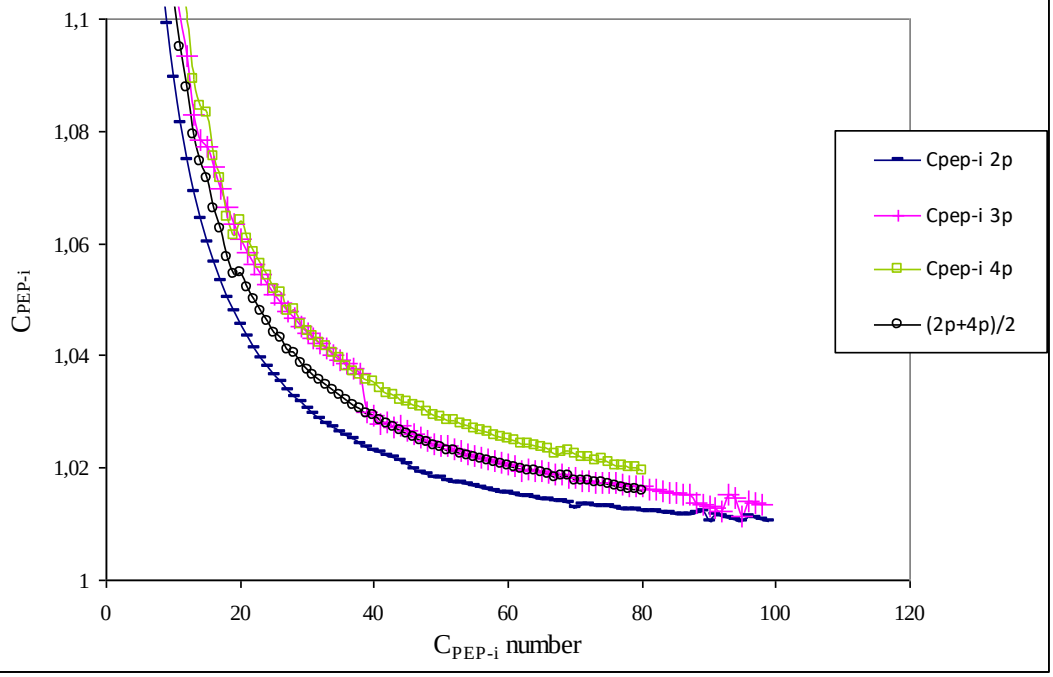


Figure 6 - $2p^3$ C_{PEP-i} in n=[2,4]

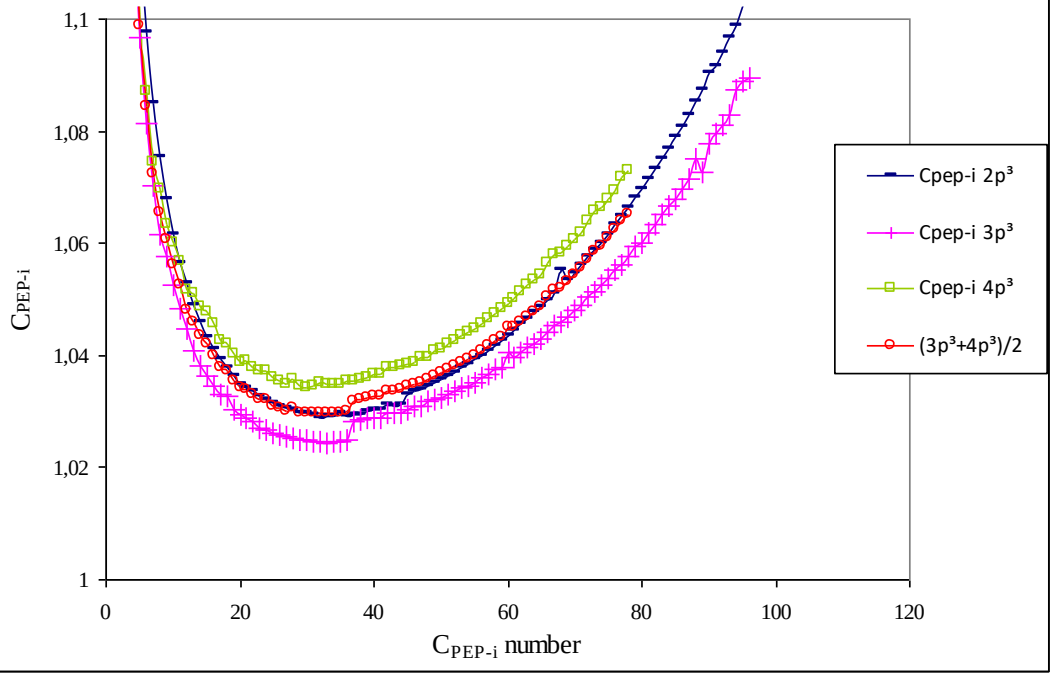


Table 7 - P79 application examples with C_{PEP-i}			
BES	Factor	Operación	Figure
np	CPEP-i	$(17) C_{PEP-i}(3p) = \frac{C_{PEP-i}(2p) + C_{PEP-i}(4p)}{2}$	5
np^3	CPEP-i	$(18) C_{PEP-i}(2p^3) = \frac{C_{PEP-i}(3p^3) + C_{PEP-i}(4p^3)}{2}$	6

Fourth part: Individual Advance (A_i). A_i vs. Z behaviour, P79 application and compensable discontinuities resolution.

Individual Advance (A_i) is obtained using $C_{PEP\text{-}i}$ as Global Advance (A) has been calculated from C_{PEP} [10] and [11].

BES A_i in n=2 (that is, from $2s^2$ to $2p^6$) is represented in **Figure 7**. Main details to be noted:

a) Individual Advance for $2p^3$ or $A_i(2p^3)$ shows clear fall when Z increases that is not made by remaining BES as also happens with $C_{PEP\text{-}i}$. There is no drag or contagion effect because A_i and $C_{PEP\text{-}i}$ are individual factors. Second degree polynomial regression is good with R^2=0.9982 for Z≥20.

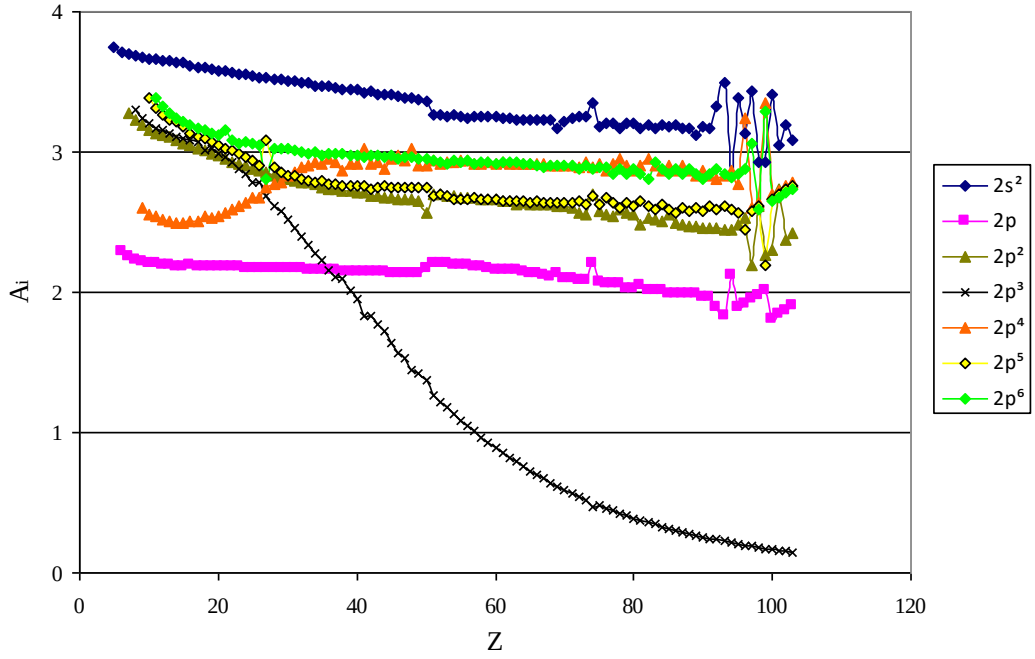
b) All A_i have start value between 2 and 4.

c) P79 application: A_i overlap of different BES.

$A_i(2p^4)$ and $A(2p^6)$ are united when Z grows. A_i of another couple, $A_i(2p^2)$ and $A_i(2p^5)$, coverage just below pair previously mentioned. Two most energetic BES are found above ($A_i(2s^2)$) or below ($A_i(2p)$) these two pairs. These 6 A_i vs Z curves have lower slope than $2p^3$ and do not show evident discontinuities except:

* Discontinuities in very high Z where may be data consequence.
* In Z≈50 (more evident when BES in n=3 are treated)
* Some relatively obvious sporadic discontinuity that is compensable with opposite sign discontinuity as seen in next point.

Figure 7 - Individual Advances (A_i) in n=2



A_i vs. Z in n=3 and n=4 are shown in **Figures 7.B.** and **Figure 7.C.** with similar comments to those made for n=2:

a) $A_i(np^3)$ vs. Z has adjustable trend with second degree polynomial regression.

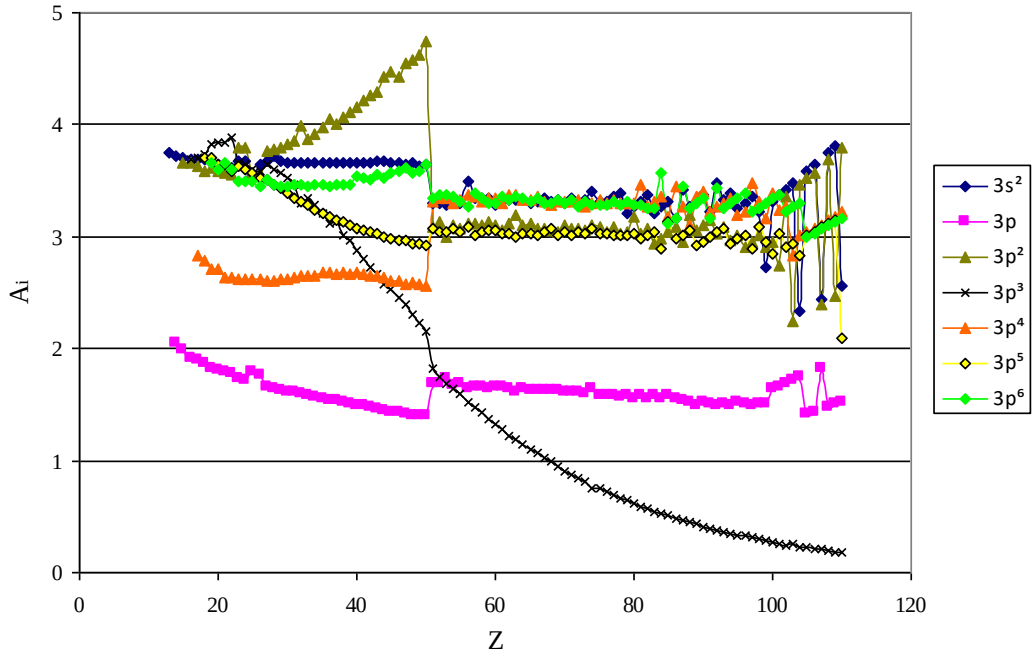
b) Same two pairs are formed: $A_i(np^4)$ with $A_i(np^6)$ and $A_i(np^2)$ with $A_i(np^5)$. Differential points:

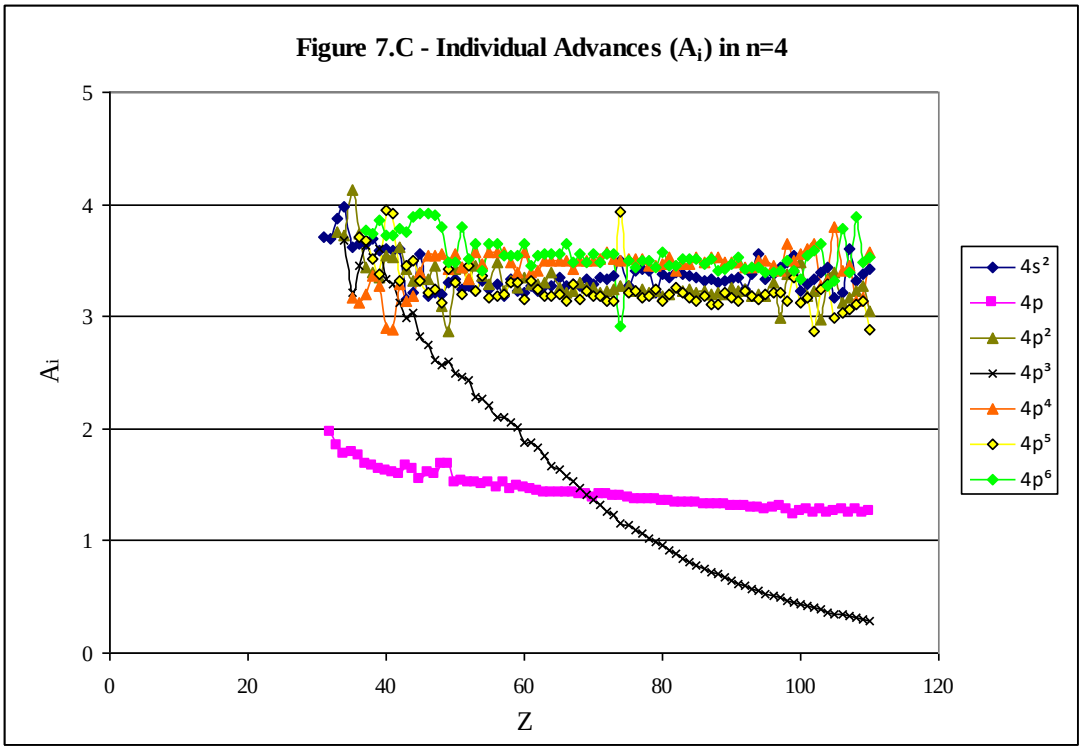
* Arrival to pairs formation in n=3 is carried out with remarkable discontinuity.
* ns^2 and np positions: $2s^2$ and 2p are placed symmetrically on both sides of two pairs. In contrast and as n increases, two pairs and ns^2 are grouped in increasingly smaller A_i interval and np is progressively further away.

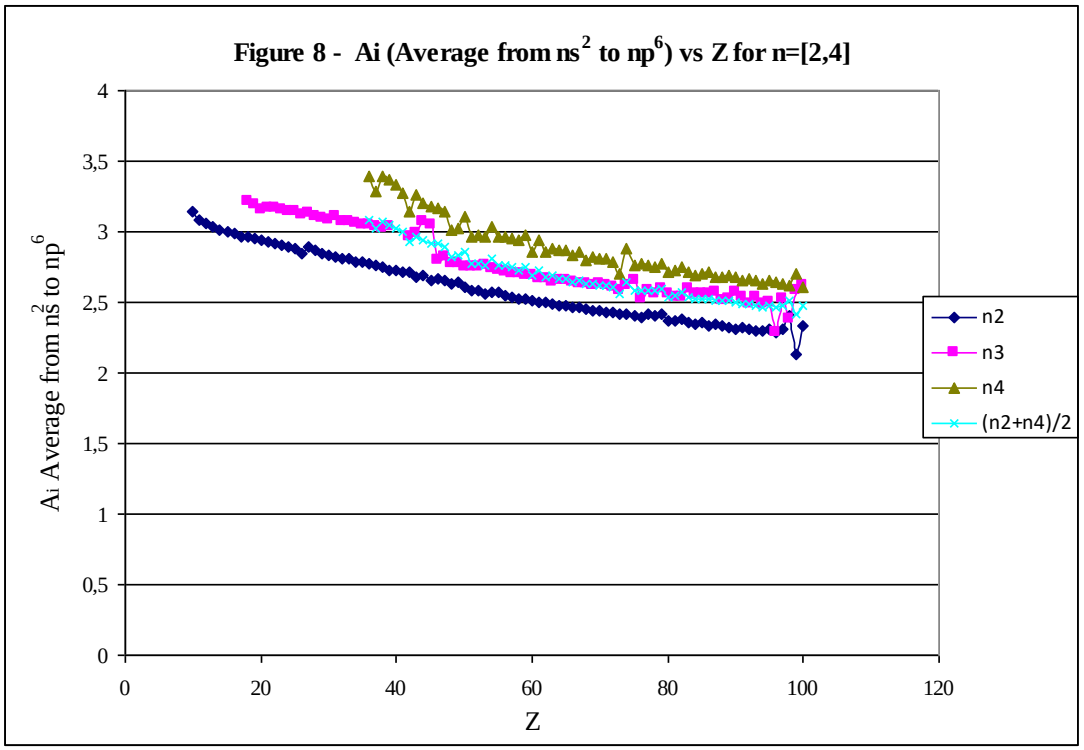
c) Comments made before for discontinuities are applicable and discontinuity in Z≈50 is especially noteworthy when n=3 (Figure 7.C)

Average of seven Ai vs. Z curves for each n is made in **Figure 8**. Averages per n present smooth drop with similar slope. Parallel tendency between three n averages allow mean between n=2 and n=4 to be approximately superimposed on n=3. That is, n=3 is interspersed right in middle of n=2 and n=4.

Figure 7.B - Individual Advances (A_i) in n=3

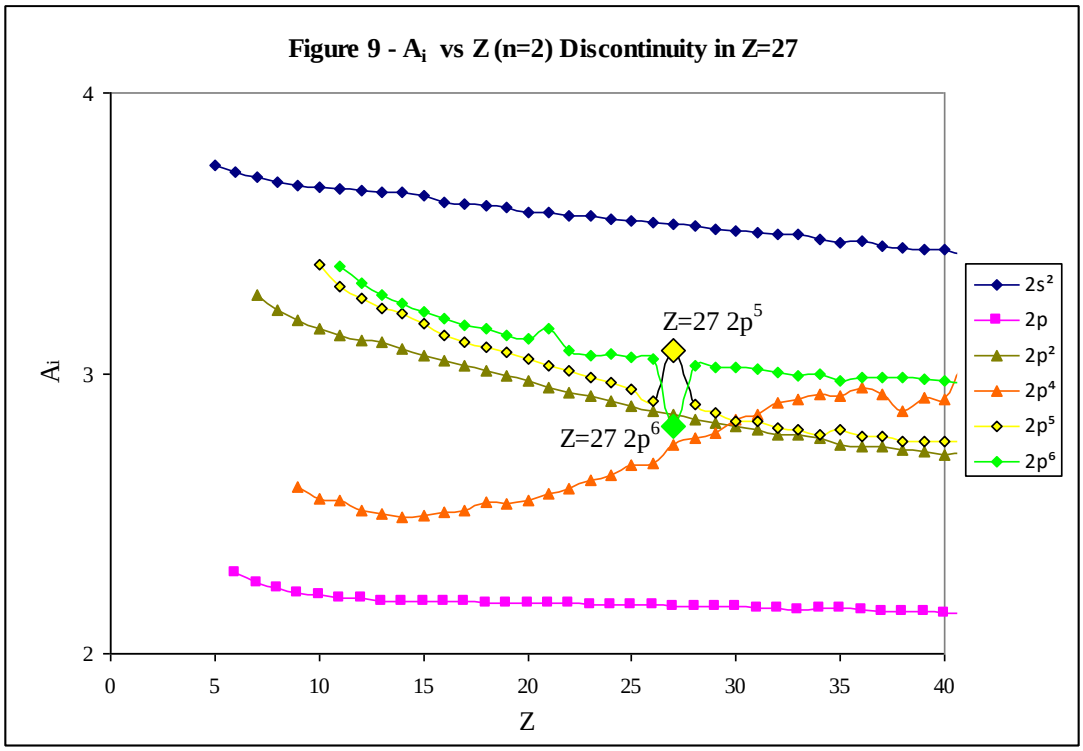






Compensation for sporadic discontinuity in A_i vs. Z curves

Relatively obvious sporadic discontinuity can be compensated with opposite sign discontinuity as has been commented in Figures 7. **Figure 9** shows A_i vs. Z in n=2 (Figure 7) focused on Z<40 to observe clearly of all curves with some small variation and one great discontinuity with Z=27 (Cobalt). Two discontinuities present opposite sign: $2p^5$ and $2p^6$. Both points have been increased in size and identified in Figure 9.



Procedure used to calculate whether two A_i are energetically compensable, totally or partially, is as follows:

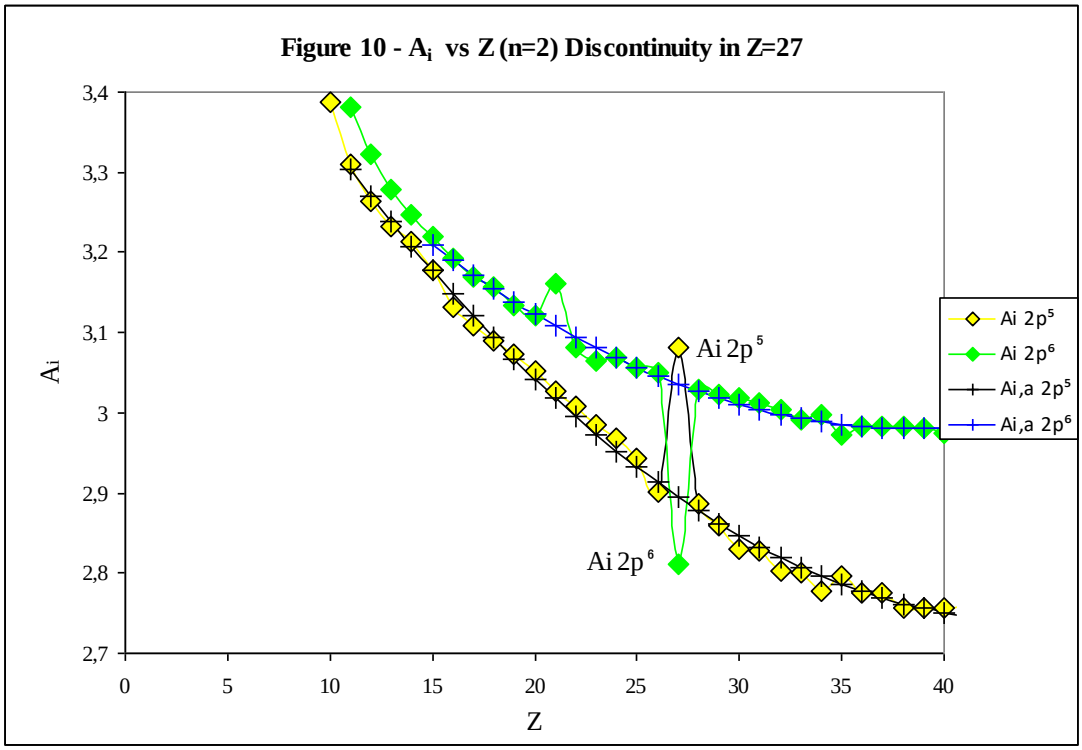
a) $A_{i,a}$ vs Z curve

$A_{i,a}$ vs Z curve is obtained from Second degree polynomial regression of A_i vs. Z without obvious discontinuities. $A_{i,a}$ is Individual Advance Adapted to said regression. A_i and $A_{i,a}$ vs. Z are in **Figure 10**.

Z=[11,49] without Z=27 discontinuity has been considered for $2p^5$ and regression equation with its R^2 is in (19). R^2 is good because small energetic variations cause marked variations in A_i. For its part, $2p^6$ has equation and R^2 in (20) with Z=[15,40] and obviating Z=27 and least discontinuity in Z=21.

(19) $A_{i,a}(2p^5) = 0{,}000497Z^2 - 0{,}044416Z + 3{,}731937$ $\quad R^2 = 0{,}997282$

(20) $A_{i,a}(2p^6) = 0{,}000410Z^2 - 0{,}031688Z + 3{,}592549$ $\quad R^2 = 0{,}991070$



b) $A_{i,a} \rightarrow C_{PEP\text{-}i,a} \rightarrow IE_a \rightarrow IE_a\text{-}IE \rightarrow$ Discontinuities compensation study

Following calculations and comparisons are recorded in **Table 8**. $A_{i,a}(2p^5)$ and $A_{i,a}(2p^6)$ for Z=27 are obtained with (19) and (20). $C_{PEP\text{-}i,a}$ is calculated as $C_{PEP\text{-}i}$ [10] and [11], but with con $A_{i,a}$ (21). $C_{PEP\text{-}i,a}$ is individual C_{PEP} with Individual Advance Adapted ($A_{i,a}$).

IE_a (ionization energy adapted) can be known through $C_{PEP\text{-}i,a}$ and relation between IE_a and immediately higher ionization energy (IE). IE data are in reference [12]. Way to proceed is in $IE_a(2p^5)$ example calculated with $2p^4$ (BES immediately superior from energetic point of view) (22).

Two differences IE_a-IE (+5.7 and -6.8 eV) are of the same magnitude order and are practically mutually compensated. RC (%), Relative change in percentage (%), despite being very evident discontinuities, is less than 0.5 % in both cases. In the same line, remarkable Sc (Z=21) discontinuity is less that 1 eV with RC (%)= -0,14%. Therefore, these data imply that discontinuities below 0.1 % are also appreciable.

Table 8 - Compensation for sporadic discontinuities in A_i vs. Z between Cobalt $2p^5$ & $2p^6$

BES	Ai	Ai,a	$C_{PEP\text{-}i,a}$	IE_a	IE [12]	IE_a-IE [12]	RC (%)
2p5	3,08196	2,89501	1,03514	-1498,80	-1504,5	5,7 eV	-0,37 %
2p6	2,81056	3,03586	1,03515	-1404,05	-1397,2	-6,8 eV	+0,49 %

$$(21)\ C_{PEP\text{-}i,a} = 1 + \frac{2}{S + A_{i,a}(Z - Z_O)}$$

$$(22)\ C_{PEP-i,a}(2p^5) = \left(\frac{E_o(2p^4)}{E_{o,a}(2p^5)}\right)^{1/2} = \frac{C_{PEP-a}(2p^5)}{C_{PEP}(2p^4)} = \frac{\left(\frac{(E_o)(2s)}{E_{o,a}(2p^5)}\right)^{1/2}}{\left(\frac{(E_o)(2s)}{E_o(2p^4)}\right)^{1/2}}$$

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Abbreviations Table

Following Table indicates abbreviations used in this theory and its use in article in question is marked with X. 21 and 22 are [10] and [11] respectively. 23 is present article.

Abbreviation	[8]	[9]	21	22	23	Meaning
3-PA(x,y)			X			3-point alignment(n,Group)
A			X	X	X	Advance (A or C_{PEP} A). Related with x and S.
A_{ii}					X	Internal Global Advances
A_i				X	X	Individual Advance
$A_{i,a}$					X	Individual Advance Adapted to regression curve
A_E			X			Estimated Advance (A)
BES	X	X	X	X	X	Born Electronic System
c_i	X	X	X		X	EE Orbital circumference
C_F	X	X				Wavelength compaction factor
C_{PEP}	X	X	X	X	X	Probability electrons pair coefficient

C_{PEP-G}			X	X	X	Global C_{PEP} and usually written simple as C_{PEP}
C_{PEP-i}			X	X	X	Individual C_{PEP} (BES is referred to the next energetic BES)
$C_{PEP-i,a}$					X	C_{PEP-i} with Individual Advance Adapted ($A_{i,a}$).
C_{POTI}	X	X				Probabilistic Orbital Tide in Third Feliz Solution
C_{PEP} number			X	X		C_{PEP} number following Z growth
$C_{POTI-AL}$	X	X	X	X		C_{POTI} Angular Limit
$C_{POTI-GAL}$	X					C_{POTI} Geometric Angular Limit
$C_{POTI-LAG}$	X					C_{POTI} Lobe always growing
d	X	X				Birth wavelength division or simply, division
EE	X	X	X			Electronic extreme
E_o	X	X				Initial, birth or output energy
$((Eo)_B)_E$			X			Estimated born E_o
E.S.			X			Electronic System (Lobe)
E_i	X					EE energy
Flui BAR				X	X	Flui BES A (Global Advance) Region
GNC	X	X				Geometric NIN Coupling
ħ	X					Reduced Planck´s constant
H_i	X	X	X		X	EE Circular orbit height
IE	X	X	X	X		Ionization Energy
IE_a					X	Ionization energy adapted
m_e	X					Electron mass
λ_{Birth} λ	X					Birth wavelength
MON	X	X				Modified Orbital Number
NIN	X	X	X	X	X	Negative in Negative (Electron in electron concept)
OES	X	X	X	X	X	Origin Electronic System
OPA	X					Orbital Planes Axis
P_i	X	X				EE Probability
PN					X	Points of nativity
PNC	X	X				Probabilistic NIN Coupling
PUB C_{PEP}			X	X	X	Probability Union Between C_{PEP}
r_i	X	X	X		X	Distance between nucleus and EE
S			X	X		Start Point meets: S=x
x			X			x equals to $2/(C_{PEP}-1)$
v_i	X					EE velocity
z	X	X				Effective nuclear charge
Z	X		X	X		Atomic number
Zo			X			Zo is matched with Start Atomic Number (S)
$Z_{A\rightarrow 0}$ (ES)				X	X	Z extrapolated with A→0 and (Electronic System)

Annex

Table 2. Orbital capacity by advancement of numbers I (Till 15th period) - Initial situation in periodic Table											
Period	**PN by orbital and period**								**PN_P Sum**	**$PN_P – PN_{P-1}$**	**X_P Value**
	s	**p**	**d**	**f**	**g**	**h**	**i**	**j**			
1	2								2	2	1
2	4	6							10	8	2
3	6	12							18	8	2
4	8	18	10						36	18	3
5	10	24	20						54	18	3
6	12	30	30	14					86	32	4
7	14	36	40	28					118	32	4
8	16	42	50	42	18				168	50	5
9	18	48	60	56	36				218	50	5
10	20	54	70	70	54	22			290	72	6
11	22	60	80	84	72	44			362	72	6
12	24	66	90	98	90	66	26		460	98	7
13	26	72	100	112	108	88	52		558	98	7
14	28	78	110	126	126	110	78	30	686	128	8
15	30	84	120	140	144	132	104	60	814	128	8

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	17	SPA IV: Silpovgar IV with Piepflui. Excess Relativistic: influence in LAN and SPA
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24 hours of new day		