

ARTICLE 12  
RELATION OF RIQUELME DE GOZY: LAN LINEALITY WITH  
ENERGY OF EXCITED STATES

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**ABSTRACT**

This is 12th article of 24 dedicated to atomic model based on Victoria equation (Articles index is at end). Excited state energy is attracted towards Torrebotana Central Line [1] and this attraction is accentuated as n and l are increased. LAN allows Serelles Secondary Lines creation depending on non-excited and excited states. LAN vs. n curve shows soft plain that leads to straight line equation in excited state energy function. Relation of Riquelme de Gozy is this line equation and now, Li detailed study of  $1s^2s \rightarrow 1s^2ns$  is extended to this jump in other atoms and other jump types.

Initially, P50 Initial LAN value in jump from ns to ns is utilized with "Xorrador Approximation" that enables correct first estimate of excited state energies.

**KEYWORDS**

Tete-Vic equation. Torrebotana Central Line, Serelles Secondary Line, LAN plain, Relation of Riquelme de Gozy,  $z_{CT}$  (Zon Equation).

**INTRODUCTION**

Continuing with P49 LAN plain: Jump in Serelles Secondary Line, LAN linearity with destiny energy is corroborated with different atoms and jumps. This linearity is called Relation of Riquelme de Gozy and can be obtained with  $E_k$  (jump reference value [3]) or  $E_{dR}$  (destiny energy [3]) with equivalent results to being related by IE (Ionization Energy) although slope sign or Y-intercept are different. Abbreviations Table is at end article. As in [2], Relation of Riquelme de Gozy is calculated with  $E_{dR}$  and linearity is checked with 3 points even though linearity equation only requires 2: First three points are selected to see if linearity condition is reached. First three points are:

- a) ns → ns                      First two jumps and non-excited state (thanks to P50 Initial LAN value in jump from ns to ns and its application to Relation of Riquelme de Gozy).
- b) Other jumps                First three jumps

Lithium study in  $1s^2s \rightarrow 1s^2ns$  (Term=  $^2S$  and  $J=1/2$ ) jump is followed with identical steps taken and therefore not explained in such detailed way.  $1s^2s \rightarrow 1s^2ns$  (Term=  $^2S$  and  $J=1/2$ ) jump is ns → ns jump and consequently in a) group of previous situation with special LAN(P50) importance [2]. LAN general equation and LAN(P50) particular case are given in (1) and (2) respectively [2]:

$$(1) - LAN \approx -LAN_R = \left( \frac{z_s^2 E_o}{z_o^2 E_{dR}} \right)^{1/2} - n = \left( \frac{z_s^2 E_o}{z_o^2 (E_k + IE)} \right)^{1/2} - n$$

$$(2) - \text{LAN}(P50) = -\text{LAN}_{n_s \rightarrow n_s} = \frac{(-E_o)^{1/2} z_s}{(-IE)^{1/2} z_o} - n_{\text{initial}}$$

LAN(P50) is calculated for lower Z atoms with 2s→ns jump in **Table 1** (Z=[3,13]). LAN is added to n and lacks unit, although Lanito is assigned and for example International System prefixes to name submultiples can be used in situation with low LAN. Millilanito (mLanito) is also shown in Table 1. Anyway, Lanito is unit used if submultiple is not indicated.

<b>Table 1 - LAN(P50) in 2s→ns (Lanitos and mLanitos)</b>		
Symbol	LAN(P50) (n=2) (Lanitos)	LAN(P50) (n=2) (mLanitos)
Li	0,41144445	411,44445
Be	0,27118299	271,18299
B	0,20303233	203,03233
C	0,16242214	162,42214
N	0,13542253	135,42253
O	0,11615164	116,15164
F	0,10171511	101,71511
Ne	0,09048397	90,48397
Na	0,08151353	81,51353
Mg	0,07419118	74,19118
Al	0,06806405	68,06405

### 1) Xorrador Approximation with first LAN value

Xorrador Approximation with First LAN value is an interesting tool because, even without knowing how varies with excited electron energy, can be used as constant for every excited state because P49 LAN plain stipulates low variation with energy. This first value is LAN(P50) for non-excited state in ns to ns jump (2) and first excited state for other jumps. For this fact, tool is still more surprising for ns→ns because estimation can be done for every ns with Ionization Energy and, therefore, without knowing any excited state energy.

Jump Energy and Destiny Energy deduced with Xorrador Approximation carry suffix A to mark that are approximate values and are connected with IE (3). Expression for reference data is analogous with  $E_k$  and  $E_{dR}$  as seen in introduction, [1] and [2] (4).

$$(3) E_{dA} = E_{JA} + IE$$

$$(4) E_{dR} = E_k + IE$$

Approximated destiny energy ( $E_{dA}$ ) (5) has almost identical equation to  $E_{dS}$  (where S is Serelles) [2], but assuming license to consider constant LAN(P50) and valid for all excited state energy (6).

$$(5)E_{dA} = E_{JA} + IE = \frac{z_s^2 E_o}{z_o^2 (n - LAN(P50))^2}$$

$$(6) - LAN_A = \text{constant} = -LAN(P50) = \left( \frac{z_s^2 E_o}{z_o^2 E_{dA}} \right)^{1/2} - n = \left( \frac{z_s^2 E_o}{z_o^2 (E_{JA} + IE)} \right)^{1/2} - n$$

**Table 2** contains necessary Neon data for LAN(P50) calculation (2):

$E_o$  is ionization energy of origin electronic system (OES IE) in all atom: 1s electron [4]

IE is ionization energy for electron to be excited: born electronic system or BES [4]

$z_s$  and  $z_o$  are Start charge and 1s origin charge respectively according to P46 [1]

LAN(P50) is Initial LAN value in ns→ns jump when electron is non-excited. [2]

<b>Table 2</b> - Ne $1s^2 2s \rightarrow 1s^2 ns$ (Term= $^2S$ J=1/2): data for LAN(P50) (2)				
$E_o$ (eV) [4]	IE 2s (eV) [4]	$z_s$	$z_o$	LAN(P50) (lanito)
-1362,1991	-239,0969	8	10	0,09048397

Comparison between  $E_{dA}$  provided by (5) and  $E_k$  (jump reference value [3]) is summarized in the **Table 3**:

$n$  is excited state principal quantum number

$E_{dA}$  is approximated destiny energy (5)

$E_{JA}$  is approximated jump energy and is related with  $E_{dA}$  and IE by (3)

$E_k$  is jump reference value [3] and is related with  $E_{dR}$  and IE by (4)

AC is Actual Change (7)

%RC (Jump) is Relative Change based on jump energies (8)

%RC (Destiny) is Relative Change based on destiny energies (9)

$$(7) \text{ Actual Change} = AC = \Delta = E_{JA} - E_k$$

$$(8) \%RC(\text{Jump}) = \frac{(E_{JA} - E_k)}{E_k} * 100$$

$$(9) \%RC(\text{Destiny}) = \frac{(E_{dA} - E_{dR})}{E_{dR}} * 100$$

n	$E_{dA}$ (eV) (5)	$E_{JA}$ (eV) (3)	$E_k$ (eV) [3]	AC (eV) (7)	%RC (Jump)(8)	%RC (Destiny)(9)
3	-102,986205	136,1106951	136,36848	0,2577849	0,19%	-0,25%
4	-57,0393498	182,0575502	182,2092	0,15164984	0,08%	-0,27%
5	-36,1695577	202,9273423	203,0192	0,09185772	0,05%	-0,25%
6	-24,9641471	214,1327529	214,1925	0,0597471	0,03%	-0,24%
7	-18,2610315	220,8358685	220,8772	0,0413315	0,02%	-0,23%
8	-13,9354418	225,1614582	225,1915	0,0300418	0,01%	-0,22%
9	-10,9827813	228,1141187	228,13675	0,02263131	0,01%	-0,21%
10	-8,8780109	230,2188891	230,2365	0,0176109	0,01%	-0,20%

Xorrador supplies good approximation between  $E_{JA}$  and  $E_k$  and better than provided by Torrebotana Central Line jump energy ( $E_J$ ) where, for example in  $1s^2 3s$  jump,  $E_J \approx 142,23$  eV which is farthest from  $E_k = 136,36848$  eV than Xorrador approximate value  $E_{JA} = 136,1106951$  eV. Therefore, Xorrador is good tool to have an impression closer to  $2s \rightarrow ns$  Serelles Secondary Line and to destiny energy in that jump than Torrebotana Central Line.

Ne  $1s^2 2s \rightarrow 1s^2 ns$  (Term= $^2S$  J=1/2) has low LAN(P50) and close to 0 (LAN(P50)=0,41144445 Lanitos) (Table 1). For a given jump (in this case  $ns \rightarrow ns$  (Term= $^2S$  J=1/2)), LAN increases generally when (10):

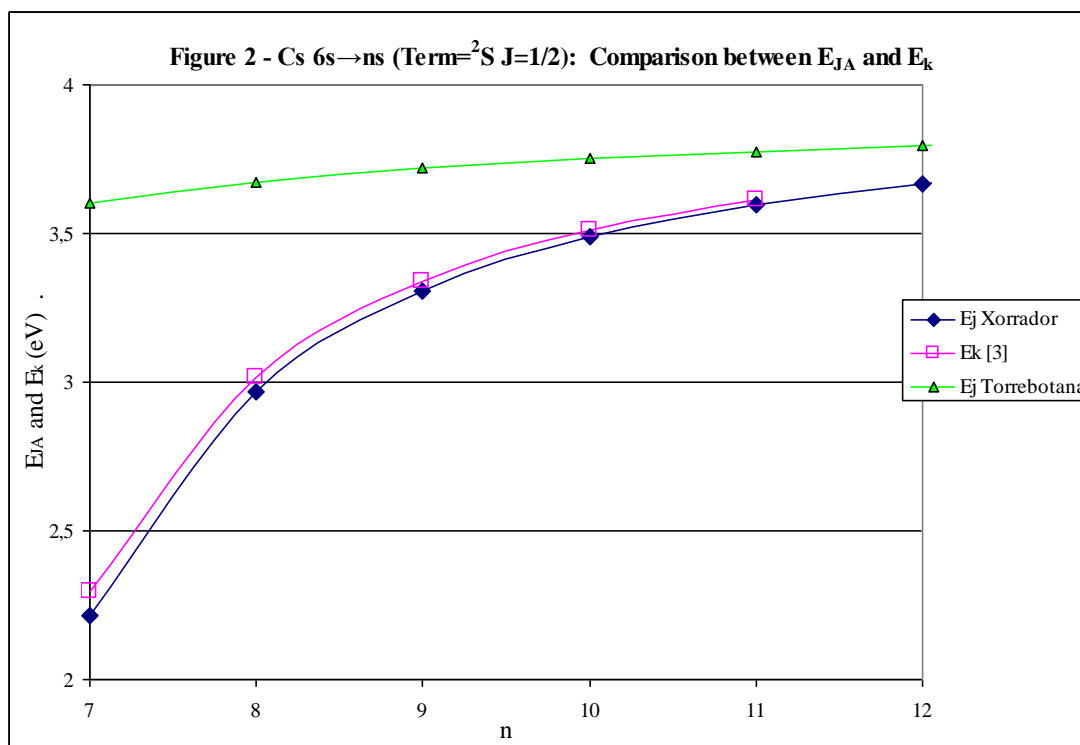
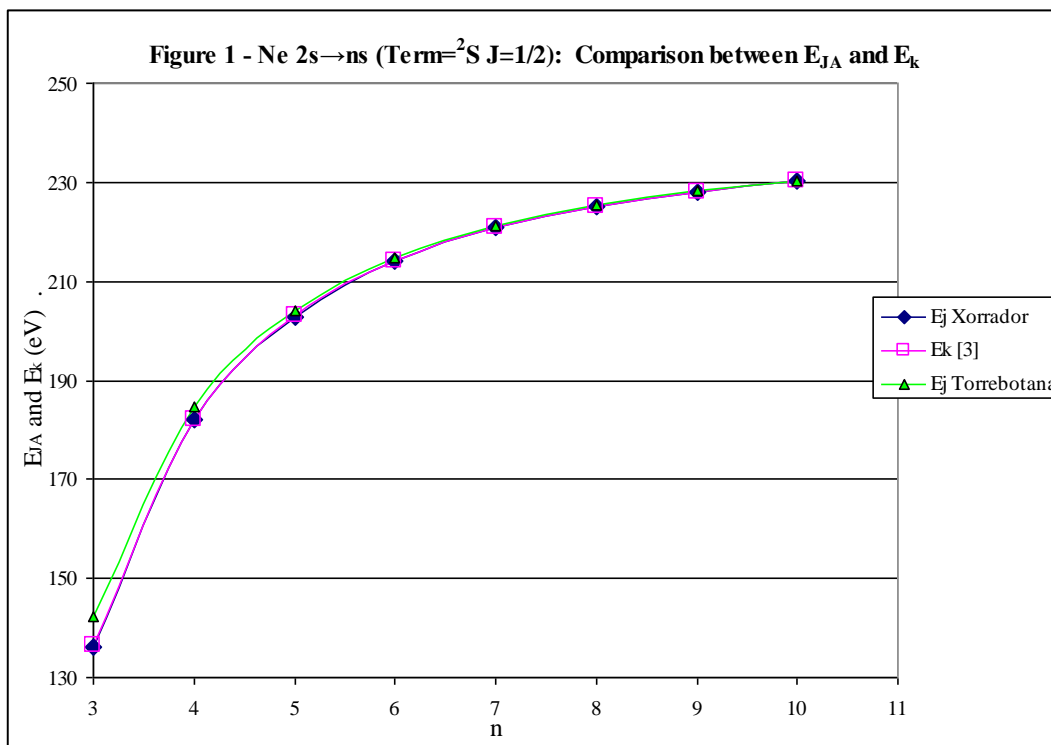
$$(10) \quad n \uparrow \quad z_s \downarrow \rightarrow \text{LAN} \uparrow$$

Elevated LAN(P50) is sought to study situation antagonistic to that commented with Ne and its low LAN(P50). Example selected is Cesium which has larger n (n=6 for Cs vs. n=2 for Li) and smallest possible  $z_s$  ( $z_s=1$ ). **Table 4** and **Table 5** are included in the same way as views for Neon. Xorrador is somewhat more removed from reference value that in Neon case because when LAN is increased has greater slope or variation of its value with energy and, therefore, implying that constant LAN(P50) use for all excited state (5) is worse approximation. Another notable fact is that deviation between Xorrador Approximation and reference data is practically constant for all jump:

$$\begin{aligned} (\%RC \text{ (Destiny)})_{\text{NEON}} &\approx -0,2\% \\ (\%RC \text{ (Destiny)})_{\text{CESIUM}} &\approx -5\% \end{aligned}$$

On the other hand, positive effect especially visible in first excited states carried out by Xorrador ( $E_{dA}$  and  $E_{JA}$ ) of approach to reference data ( $E_{dR}$  and  $E_k$ ) from indicated by Torrebotana Central Line jump energy ( $E_J$  and  $E_d$ ) is more notorious when LAN(P50) is elevated (**Figure 1** and **Figure 2**).

<b>Table 4 - Cs 6s→ns (Term=<sup>2</sup>S J=1/2): data for LAN(P50) (2)</b>				
E <sub>o</sub> (eV) [4]	IE 2s (eV) [4]	z <sub>s</sub>	z <sub>o</sub>	LAN(P50) (lanito)
-42912,99	-3,893905548	1	55	4,0912942



n	$E_{dA}$ (eV) (5)	$E_{JA}$ (eV) (3)	$E_k$ (eV) [3]	AC (eV) (7)	%RC (Jump)(8)	%RC (Destiny)(9)
7	-1,67673259	2,217172962	2,29811264	0,08093968	3,52%	-4,83%
8	-0,92853319	2,965372359	3,014942251	0,04956989	1,64%	-5,34%
9	-0,58874793	3,305157622	3,33649692	0,0313393	0,94%	-5,32%
10	-0,40632979	3,487575758	3,50878114	0,02120538	0,60%	-5,22%
11	-0,2972145	3,596691044	3,611874168	0,01518312	0,42%	-5,11%

## 2) Relation of Riquelme de Gozy

### 2.1) $2s \rightarrow ns$ jump (Term= $^2S$ J=1/2)

P49 LAN plain: Jump in Serelles Secondary Line proposes Relation of Riquelme de Gozy that is linear tendency of LAN vs. electron energy or jump energy. This Relation is complemented for  $ns \rightarrow ns$  jumps with P50 Initial LAN value in jump from ns to ns, as Lithium example is carefully studied [2].

Line equation of Relation of Riquelme de Gozy (11) for  $2s \rightarrow ns$  jump (Term= $^2S$  J=1/2) from Li to Ne is included in **Table 6**. Riquelme de Gozy equation (11) can be obtained with only two points, initial state and first excited state, because  $LAN_R$  and  $LAN(P50)$  are known by (1) and (2). Table 6 employs three states (initial state and first two excited states) to demonstrate optimum linearity between them.

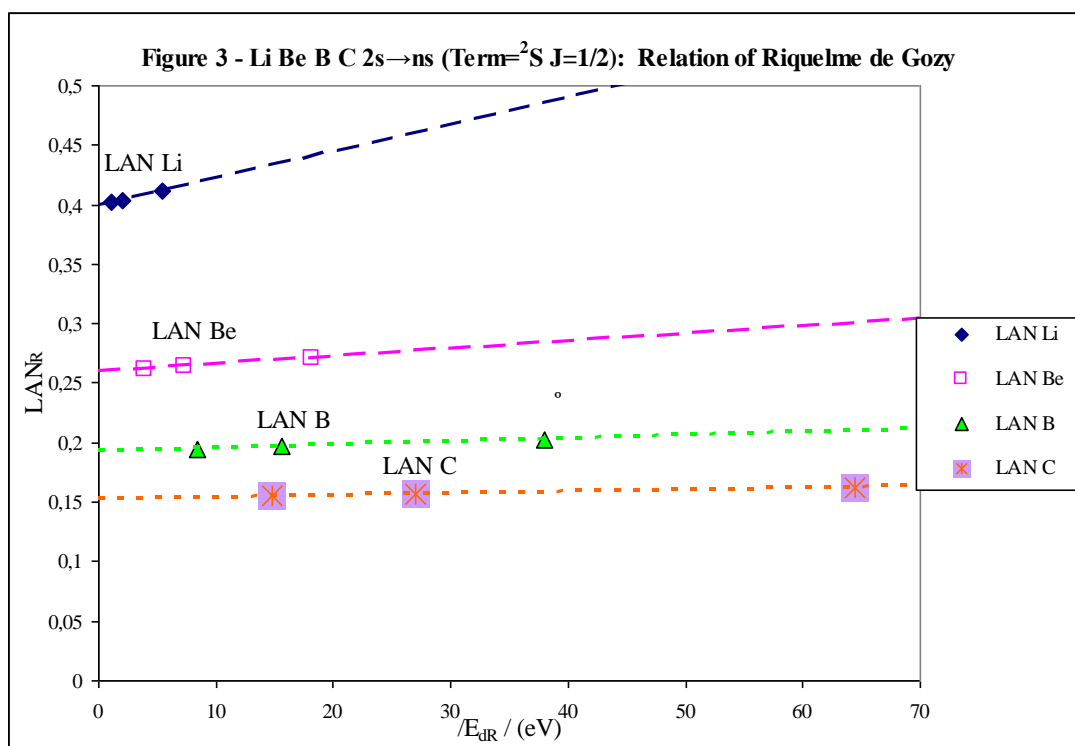
$$(11) LAN_R = a + b/E_{dR}/$$

Symbol	a (lanito)	b (mililitano/eV)	$R^2$
Li	0,399193	2,272	1,000000
Be	0,259453	0,644	0,999992
B	0,192674	0,273	0,999999
C	0,153208	0,143	0,999973
N	0,127159	0,0845	0,999879
O	0,108596	0,0548	0,999730
F	0,094728	0,0378	0,999559
Ne	0,0837893	0,0282	0,997324

Linear regression has excellent  $R^2$  value which, although moves slightly from 1 as  $z_s$  increases, still has  $R^2(\text{Fluorine})=0,9996$ , i.e. after 7 atoms. This linearity has high sensibility to slight energy variations as is show in Lithium example [2]. This fact is corroborated with  $R^2$  in **Table 7** dedicated to Beryllium and Fluorine. Jump reference value ( $E_k$ ) [3] in  $3s$  (first excited state) is modified from 1% to 0,0001%. Linear trend is lost to naked eye with  $E_k(1s^23s)$  variation of 1 and 0,1%. Effects are less visible in Be than in F when change is 0,01%. Finally,  $R^2$  modifications are very limited for lower  $E_k(1s^23s)$  alteration.

<b>Table 7 - Be and F: <math>2s \rightarrow 1s^2ns</math> (Term= <math>^2S</math> and <math>J=1/2</math>).</b>						
$R^2$ variation in Relation of Riquelme de Gozy by $E_k(3s)$ modification						
Symbol	$R^2$ of Relation of Riquelme de Gozy					
	With [3] Data	+1%	+0,1%	+0,01%	+0,001%	+0,0001%
Be	1,0000	0,3512	0,953	0,9993	1,0000	1,0000
F	0,9996	0,5393	0,7972	0,989	0,9991	0,9995
Symbol	$R^2$ of Relation of Riquelme de Gozy					
	With [3] Data	-1%	-0,1%	-0,01%	-0,001%	-0,0001%
Be	1,0000	0,0172	0,9413	0,9996	1,0000	1,0000
F	0,9996	0,4153	0,0107	0,9936	0,9999	0,9996

$LAN_R$  is affected to greater extent by these  $E_k$  percentage variations as destiny  $n$  increases because  $LAN_R$  calculation (1) is carried out with  $/E_{dR}/$  and:  $\uparrow n \rightarrow \uparrow E_k \rightarrow \downarrow /E_{dR}/$ .



Differences between line equation of Relation of Riquelme de Gozy (11) for Li, Be, B and C can be appreciated in **Figure 3** where all allow to contemplate LAN plain idea and how its value and slope descend with  $z_s$  (Start charge according to P46 [1]). Figure 3 is Table 6 representation with three states (initial state and first two excited states) to demonstrate optimum linearity between them. Linear regression is extrapolated to Y-intercept of Relation of Riquelme de Gozy.

## 2.2) $3s \rightarrow ns$ jump (Term= $^2S$ J=1/2)

Line equation of Relation of Riquelme de Gozy (11) is for same jump as in previous point, but  $n=3$  is initial or non-excited state. Relation of Riquelme de Gozy for jump  $2p^63s \rightarrow 2p^6ns$  is made with three states (non-excited ( $2p^63s$ ) and first two excited states ( $2p^64s$  and  $2p^65s$ )) and is compiled in **Table 8**. All atoms that have at least the two jumps cited [3] are included in Table 8.

<b>Table 8</b> – Relation of Riquelme de Gozy in Serelles Secondary line $3s \rightarrow ns$ (Term= $^2S$ and J=1/2) with first three data			
Symbol	a (lanito)	b (mililano/eV)	R <sup>2</sup>
Na	1,34467	5,27	0,9999
Mg	1,0628	2,2	1,0000
Al	0,88899	1,2	1,0000
Si	0,76659	0,802	0,9986
P	0,67667	0,508	0,9999
S	0,60557	0,366	0,9998
Cl	0,54772	0,278	0,9995
Ar	0,50089	0,212	0,9994
K	0,46084	0,17	0,9992
Ca	0,42649	0,14	0,9986
Sc	0,39393	0,119	0,9987
Ti	0,37138	0,0967	0,9993
V	0,34838	0,0832	0,9990
Cr	0,32636	0,0769	0,9923
Mn	0,30775	0,0681	0,9899
Fe	0,2945707	0,0526	0,9995
Co	0,2774294	0,0511	0,9992

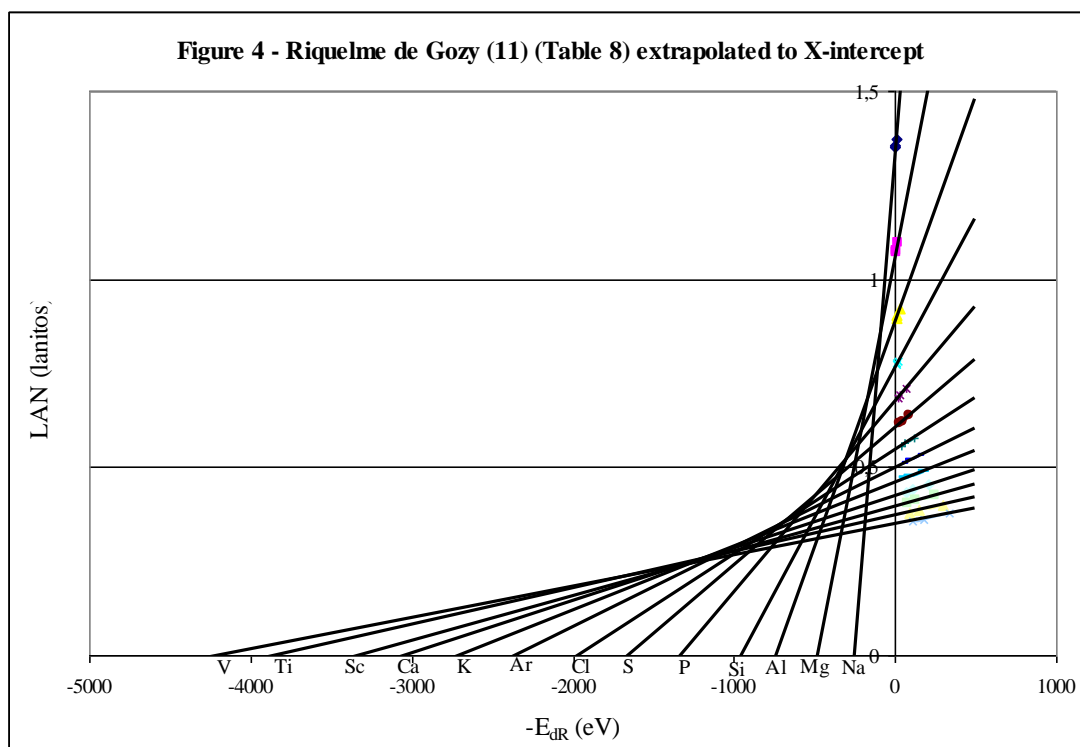


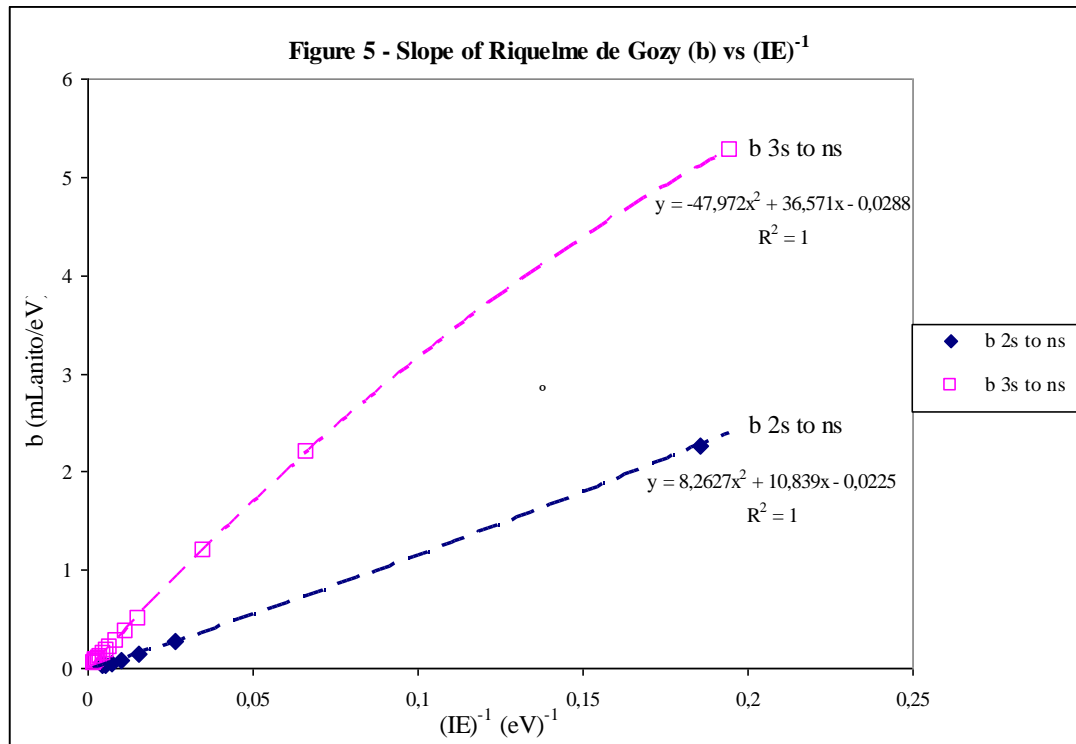
Optimum linear adjustment reflected in  $R^2$  regression coefficient close to 1 are produced again.  $R^2$  majority is found in range:  $[0,999,1[$  Only 2 exception (Cr ( $z_s=15$ ) and Mn ( $z_s=16$ )) with  $R^2=0,99$  are high  $z_s$  although  $z_s$  of their environment, slightly lower (V, Ti, Sc...) or higher (Fe and Co), has very good  $R^2 \approx 0,999$ . This fact suggests that either there is some effect not considered in these exceptions or there is some small error in [3].

Another important aspect is clear downward trend of Y-intercept (a) and slope (b) as  $z_s$  increases (12). This trend is most pronounced when  $z_s$  is low:

$$(12) z_s \uparrow \rightarrow Y\text{-intercept (a)} \downarrow \ \& \ \text{slope (b)} \downarrow$$

Line equation of Relation of Riquelme de Gozy (11) (Table 8) are extrapolated to X-intercept producing atomic sequencing (Na, Mg, Al, Si...) and with approximately constant spacing (**Figure 4**). Another relationship is slope of Riquelme de Gozy (b) vs.  $IE^{-1}$  where IE is ionization energy of excited electron (**Figure 5**). Slope from Table 6 and 8 as well IE from [4] have been employed in Figure 5. Two data have only been discarded: Be (2s to ns) and Si (3s to ns). Both curves present second-degree polynomial regression with  $R^2=1,0000$  and tend to point (0,0). These and other observable trends are prelude to theory that relates LAN with energy function.



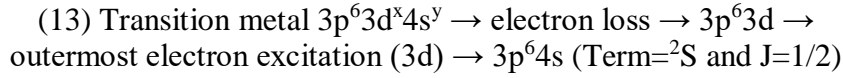


### 2.3) $4s \rightarrow ns$ jump (Term= $^2S$ J=1/2)

Line equation of Relation of Riquelme de Gozy (11) is in **Table 9**. Relation of Riquelme de Gozy for jump  $4s \rightarrow ns$  is made with three states (non-excited (4s) and first two excited states (5s and 6s) to check linearity as in previous cases. All atoms that have at least the two jumps cited [3] are included in Table 9.

<b>Table 9 – Relation of Riquelme de Gozy in Serelles Secondary line <math>4s \rightarrow ns</math> (Term=<math>^2S</math> and J=1/2) with first three data</b>				
Curve	Symbol	a (lanito)	b (mililano/eV)	$R^2$
<b>POTASSIUM</b>	K	2,16934	12,97	0,9997
	Ca	1,78859	5,47	0,9999
	Sc	1,54536	3,08	0,9999
	Ti	1,36978	1,97	1,0000
	V	1,23446	1,36	1,0000
	Cr	1,12599	0,988	1,0000
<b>COPPER</b>	Ga	1,90598	2,78	0,9993
	Kr	1,25633	0,828	0,9936
	Rb	1,19154	0,528	0,9977
	Sr	1,10808	0,531	0,9891

K, C and Ga are atoms equivalent to Na, Mg and Al or Li, Be and B, but Transition metals have a divergence from what is seen in two previous points. For example, Sc is  $3p^63d4s^2$  and when loses one electron is  $3p^63d4s$  (Term= $^1D$  and  $J=2$ ) instead of  $3p^64s$  (Term= $^2S$  and  $J=1/2$ ) which are values being used. Following steps (13) must be performed so that electron is located in correct configuration:



Two transition metals (Sc with  $z_s=3$  and Ti with  $z_s=4$ ) have been selected by way of example with IE,  $/E_{dR}/$ , LAN(P50) and LAN<sub>R</sub> in **Table 10**. Trends indicated previously are maintained:

<b>Table 10</b> - $/E_{dR}/$ and LAN <sub>R</sub> in transition metals. First three data for Serelles Secondary line $4s \rightarrow ns$ (Term= $^2S$ and $J=1/2$ ).				
	Sc		Ti	
Configuration	$/E_{dR}/$ (eV)	LAN <sub>R</sub> (lanito)	$/E_{dR}/$ (eV)	LAN <sub>R</sub> (lanito)
$3p^63d$	24,75666 (IE)		43,26717 (IE)	
$3p^64s$	21,590188	1,6118173 LAN(P50)	33,300214	1,4353200 LAN(P50)
$3p^65s$	10,515528	1,57799832	16,932016	1,4033153
$3p^66s$	6,258958	1,56447796	10,306291	1,3899514

a) a and b drop with  $z_s$ . Novel nuance is two curves creation (first headed by K and second by Cu) as result of intercalated transition metals.

b)  $R^2$  continues with value close to 1 even with transition metals. Kr  $R^2$  is lower, but can reach  $R^2=1,0000$  with, for example, slight energetic variation of  $E_k(4s \rightarrow 6s)$  from 85,8613 to 85,7926 eV ( $\%RC \approx 0,08\%$ ).

#### 2.4) Jump other than $ns \rightarrow ns$

Study has been focused on for Serelles Secondary line  $ns \rightarrow ns$  (Term=  $^2S$  and  $J=1/2$ ), but Relation of Riquelme de Gozy can be verified with jump whose start state and excited state are different and that consequently also differ their Term and J. Relation of Riquelme de Gozy is very sensitive to slight Energy deviations and, in any jump type, linearity deviations of Riquelme de Gozy may be due to one or more of these causes:

a) Reference data has small deviation or assignation is not correct.

b) Relation linearity apparently turns to curvature as excited state n increases. This fact is accelerated under certain conditions. Divergence between  $E_{dR}$  (reference destiny energy) and  $E_{dRI}$  (ideal  $E_{dR}$ ) [2] is explained after articles dedicated to another Relations which include LAN.

c) Phenomena not included and affecting specific atoms.

**Table 11** summarizes examples of different jump type: not ns and/or do not jump to ns excited state together with Na  $3s \rightarrow ns$ . As indicated in introduction, non-excited state (LAN(P50)) is only applied to ns  $\rightarrow$  ns jump, therefore three excited states must be selected to corroborate linearity with three points: jumps are towards n=3, 4 and 5 when indicated as (\*) and n=4, 5 and 6 when marked as (\*\*). Applicability of Riquelme de Gozy is demonstrated with  $R^2$  very close to 1 for different jumps.  $R^2$  is indicated with 4 decimal digits and only exceed in case of superior linearity to 1.0000 (For example, Na case with 1,000000).

<b>Table 11</b> - Linearity Coefficient $R^2$ in Relation of Riquelme de Gozy - First three excited states for Serelles Secondary Line of different configurations and jumps ((*) n = 3, 4 and 5 and (**) n = 4, 5 and 6)						
Atom	Configuration	$z_s$	Term & J	Excited state	Term & J	$R^2$
Na	$2p^63s$	1	$^2S$ & 1/2	$2p^6np$ (*)	$^2P^o$ & 3/2	1,000000
Mg	$2p^63s$	2	$^2S$ & 1/2	$2p^6np$ (*)	$^2P^o$ & 3/2	1,0000
Mg	$2p^63s^2$	1	$^1S$ & 0	$3snp$ (*)	$^1P^o$ & 1	0,9980
Mg	$2p^63s^2$	1	$^1S$ & 0	$3snp$ (**)	$^1P^o$ & 1	0,9999
Al	$2p^63s^2$	2	$^1S$ & 0	$3snp$ (*)	$^1P^o$ & 1	0,9929
Al	$2p^63s^23p$	1	$^2P^o$ & 1/2	$3s^2ns$ (**)	$^2S$ & 1/2	1,0000
Si	$2p^63s^23p^2$	1	$^2P^o$ & 1/2	$3s^23pns$ (**)	$^2S$ & 1/2	0,9998
Sc	$3p^63d$	3	$^1D$ & 3/2	$3p^6np$ (**)	$^2P^o$ & 3/2	1,00000
Ti	$3p^63d$	4	$^1D$ & 3/2	$3p^6np$ (**)	$^2P^o$ & 3/2	0,9997
Sc	$3p^63d$	3	$^1D$ & 3/2	$3p^6nd$ (**)	$^2D$ & 5/2	1,00000

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- [3] Kramida, A., Ralchenko, Yu., Reader, J., and NIST ASD Team (2015). *NIST Atomic Spectra Database* (ver. 5.3), [Online]. Available: <http://physics.nist.gov/asd> [2016, May 18]. National Institute of Standards and Technology, Gaithersburg, MD.
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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. 10 is [1], 11 is [2] and 12 is present article.

Abbreviation	10	11	12	Meaning
AC	X		X	Actual Change
BES	X	X		Born Electronic System
$E_d$	X	X		Excited state destiny energy
$E_{dA}$			X	Destiny Energy deduced with Xorrador Approximation
$E_{dI}$		X		Excited state destiny energy obtained from ideal $E_d$
$E_{dR}$		X	X	Reference destiny energy
$E_{dRI}$		X	X	Ideal $E_{dR}$ obtained from extrapolation of others $E_{dR}$ satisfying Relation of Riquelme de Gozy
$E_{dS}$		X		Excited state destiny energy in Serelles Secondary Line
$E_J$	X	X		Jump energy in Torrebotana Central Line
$E_{JA}$			X	Jump Energy deduced with Xorrador Approximation
$E_{J,R}$	X			Referenced $E_J$ to IE
$E_{JS}$		X		Jump energy in Serelles Secondary Line
$E_k$	X	X	X	Reference Jump energy
$E_{k,R}$	X			Referenced $E_k$ to IE
$E_o$	X	X	X	1s OES Ionization energy
El	X	X		Es, Ep, Ed and Ef are energies to reach ns, np, nd & nf
IE	X	X	X	Ionization energy
l	X	X	X	Orbital quantum number
LAN	X	X	X	Serelles Secondary Lines Factor
$LAN_I$ $LAN_{RI}$		X		Ideal LAN obtained from $E_d$ or $E_{dRI}$
$LAN_R$		X	X	LAN with reference data
$LAN_{R,M}$		X		$LAN_R$ with modification
LAN(P50)		X	X	Initial LAN value in ns to ns jump. LAN with IE
n	X	X	X	Principal quantum number
$n_{initial}$ or $n_s$		X	X	n of non-excited electron
NIN	X			Negative in negative
OES	X	X		Origin Electronic System
RC	X		X	Relative Change
z	X			Effective nuclear charge
Z	X			Atomic Number
$z_{CT}$	X	X		Excited state charge
$z_o$	X	X	X	1s Origin charge according to P46

$z_s$	X	X	X	Start charge according to P46
$z_{ss}$		X		Serelles secondary charge

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