ARTICLE 05
FELIZ III THE KING MAJOR: ORBITAL FILLED KEEPING PROBABILITY ELECTRONIC DISTRIBUTION

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ABSTRACT

Electronic Extreme Probability (P_i), defined in [3] as quotient between orbital circumference (c_i) [2] and velocity (v_i) [1], includes C_F from being constant to variable. Initially, variable C_F is 1-order [3] to become in high-order (theoretically up to order infinite) achieving probability radial closure [4].

If probability radial closure is achieved by Second Feliz Solution [4], now arrival at orbital geometric limit and orbital volume filling are acquired with C_{POTI} coefficient of Third Feliz Solution. These actions are performed by radial probability distribution curve that is kept constant.

Finally, a method by trial and error is included to find orbital geometric limit.

KEYWORDS

Third Feliz Solution, C_{POTI} $C_{POTI\text{-}LAG}$ $C_{POTI\text{-}AL}$ $C_{POTI\text{-}GAL}$, orbital geometric limit, orbital volume filling, Victoria Equation.

INTRODUCTION

This is 5th article of 24 dedicated to atomic model based on Victoria equation (Articles index is at end). A extern electronic extreme (EE_A) is indicated with a suffix (r_A, H_A or c_A), B intern with b suffix (r_B, h_B or c_B) and i suffix is used to both electronic extremes (EE_i). All abbreviations are compiled, in conjunction with those included in [1,4], at article end. Once a possible orbital contour is delimited by:

a) r_i c_i and H_i

Electronic extremes (A extern and B intern) orbit in c_i radius circumference at r_i nucleus distance. Circular orbital height (H_i) is obtained by right-angled triangle relation [1] and [2].

b) c_i with variable C_F

Electron probability density is approximated by First Feliz Solution and, for low divisions, P_i is cancelled with Second Feliz Solution. Importance in P_A cancelation is greater since can reach up to infinite (if $d \rightarrow 0$ is allowed) [3] and [4].

Following questions have been asked: Can geometric distribution be changed? What is geometric limit? Can geometric and probabilistic distribution be filled with equivalent radial probability curves? Geometric distribution is plane representation that includes two of three orbital contour dimensions: r_i c_i and H_i. Radial probability curve represents Pi vs ri. Both representations are in [4].

P30 Third Feliz Solution. Feliz III The King-Major. Orbital filled keeping probability electronic distribution.

Electronic Extreme Probability (P_i) must have a factor that allows geometric distribution filling with equivalent radial probability curves. P_i equation that has C_F with J theoretically up to order infinite (1) is made by P_i equation as ri function [3] and C_F of Second Feliz Solution [4]. C_F must be multiplied by a factor to have equivalent radial probabilistic curves. This factor is called POTI coefficient (Probabilistic Orbital Tide) and is represented by C_{POTI}

$$(1)\ P_i = \frac{\hbar}{2f\left(2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}\right)}\frac{r_i}{z}$$

Definitive C_F expression is given by (2) where Compaction Factor (C_F) of Second Feliz Solution is divided by C_{POTI} (2)

$$(2)\ C_{F-J\,order} = \frac{2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}}{C_{POTI}}$$

Thus, Feliz Probability Equation as function of C_{POTI} r_i and division (d) for Electronic extremes with PEP (P), MON (M) and z is given by (3):

$$(3)\ P_i = \frac{\hbar}{2f\left(2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}\right)}\frac{r_i C_{POTI}}{z}$$

In [3], P_A and c_A developed expressions are obtained by r_i substitution with expression deduced in Victoria Equation [1]. In these equations, C_F is not explained. C_F has been expanded in [3] and [4] and now C_{POTI} has been included. Definitive C_F is provided by (2). c_A and P_A developed expressions [3] are extended with definitive C_F inclusion in (4) and (5) respectively.

$$(4)\ c_A = \frac{\hbar\, C_{POTI}\sqrt{-F-\frac{h\sqrt{-E_o}}{dm_e^{1/2}}-\sqrt{F^2+\frac{h^2(-E_o)}{d^2m_e}}}}{2\sqrt{E_o m_e f z}\left(2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}\right)}$$

$$(5)\ P_A = \frac{\hbar\, C_{POTI}\left(-F-\frac{h\sqrt{-E_o}}{dm_e^{1/2}}-\sqrt{F^2+\frac{h^2(-E_o)}{d^2m_e}}\right)}{4E_o f z\left(2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}\right)}$$

r_B (6) is related to r_A considering birth wavelength (λ) and division (d) [1]. Expressions for c_B and P_B are as (4) and (5) respectively using r_B instead of r_A.

$$(6)\ r_B = r_A - \frac{\lambda}{d}$$

Probability curves varying C_{POTI}

Filling of contour delimited by curve of greater C_{POTI} is observed in geometric distribution (c_i vs H_i) with different C_{POTI} (**Figure 1**). Equivalent radial probability curves with identical maximum are corroborated when C_{POTI} is modified (**Figure 2**).

Lithium atom is selected for being first with PEP=2 having only one electron in its upper n ($1s^2 2s$ electron configuration). 2s electron density has two lobes separated by a node. Article is centred on extern lobe (n=2). Inner lobe (n=1) is coupled to 1s electron and couplings explanation has not been completed. Data used for Lithium 2s extern lobe are:

a) E_o=IE P03 ES Energy. Victoria Equation E_o [1] is Ionization Energy (IE) (data from [5])

b) z=1 P14 Effective nuclear charge in ns electron external lobe [1]

c) PEP=2 P27 PEP Factor (Principal Electronic Part) [3]

d) MON=25 P26 MON Factor (Modified Orbital Number) [3]. ns follows a decrease with fractional factor that develops in later article. This article is focused on being introduction to geometry and radial probability.

e) C_{POTI} C_{POTI} is varied from 0.1 to 2.9 with 0.2 intervals where, to better appreciate greater change, C_{POTI} is passed to 3.0 3.1 and 3.1201231 which is so-called C_{POTI} angular limit (defined in P32). For H_i vs c_i figures and looking for the most realistic geometry view, relation between Hi and ci is 1:1.

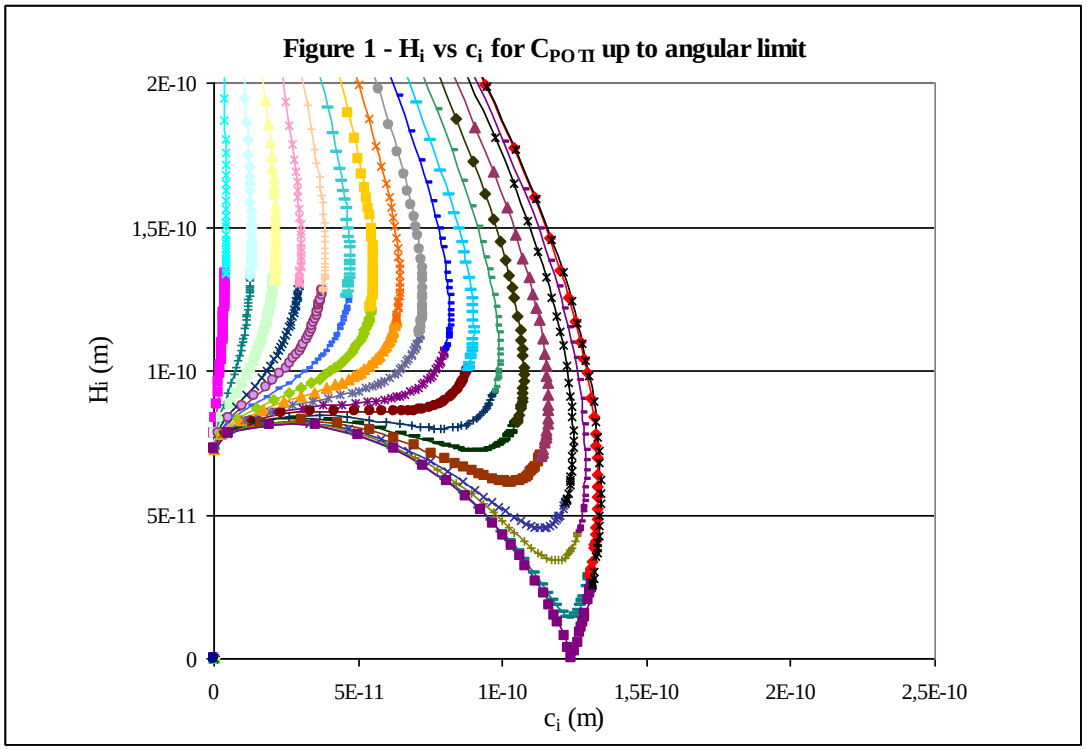
Figure 1 comments

C_F increases if C_{POTI} is reduced because C_{POTI} is in C_F denominator (2). Consequently, ci is compacted and reduced (4). The end result is that H_i increases by approaching r_i to compensate for c_i reduction (7). H_i and c_i are mutually compensated to fulfill right-angled triangle relation.

$$(7)\ C_{POTI} \downarrow \rightarrow C_F \uparrow \rightarrow c_i \downarrow \rightarrow H_i \uparrow \rightarrow (H_i \rightarrow r_i) \text{ and } (c_i \rightarrow 0)$$

Thus, lowest C_{POTI} represented (C_{POTI} = 0.1) is leftmost curve in Figure 1. Curves are displaced by increasing C_{POTI} towards higher c_i .This displacement is not constant and has changes in curve morphology.

Minimum appears and is accelerating as C_{POTI} increases. Finally, this minimum collides with Y axis (H_i = 0) when C_{POTI} angular limit is reached. This displacement is not constant and accelerating refers to increase in ratio between H_i difference and C_{POTI} difference. This is that small C_{POTI} increase causes high H_i decrease when C_{POTI} is near to C_{POTI} angular limit.



One electron is two curve points that are A and B electronic extremes (EE_A and EE_B) originated by wavelength division (d). These points give c_i radius circular turn to corresponding H_i heights. Therefore, Figure 1 must be imagined with circular turn of each and every one of these points and, in general, of any C_{POTI} that is in C_{POTI} interval (8):

$$(8)\ C_{POTIINTERVAL} =]0, GAL[$$

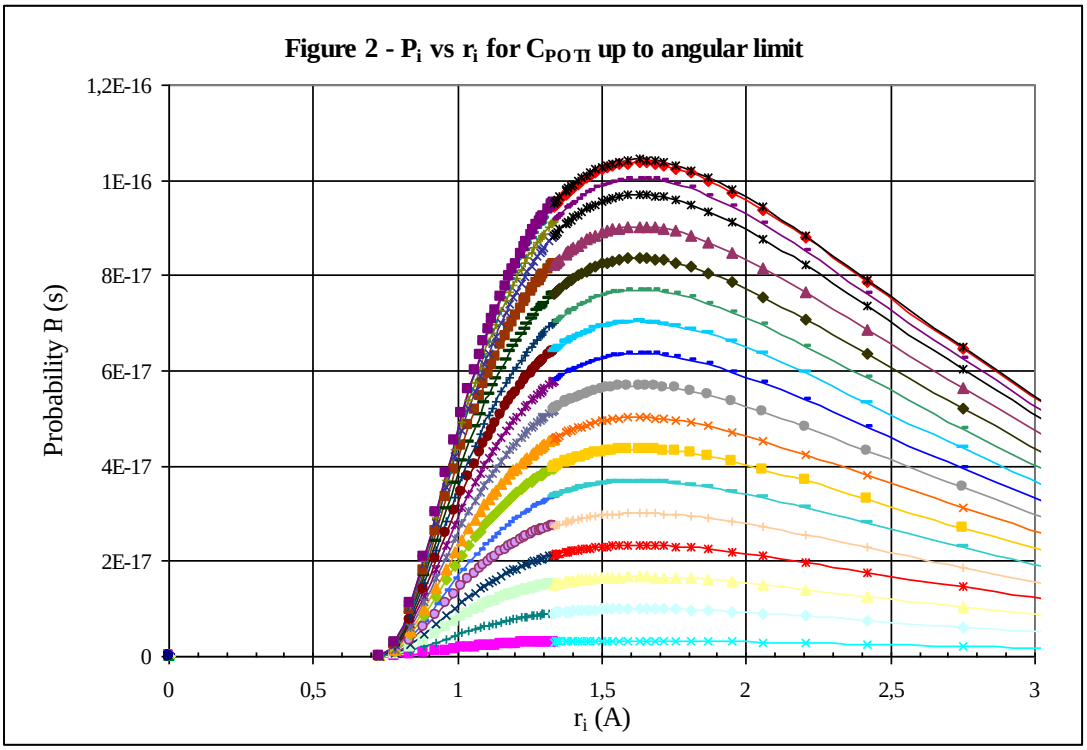
Geometric Angular Limit (GAL) is developed in P31, P32 and P33. In Figure 1, GAL has been taken to maximum that is when $H_i = 0$. This maximum GAL is called Angular Limit (AL). Reaching maximum GAL involves occupying larger volume. GAL depends on orbital type (s, p, d…) selected.

Figure 2 comments

P_i vs r_i curve is represented in Figure 2. Proportional P_i vs r_i curves are produced when C_{POTI} is varied because one single axis is modified:

a) All c_i divisions (and therefore P_i) are affected by C_{POTI} in equal proportion.
b) r_i is not conditioned by c_i variation and, consequently, r_i is C_{POTI} independent.

In Figure 2, Lithium 2s Probability Maximum is situated around 165 pm, which is in agreement with 167 pm [6] and 164 pm [7]. MON=25 is the only magnitude that is not yet justified because P26 MON Factor (Modified Orbital Number) [3] is not developed and in P26 in indicated: “MON value and numerical rules are developed later”.



P31 Special case: Lobe always growing (LAG)

Lobe with LAG could have maximum $C_{POTI\text{-}GAL}$ that allows fulfilment of (9). $C_{POTI\text{-}GAL}$ is C_{POTI} Geometric Angular Limit. Therefore, H_i is always growing as electronic extremes move away from nucleus.

$$(9)\ \frac{dH_i}{dr_i} > 0 \quad \text{with Maximum } C_{POTI\text{-}GAL}$$

A simple way to approximate $C_{POTI\text{-}GAL}$ and to be able to observe LAG is to calculate H_i differentials as EE_i move away from nucleus. Therefore, in the EE_B case, upper division H_i minus lower division must always be positive. Situation for EE_A is reverse because division decreases as moves away from nucleus. Maximum C_{POTI} that satisfies that these differentials are positive is the one chosen.

In **Figure 3,** and continuing with data of Lithium 2s extern lobe (n=2) as example, the finished comment has been applied to first 15 2s Lithium divisions. Important thing is to show different geometries of lobes. Maximum $C_{POTI\text{-}GAL}$ for LAG is about 2.0 and is employed in Figure 3. There would be negative differentials in EE_B if C_{POTI} was higher and if C_{POTI} was less than 2.0, then would not be maximum $C_{POTI\text{-}GAL}$ that allows (9). H_i vs c_i curves are plotted for C_{POTI} = [0.3, 2] with C_{POTI} = 0.1 intervals (**Figure 4**)

Figure 3 - 2s Li in n=2 applied as example to Hi differentials for LAG ($C_{POTI-GAL}$=2.0)

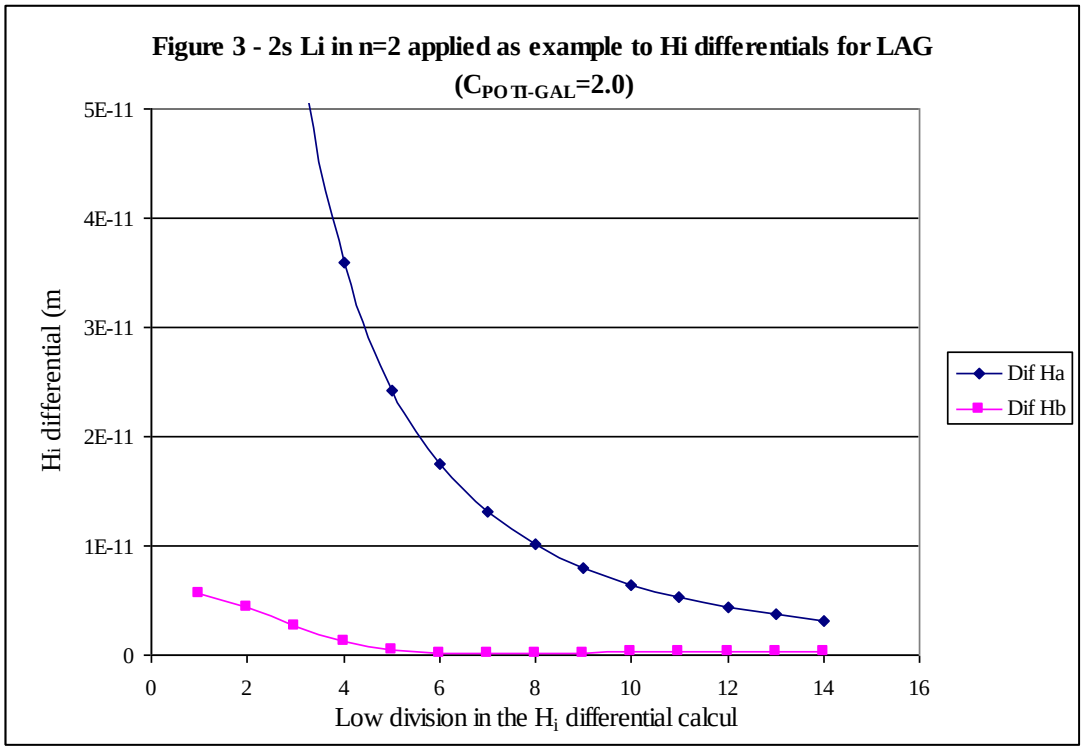
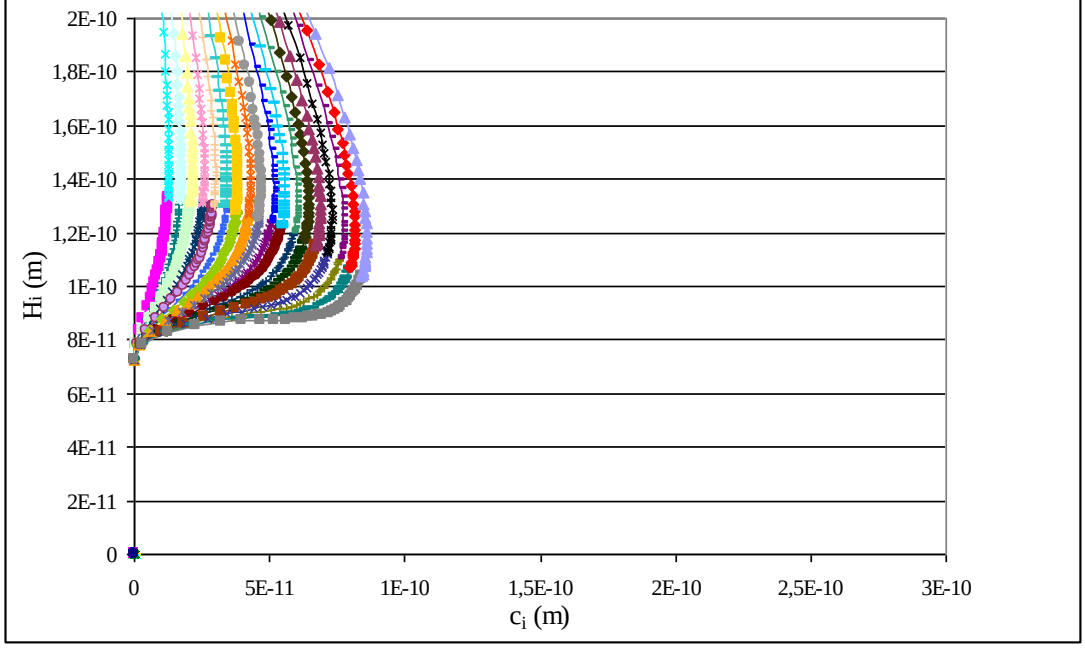


Figure 4 - 2s Li in n=2 applied as example to H_i vs c_i for LAG



P32 $C_{POTI-AL}$ (C_{POTI} Angular Limit)

p-lobes could have $C_{POTI-AL}$. Also, s orbital is presupposed $C_{POTI-AL}$ although is not appreciated because does not have fixed axis. Maximum C_{POTI} Geometric Angular Limit is C_{POTI} Angular Limit ($C_{POTI-AL}$) because limitation is only angular since can not be overcome. $C_{POTI-AL}$ fulfilment (10):

$$(10)\ H_i = 0$$

Interest angle is defined as Nucleus-Orbit-Angle (α_{NOA}). α_{NOA} is angle that conforms nucleus with two semi turn positions in one EE orbit. When $H_i = 0$, line connecting two semi turn positions in one EE orbit also passes through nucleus and, in consequence, angle when $H_i = 0$ is given by (11):

$$(11)\ (\alpha_{NOA})_{Hi\ =\ 0} = (\alpha_{NOA})_{Maximum\ Limit} = 180^{o}$$

180 degrees is maximum α_{NOA} limit since higher C_{POTI} implies: $r_i^2 - c_i^2 < 0$ and H_i (12) [2] would have no real solutions.

$$(12)\ H_i = \sqrt{r_i^{\,2} - c_i^{\,2}}$$

In general, Maximum $C_{POTI\text{-}GAL}$ that can reach EE is governed by α_{NOA} limit and therefore, c_i and H_i must keep (13). Change $(\alpha_{NOA})_{LIMIT}$ by $\frac{(\alpha_{NOA})_{LIMIT}}{2}$ implies that now c_i is opposite side and H_i is adjacent side.

$$(13)\ tg\left(\frac{(\alpha_{NOA})_{Limit}}{2}\right) = \frac{c_i}{H_i}$$

In this particular case with $(\alpha_{NOA})_{Maximum\ Limit}$ (11), (13) goes to (14):

$$(14)\ tg\left(\frac{180}{2}\right) = tg(90) = \infty = \frac{c_i}{H_i} \rightarrow (H_i \rightarrow 0)$$

And consequently, $H_i \rightarrow 0$. Perhaps, for this case with $(\alpha_{NOA})_{Maximum\ Limit}$ is mote intuitive to use (15) and as $c_i = r_i$, then $H_i = 0$.

$$(15)\ \sin\left(\frac{(\alpha_{NOA})_{Limit}}{2}\right) = \sin\left(\frac{180}{2}\right) = \sin(90) = 1 = \frac{c_i}{r_i} \rightarrow c_i = r_i$$

In **Annex**, method for calculating $C_{POTI\text{-}AL}$ is developed.

P33 $C_{POTI\text{-}GAL}$ Geometric Angular Limit

Lobes with geometric limitations have $C_{POTI\text{-}GAL}$ that allows fulfilment of (13) and $(\alpha_{NOA})_{Limit}$ must comply (16):

$$(16)\ \ 0 < (\alpha_{NOA})_{Limit} < 180$$

That is, $(\alpha_{NOA})_{Limit}$ must not be 180º or $(\alpha_{NOA})_{Maximum\ Limit}$ (P32) and there is no EE orbit with $(\alpha_{NOA})=0$ and therefore $c_i=0$. Thus, since d lobe occupies one quadrant (90 degrees), (17) is obtained by substituting (13); d lobe $C_{POTI\text{-}GAL}$ must comply that there is limit division where $c_i=H_i$

$$(17)\ \mathrm{tg}\left(\frac{90}{2}\right)=\mathrm{tg}(45)=1=\frac{c_i}{H_i}\rightarrow c_i=H_i$$

c_i is less that H_i if $(\alpha_{NOA})_{Limit}$ is closed more that 90 degrees. Thus, for example if $(\alpha_{NOA})_{Limit}=60^o$, c_i maximum value in relation to H_i is given by (18):

$$(18)\ \mathrm{tg}\left(\frac{60}{2}\right)=\mathrm{tg}(30)=\frac{1}{\sqrt{3}}=\frac{c_i}{H_i}\rightarrow c_i=\frac{H_i}{\sqrt{3}}$$

$C_{POTI\text{-}GAL}$ defines extern shape and its higher probability. Higher probability since C_{POTI} is in P_i numerator (3) and extern shape because C_{POTI} divides C_F and therefore multiplies c_i. Likewise, Figure 1, 2 and 4 serve to corroborate it.

Figures 5 and 6 better illustrate P32 and P33 and their relation with p and d orbital geometric idea respectively. Lithium data indicated at the beginning are utilized in **Figure 5.A and 6.A.** as an example since is 2s electron. Figure 5.A. can be imagined for 2s electron if applied "P18 Rotation movement or fixation of OPA: Difference between s and No s electrons is like seeing blades of moving fan (seen as a whole) or stopped (which looks its shape) respectively" [2]. One orbital type of $2p^5$ Fluorine and $3d^{10}$ Zinc is shown in **Figure 5.B and 6.B.** respectively and are in Annex 2 along Pi vs ri curves (**Figure 5.C. and 6.C.**) for C_{POTI} indicated in **Table 1**. Orbitals have been brought to $C_{POTI\text{-}AL}$ (F) and $C_{POTI\text{-}GAL}$ (Zn) to verify that, although $2p^5$ Fluorine and $3d^{10}$ Zinc are more penetrating than simulated Lithium "p" and "d" orbitals, ci vs. Hi shape is equivalent.

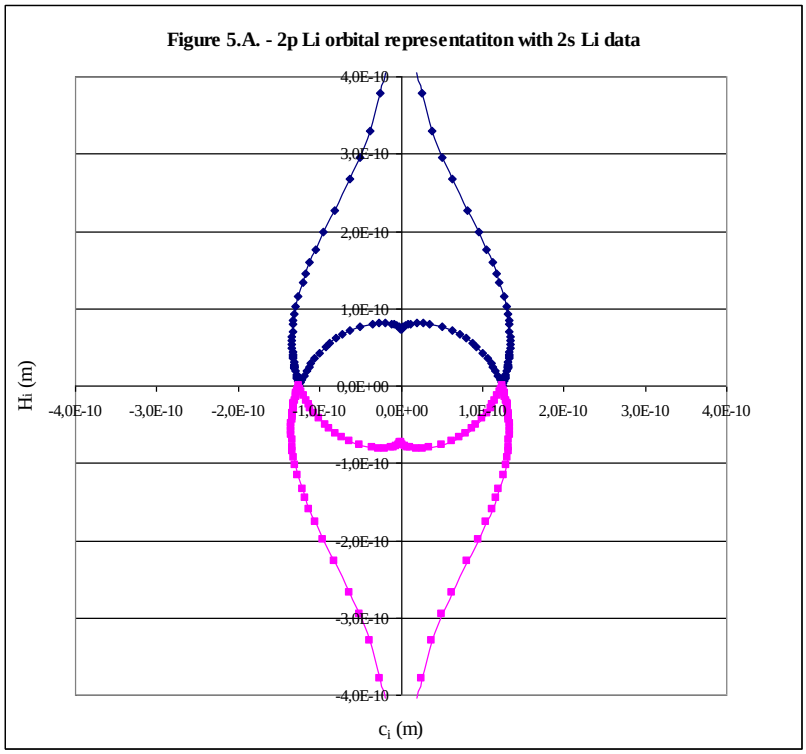
MON is proposed in following article as noted when MON=25 has been assigned to extern lobe of 2s Li whose z is given by P14 Effective nuclear charge in ns electron external lobe [1]. Therefore, z and MON are not yet provided for $2p^5$ Fluorine and $3d^{10}$ Zinc and are indicated directly in **Table 1**. Data are obtained by geometric and probabilistic coupling with ns electron as explained in following article.

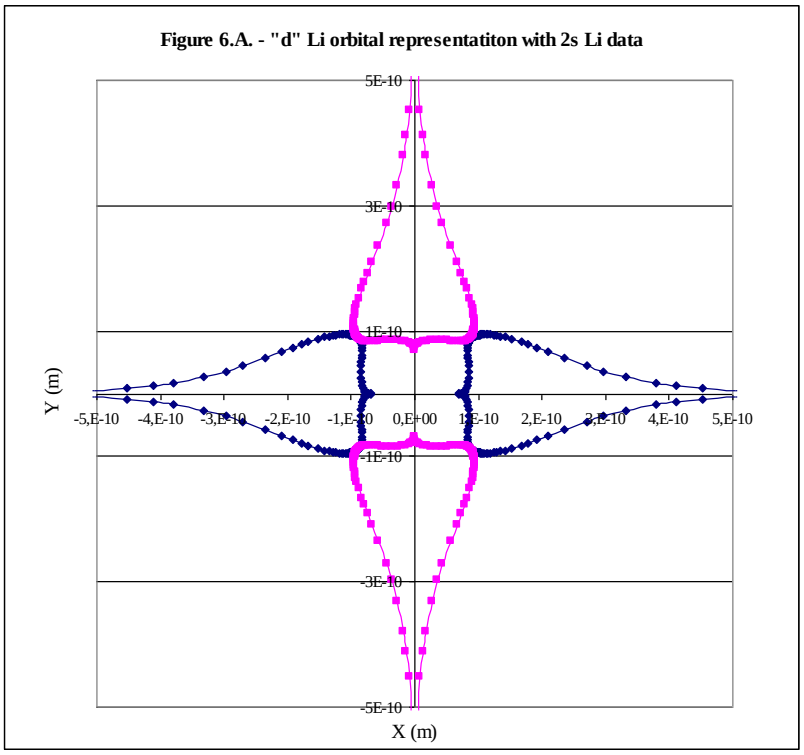
Table 1 - Data provided with PEP=2 and E_o=IE and Maximum Probability compared with references for indicated lobes.

Lobe	z	MON	C_{POTI}	Maximum electron density (A)			
				Maximum P_i	[6]	[7]	[8]
$2p^5$ F	0.66	106	1.13	0.41	0.41	0.38	0.360
$3d^{10}$ Zn	1.08	74	0.86	0.31	No data	No data	0.292

[8] is "radii equated to the outermost maximum of the 1-electron radial charge densities of electrons in the various shells in neutral atoms" and allows $3d^{10}$ Zn to be checked with reference [8] (3d shell) because [6] and [7] only provide "Maximum electron density" for outermost shell.

Maximum Pi observed in Pi vs ri curves (0.41A for $2p^5$ F and 0.31 for $3d^{10}$ Zn) are in agreement with references [6-8].

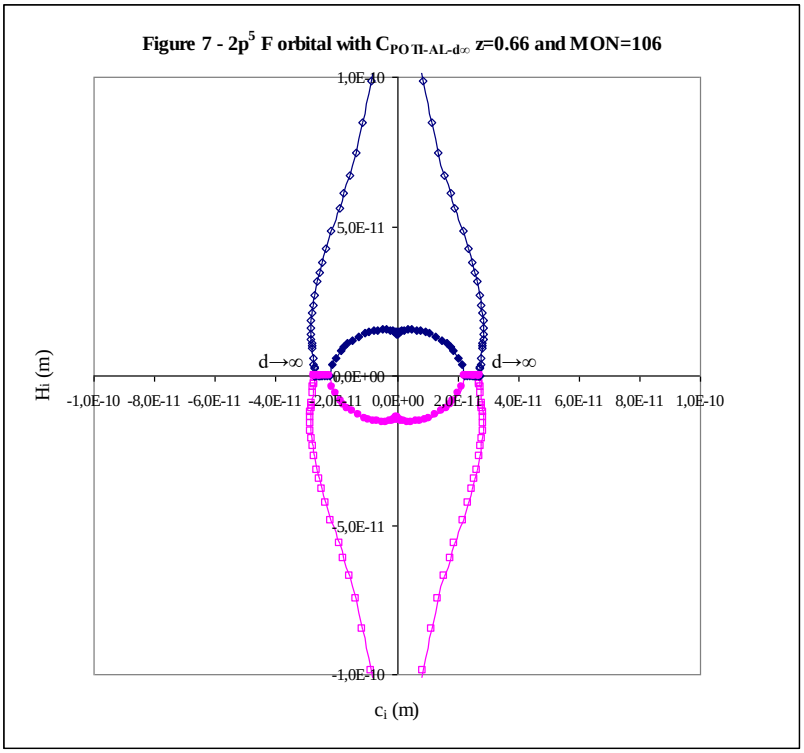


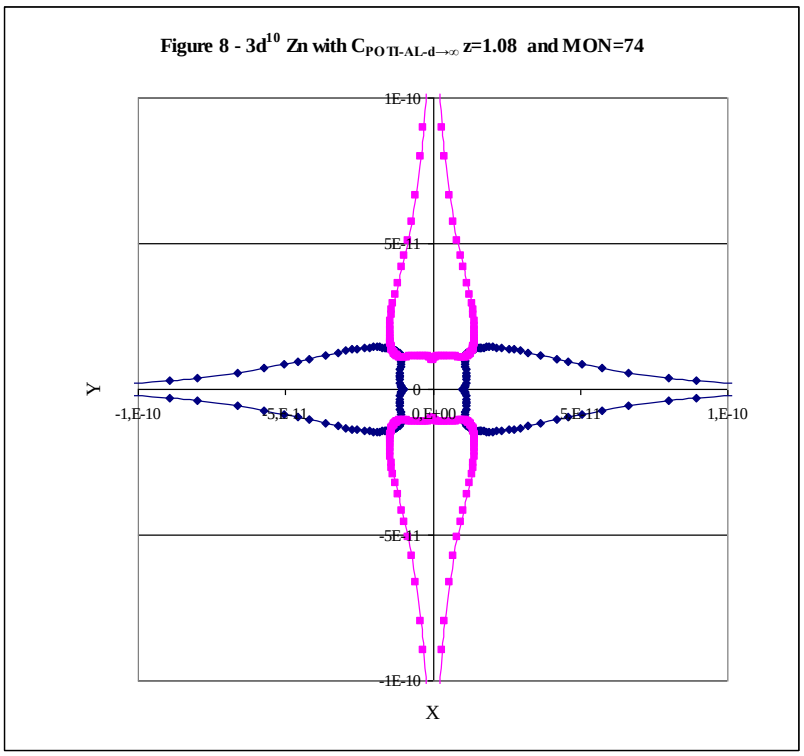


$C_{POTI\text{-}GAL*}$ and $C_{POTI\text{-}AL*}$

* indicates that C_{POTI} Geometric Angular Limit or Angular Limit has been exceeded. $C_{POTI\text{-}AL\text{-}d\to\infty}$ is C_{POTI} value that allows A and B electronic extremes to meet (11) $(\alpha_{NOA})_{Hi\,=\,0} = (\alpha_{NOA})_{Maximum\ Limit} = 180^{o}$ when $d\to\infty$. $C_{POTI\text{-}AL\text{-}d\to\infty}$ has special interest case because places both electronic extremes together in transit place to other quadrant. One orbital type of $2p^5$ Fluorine and $3d^{10}$ Zinc, both with $C_{POTI\text{-}AL\text{-}d\to\infty}$, is shown in **Figure 7**

and **Figure 8**. EE_B is drawn with filled symbols and EE_A with empty symbols. Data used are in Table 1 except C_{POTI} because $C_{POTI\text{-}AL\text{-}d\to\infty}(2p^5\ F)$= 1.16647 and $C_{POTI\text{-}GAL\text{-}d\to\infty}(3d^{10}\ Zn)$= 0.891754 are now employed. Special EE_B situation between $C_{POTI\text{-}GAL}$ or $C_{POTI\text{-}AL}$ and $C_{POTI\text{-}GAL*}$ or $C_{POTI\text{-}AL*}$ respectively must be studied.





$C_{POTI\text{-}AL\text{-}d\to\infty}$ and $C_{POTI\text{-}GAL\text{-}d\to\infty}$ calculation

$C_{POTI\text{-}AL\text{-}d\to\infty}$ and $C_{POTI\text{-}GAL\text{-}d\to\infty}$ calculation is facilitated because C_F (2) is simplified when $d\to\infty$ (19):

$$(30)\ C_{F-J\,order}(d\to\infty)=\frac{2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}}{C_{POTI}}=\frac{2+\sum_{x=1}^{J}\frac{x^2*P*M}{\infty}}{C_{POTI}}=\frac{2+0}{C_{POTI}}=\frac{2}{C_{POTI}}$$

$C_{POTI\text{-}AL\text{-}d\to\infty}$ calculation

Right-angled triangle relation [2] gives relation between H_i, c_i and r_i (31). (31) goes to equation (32) when $d\to\infty$ and to (33) when is $C_{POTI\text{-}AL\text{-}d\to\infty}$ because $H_i=0$.

$$(31)\ r_i^2=c_i^2+H_i^2$$

$$(32)\ (r_i)_{d\to\infty}^2=(c_i)_{d\to\infty}^2+(H_i)_{d\to\infty}^2$$

$$(33)\ (r_i)_{d\to\infty}^2=(c_i)_{d\to\infty}^2 \qquad \text{if } C_{POTI\text{-}AL\text{-}d\to\infty}$$

Considering ri when $d\to\infty$ (34) [1] where F is (35) and c_i expressed as r_i function (36):

$$(34)\ (r_A)_{d\to\infty}=(r_B)_{d\to\infty}=(r_i)_{d\to\infty}=\frac{-fz}{2(E_i)_{d\to\infty}}=\frac{-fz}{E_o}=\frac{-F}{E_o}$$

$$(35)\ F=\frac{Kq^2}{2}z=fz=1{,}153538564\bullet10^{-28}z$$

$$(36)\ c_i=\frac{\hbar}{C_F\sqrt{2m_ef}}\frac{r_i^{1/2}}{z^{1/2}}$$

(33) is transformed into (37):

$$(37)\ (r_i)_{d\to\infty}=\frac{\hbar}{(C_F)_{d\to\infty}\sqrt{2m_ef}}\frac{(r_i)_{d\to\infty}^{1/2}}{z^{1/2}}$$

$C_{POTI\text{-}AL\text{-}d\to\infty}$ (38) is obtained from (37) when (30) is applied and $(r_i)_{d\to\infty}$ is simplified. $C_{POTI\text{-}AL\text{-}d\to\infty}$ can therefore be obtained by knowing only E_o (ionization energy) and charge (z).

$$(38)\ C_{POTI\text{-}AL\text{-}d\to\infty}=\frac{2(r_i)_{d\to\infty}^{1/2}z^{1/2}\sqrt{2m_ef}}{\hbar}=\frac{2\left(\frac{-fz}{E_o}\right)^{1/2}z^{1/2}\sqrt{2m_ef}}{\hbar}=\frac{2^{3/2}fzm_e^{1/2}}{(-E_o)^{1/2}\hbar}$$

$C_{POTI\text{-}GAL\text{-}d\to\infty}$ calculation

Development is analogous but considering that now $H_i\neq0$.

Example is d lobe which occupies one quadrant (90 degrees) and H_i=ci (17). (33) changes to (39) if α_{NOA} goes from 180 (p lobe) to 90 (d lobe).

$$(39)\ (r_i)_{d\to\infty}^2 = 2(c_i)_{d\to\infty}^2 \qquad \text{if } C_{POTI\text{-}GAL\text{-}d\to\infty} \text{ with } \alpha_{NOA}= 90^{\circ} \text{ (d lobe).}$$

$$(40)\ (c_i)_{d\to\infty} = \frac{(r_i)_{d\to\infty}}{2^{1/2}}$$

$$(41)\ C_{POTI\text{-}GAL\text{-}d\to\infty}(90^{o}) = \frac{1}{2^{1/2}}\frac{2^{3/2} fzm_e^{1/2}}{(-E_o)^{1/2}\hbar} = \frac{2fzm_e^{1/2}}{(-E_o)^{1/2}\hbar}$$

Right-angled triangle relation (32) with division and (33) with d→∞ can be expressed in general way (42) using tangent (13):

$$(42.A)\ r_i^2 = c_i^2 + H_i^2 = c_i^2 + \frac{c_i^2}{tg^2\left(\frac{\alpha_{NOA}}{2}\right)}$$

$$(42.B)\ (r_i)_{d\to\infty}^2 = (c_i)_{d\to\infty}^2 + (H_i)_{d\to\infty}^2 = (c_i)_{d\to\infty}^2 + \frac{(c_i)_{d\to\infty}^2}{tg^2\left(\frac{\alpha_{NOA}}{2}\right)}$$

Therefore, coefficient that accompanies c_i, called F_c, is obtained in (43). Finally, Fc is located in $C_{POTI\text{-}GAL\text{-}d\to\infty}$ expression denominator (44):

$$(43)\ F_c = \left(\frac{1}{c_i^2}\left(c_i^2 + \frac{c_i^2}{tg^2\left(\frac{\alpha_{NOA}}{2}\right)}\right)\right)^{1/2} = \left(1 + \frac{1}{tg^2\left(\frac{\alpha_{NOA}}{2}\right)}\right)^{1/2} = \left(\frac{tg^2\left(\frac{\alpha_{NOA}}{2}\right)+1}{tg^2\left(\frac{\alpha_{NOA}}{2}\right)}\right)^{1/2}$$

$$(44)\ C_{POTI\text{-}GAL\text{-}d\to\infty}\left(\frac{\alpha_{NOA}}{2}\right) = \frac{1}{F_c}\frac{2^{3/2} fzm_e^{1/2}}{(-E_o)^{1/2}\hbar} = \frac{2^{3/2} fzm_e^{1/2}}{(-E_o)^{1/2}\hbar}\left(\frac{tg^2\left(\frac{\alpha_{NOA}}{2}\right)}{1+tg^2\left(\frac{\alpha_{NOA}}{2}\right)}\right)^{1/2}$$

Consequently, Fc for first lobe types is in **Table 2** and implies that $C_{POTI\text{-}GAL\text{-}d\to\infty}$ (44) decreases as orbital quantum number increases.

Table 2 - F_c for first orbital quantum numbers.

Lobe	α_{NOA}	$tg(\alpha_{NOA}/2)$	F_c	F_c^{-1}
s, p	180	∞	1	1

d	90	1	$2^{1/2}$	$\frac{1}{2^{1/2}}$
f	60	$\frac{1}{3^{1/2}}$	2	$\frac{1}{2}$

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[2] Javier Silvestre. Electronic extremes: orbital and spin (introduction). (Document sent to vixra.org)
[3] Javier Silvestre. Relations between electronic extremes: Rotation time as probability and First Feliz Solution. (Document sent to vixra.org)
[4] Javier Silvestre. Feliz II the prudent: Probability radial closure with high order variable C_F. (Document sent to vixra.org)
[5] Kramida, A., Ralchenko, Yu., Reader, J., and NIST ASD Team (2014). NIST Atomic Spectra Database (ver. 5.2), [Online]. Available: http://physics.nist.gov/asd
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Abbreviations List

Suffix indicates electronic extreme considered and i suffix is used to both electronic extremes (EE_i). Following Table indicates abbreviations used in this theory and its use in article in question is marked with X. 5 is present article

Abbreviations Table						
Abbreviation	**1**	**2**	**3**	**4**	**5**	**Meaning**
α_{NOA}					X	Nucleus-Orbit-Angle
a_o			X			Bohr radius
AL					X	Angular Limit
c_i		X	X	X	X	EE Orbital circumference
C_F		X	X	X	X	Wavelength compaction factor
C_{MON}					X	C_F without C_{POTI}
C_{POTI}					X	Probabilistic Orbital Tide in Third Feliz Solution
$C_{POTI-AL}$					X	C_{POTI} Angular Limit
$C_{POTI-GAL}$					X	C_{POTI} Geometric Angular Limit
$C_{POTI-LAG}$						C_{POTI} Lobe Always growing
d	X	X	X	X	X	Birth wavelength division or simply, division
EE	X	X	X	X	X	Electronic extreme
E_o	X	X	X	X	X	Initial, birth or output energy

E_i	X		X	X		EE energy
Ek_i	X		X	X		EE kinetic energy
EP_i	X			X		EE potential energy
ES	X	X				Equi-energetic state
f	X		X	X	X	Constant in Victoria Equation
F	X		X	X	X	Constant f multiplied by z
GAL					X	Geometric Angular Limit
h	X	X	X		X	Planck´s constant
ħ		X		X	X	Reduced Planck´s constant
h_i	X		X			Planck´s constant adapted to EE
H_i		X	X	X	X	EE Circular orbit height
IE	X	X		X	X	Ionization Energy
m_e	X	X	X	X	X	Electron mass
m_i	X		X	X		EE mass
J				X	X	C_F order in Second Feliz Solution (From x=1 to J)
K_P			X			Probability constant in Variable C_F
λ_{Birth} λ	X	X		X	X	Birth wavelength
λ_c	X					Electron classic wavelength
λ_i	X	X	X	X		EE wavelength
$\lambda_{i\text{-}Birth}$	X					EE wavelength when $d \rightarrow \infty$
LAG					X	Lobe always growing
M			X	X	X	MON (Modified Orbital Number)
MON			X	X	X	Modified Orbital Number
NIN	X		X	X		Negative in Negative (Electron in electron concept)
OAM		X				Orbital Angular Momentum
OPA		X				Orbital Planes Axis
P_i			X	X	X	EE Probability
P			X	X	X	PEP (Principal Electronic Part)
PEP			X	X	X	Principal Electronic Part
q_e	X					Electron charge
q_i	X					EE charge
q_{ip}	X					Proton charge
r_{AB}	X					Difference in nucleus distance between EE_A and EE_B
r_O	X					Nucleus distance when EE_i is in pivot or initial position
r_i	X	X	X	X	X	Distance between nucleus and EE
SAM		X				Spin Angular Momentum
SMM		X				Spin Magnetic Momentum
SSM	X		X			Secondary Swinging Movement
v_i	X	X	X	X	X	EE velocity

z	X	X	X	X	X	Effective nuclear charge
Z	X					Atomic number

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24 hours of new day		

Annex 1 - $C_{POTI-AL}$ by division with Minimum C_{POTI}

For $C_{POTI-AL}$ (P32) is taken into account:

a) Relationship between orbital circumference (c_i) and distance between EE and nucleus (r_i) (19) [3]. Compaction Factor (C_F), electron mass (m_e), Effective nuclear charge (z) and Victoria Equation f constant (f) are also included in (19):

$$(19)\ c_i = \frac{\hbar}{C_F\sqrt{2m_e f}}\frac{r_i^{1/2}}{z^{1/2}}$$

b) C_F with J order (theoretically until infinite order) (20) is developed in [4].

$$(20)\ C_{F-J\,order} = \frac{2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}}{C_{POTI}}$$

(20) is abbreviated to (22) if (20) numerator is replaced by C_{MON} (21):

$$(21)\ C_{MON} = 2+\sum_{x=1}^{J}\frac{x^2*P*M}{d^{x*P}}$$

$$(22)\ C_{F-J\,order} = \frac{C_{MON}}{C_{POTI}}$$

c_i and r_i in (19) and C_{MON} and $C_{F\text{-}J\ order}$ in (22) are altered when d is modified. Magnitudes rest is d independents.

c) Circular orbit height (H_i) is related with c_i and r_i by right-angled triangle relation (23) [2].

$$(23)\ H_i = \sqrt{r_i^2 - c_i^2}$$

d) First division (d) that causes $H_i \rightarrow 0$ is searched. Therefore, minimum C_{POTI} that meets $H_i=0$ is also sought. (24) is obtained by substituting (22) in (19)

$$(24)\ c_i = \frac{\hbar}{\sqrt{2m_e f z}}\frac{r_i^{1/2}C_{POTI}}{C_{MON}}$$

As $(\alpha_{NOA})_{Maximum\ Limit} = 180^o$ and $H_i=0$, equality between r_i and c_i (26) is a consequence of (25):

$$(25)\ H_i = \sqrt{r_i^2 - c_i^2} = 0$$

$$(26)\ r_i = c_i \quad (\text{with } H_i = 0)$$

Since c_i is already proportional to $r_i^{1/2}$ (19) and (24), remaining expression must be equal to $r_i^{1/2}$ (27) for (26) to be fulfilled.

$$(27)\ r_i^{1/2} = \frac{\hbar}{\sqrt{2m_e fz}} \frac{C_{POTI}}{C_{MON}}$$

Searched expression (28) is found when C_{POTI} is obtained from (27). "Minimum" (29) means that minimum C_{POTI} sought that meets (28).

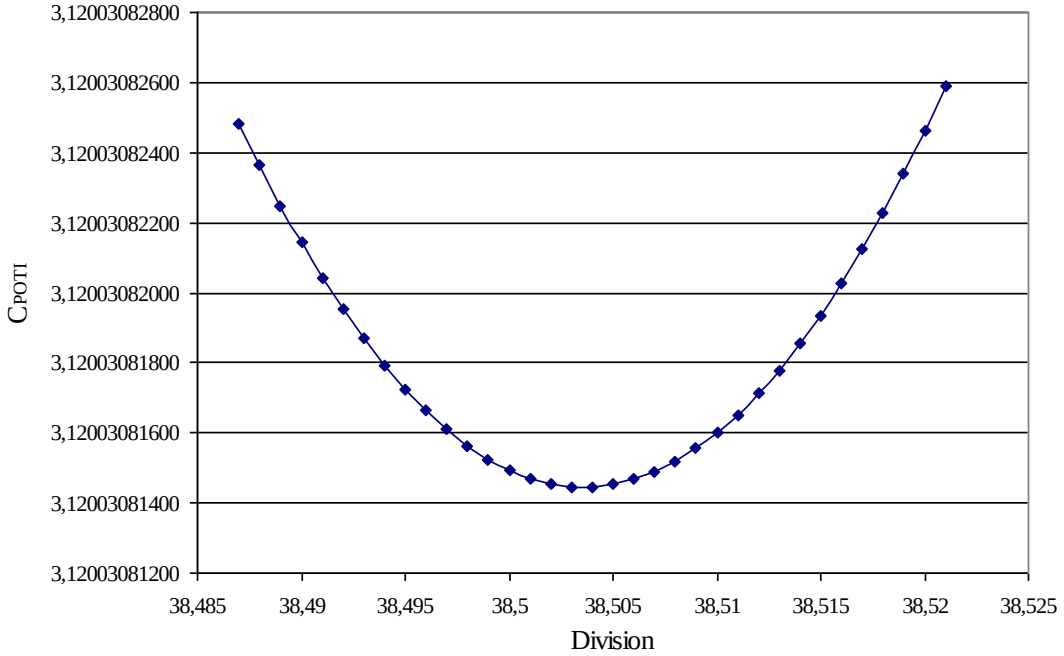
$$(28)\ C_{POTI} = \frac{\sqrt{2m_e fz}}{\hbar} r_i^{1/2} C_{MON}$$

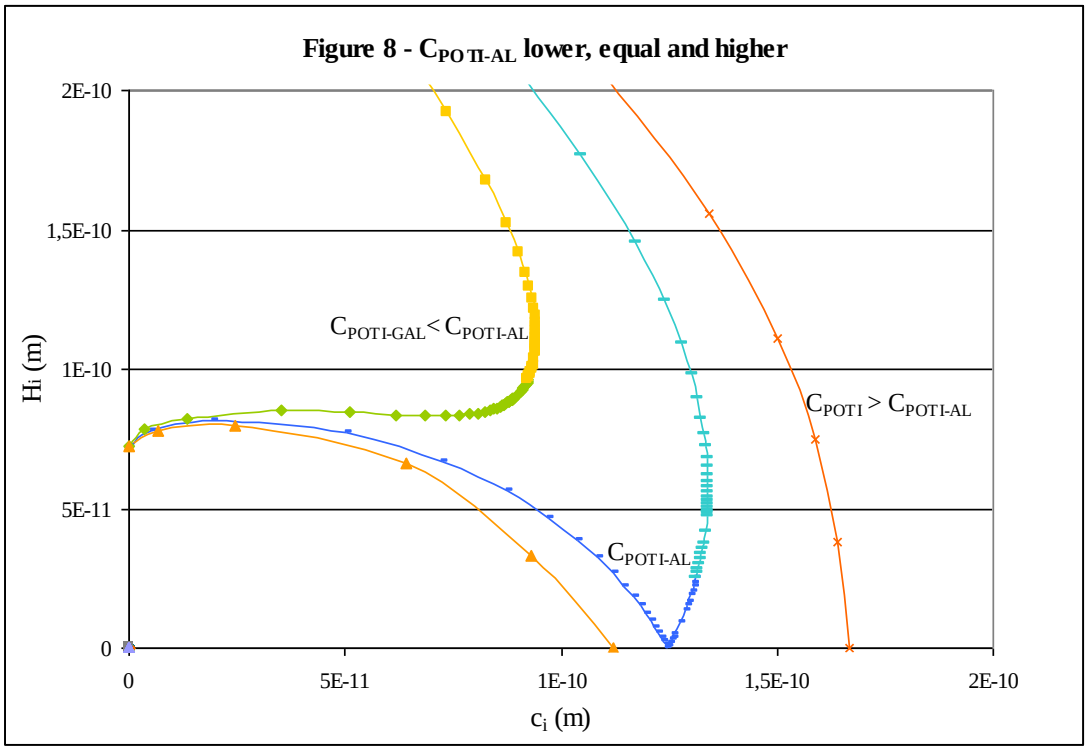
$$(29)\ C_{POTI\,Minimum} = \frac{\sqrt{2m_e fz}}{\hbar} r_i^{1/2} C_{MON}$$

$C_{POTI\ minimum}$ is located by divisions inclusion that provide C_{MON} and r_i values. Concretely and based on situations seen, C_{POTI} minimum is observed in EE_B.In **Figure 7**, C_{POTI} is represented by (28) with d=0.001 variations. Minimum curve provides $C_{POTI\ minimum}$ = 3.120030814458 that satisfies $(\alpha_{NOA})_{Hi=0}$ (11) and division in which C_{POTI} minimum occurs (d_B = 38.504). In **Figure 8** are represented 3 possibilities:

1) $C_{POTI\text{-}AL}$ (P32) that touches X axis with a single point
2) $C_{POTI\text{-}GAL}$ (P33) < $C_{POTI\text{-}AL}$ provide that EE orbit with highest α_{NOA} angle is $\alpha_{NOA}<180º = (\alpha_{NOA})_{Maximum\ Limit}$. This option does not reach X axis. $C_{POTI\text{-}GAL}$ with α_{NOA}=90º (type-d orbital) has been selected for Figure 8.
3) $C_{POTI} > C_{POTI\text{-}AL}$ has two intersection points with X axis and between them there is division range without H_i real solutions.

Figure 7 - 2s Li example - $C_{POTI\ minimum}$ search that satisfies $(\alpha_{NOA})_{Hi=0}$





Annex 2 - Orbital representation and P_i vs r_i for $2p^5$ Fluorine and $3d^{10}$ Zinc with $C_{POTI-AL}$ as an example.

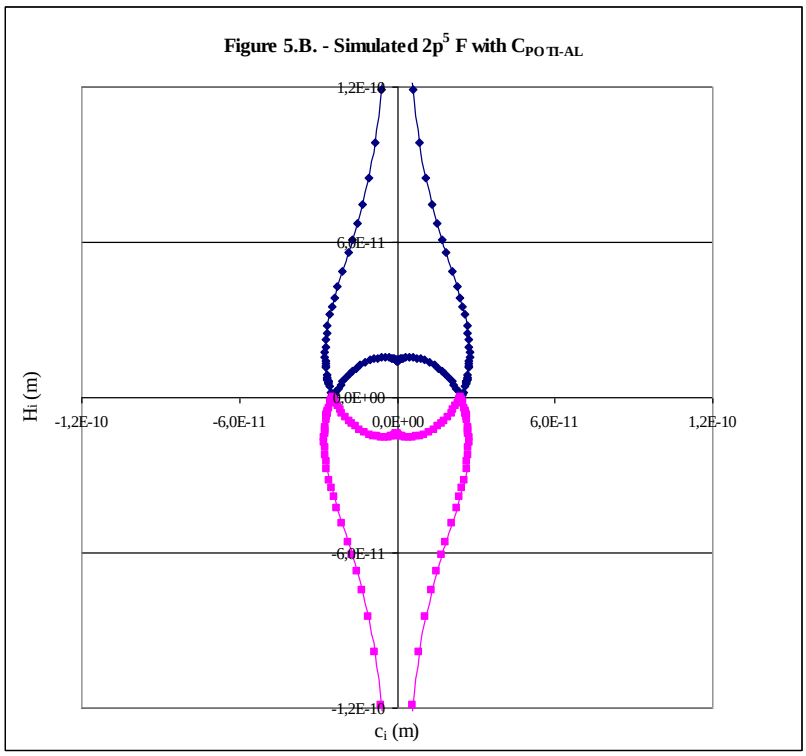


Figure 6.B. - Simulated $3d^{10}$ Zn with $C_{POTI-AL}$

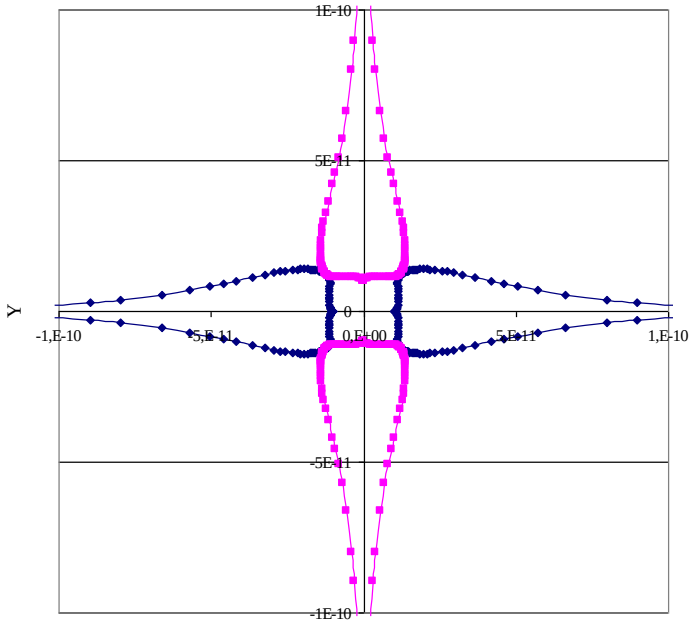


Figure 5.C. P_i vs r_i for simulated $2p^5$ F with $C_{POTI-AL}$

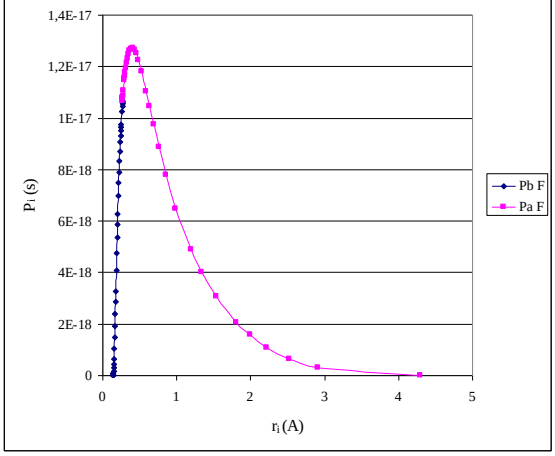


Figure 5.C. P_i vs r_i for simulated $2p^5$ F with $C_{POTI-AL}$ (Zoom in Maximum P_i)

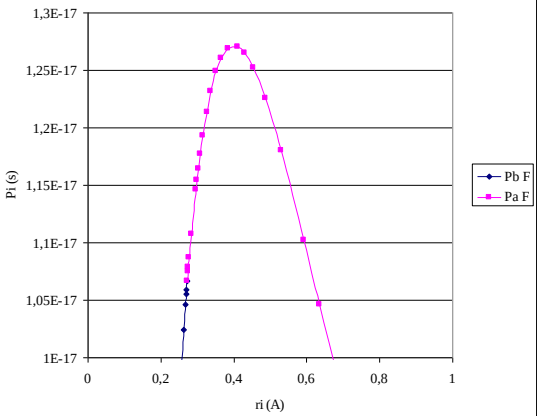


Figure 5.C. P_i vs r_i for simulated $3d^{10}$ Zn - $C_{POTI-AL}$

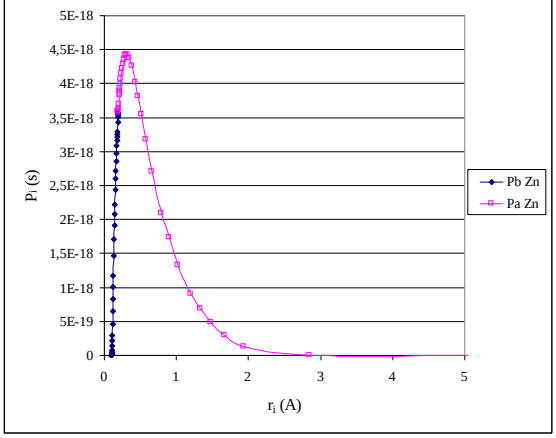


Figure 5.C. P_i vs r_i for simulated $3d^{10}$ Zn - $C_{POTI-AL}$ (Zoom in Maximum P_i)