ARTICLE 18

Excited electron: Feliz Theory of E_o vision - Relativistic II: Influence in Riquelme de Gozy

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ABSTRACT

This is 18th article of 24 dedicated to atomic model based on Victoria equation (Articles index is at end). First application of Relativistic effects is made with Relation of Silva de Peral y Alameda in $1s^2 \rightarrow 1sns$ (Term=^1S and J=0) where initial relativity postulates (from P61 to P64) are established [8]. This second part seeks to corroborate excess relativistic role in ideality deviation of Riquelme de Gozy whereas Relativistic effect has been seen with Relation of Silva de Peral y Alameda in [8].

KEYWORDS

Relation of Riquelme de Gozy, RG relation, Tete-Vic equation, LAN, Excess relativistic, ER_o, ER_{dR}, Feliz Theory of E_o, Feliz Representation of E_o

INTRODUCTION

LAN with energy modifications (1) is given in annex of [8] and (1) is changed to (2) when modifications are relativistic. Relations of Silva de Peral y Alameda (SPA relation) [5,8] and Riquelme de Gozy (RG relation) [2,3] are focused on excited electron study. In contrast, Relation of Flui Piep de Garberí (FPG relation) analyzes connection between LAN and ionization energy (non-excited state) [4]. Abbreviations Table is at end article

$$(1)\ \text{-}\ LAN_M = \frac{\left(-E_{oM}\right)^{1/2} z_s}{\left(-E_{dM}\right)^{1/2} z_o} - n = \frac{\left(-E_oG\right)^{1/2} z_s}{\left(-E_dF\right)^{1/2} z_o} - n = \frac{\left(-E_o - y\right)^{1/2} z_s}{\left(-E_d - x\right)^{1/2} z_o} - n$$

$$(2)\ \text{-}\ LAN^* \approx -LAN_R^* = \frac{\left(-E_o^*\right)^{1/2} z_s}{\left(-E_{dR}^*\right)^{1/2} z_o} - n = \frac{\left(-E_o - ER_o\right)^{1/2} z_s}{\left(-E_{dR} - ER_{dR}\right)^{1/2} z_o} - n$$

IE and E_o relativistic excesses are found when SPA relation curvature is turned towards linearity and are statements [8]:

P61 IE Excess Relativistic in SPA PEC
P62 Feliz Theory of E_o vision from electron as moves away.
P63 ER_o interatomic behaviour
P64 Feliz representation of E_o vision from electron as moves away.

Effect of excess relativistic on relation of Riquelme de Gozy (RG) is carried out in this second part. RG provides linearity between LAN and E_{dR} where E_{dR} is obtained from E_k [10]. E_{dR} is reference destiny energy and E_k is jump energy with reference data. Relation of Riquelme de Gozy is for one single atom and jump made from same initial state to defined excited state where only n is varied [2,3].

1) Helium: Relation of Riquelme de Gozy with ideal linearity behaviour

Relation of Riquelme de Gozy for $1s^22s \rightarrow 1s^2$**ns** Lithium is studied in [2]. 2s ionization energy (2s IE) and two first jumps ($1s^23s$ and $1s^24s$) provide line equation whose extrapolation is fitted to subsequent electron jumps ([10] has data up to $1s^28s$). $n_ss \rightarrow ns$ study is continued and supplemented with different electron jumps compiled in [3] final table. In all cases, linear trends are excellent with $R^2 \rightarrow 1$ although significant fact should be highlighted: only IE and two first jumps in $n_ss \rightarrow ns$ and three first jumps in other jump type make up linear trends so has not been seen (except for Lithium case) what happens to latter n.

1s and $1s^2$ ionization energies are low and consequently corresponding excess relativistic are reduced. In principle and if is accepted (2) where main modifications source is ER_o and ER_{dr}, Relation of Riquelme de Gozy must present good linearity without applying relativistic corrections. Relation of Riquelme de Gozy for $1s^2 \rightarrow 1sns$ Helium, whether antiparallel or parallel spins, is represented in **Figure 1** and **Figure 2** respectively. Optimal R^2 of linear trends for n intervals indicated are in **Table 1.**

Figure 1 - Riquelme de Gozy of Helium: $1s^2 \rightarrow 1sns$ (Term=^1S J=0)

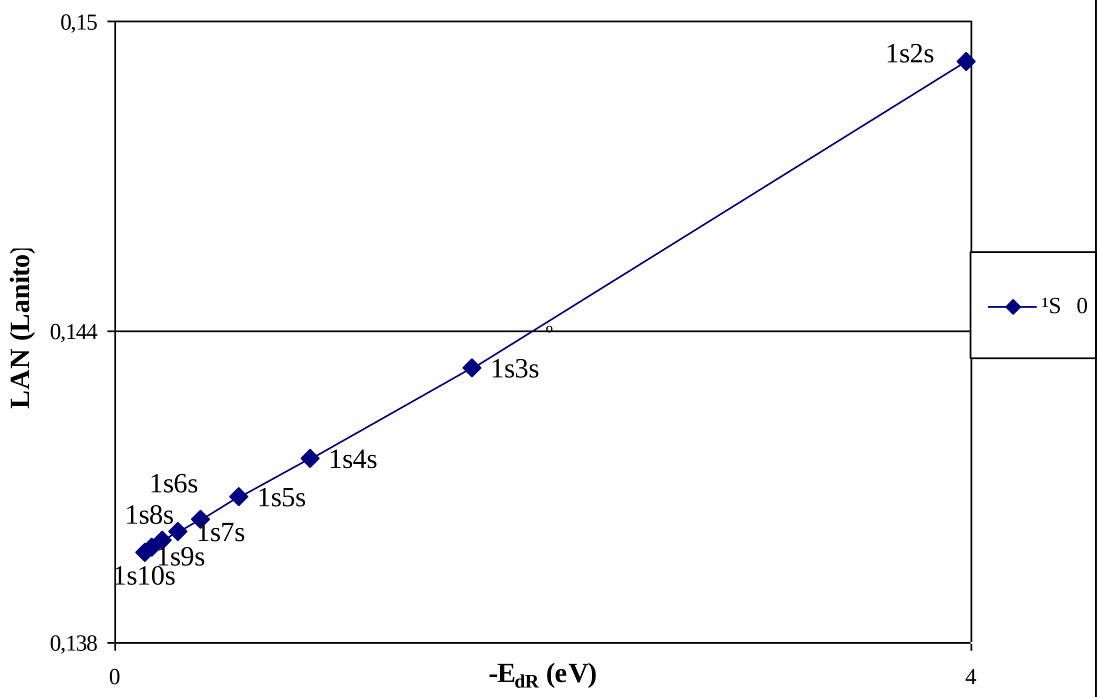
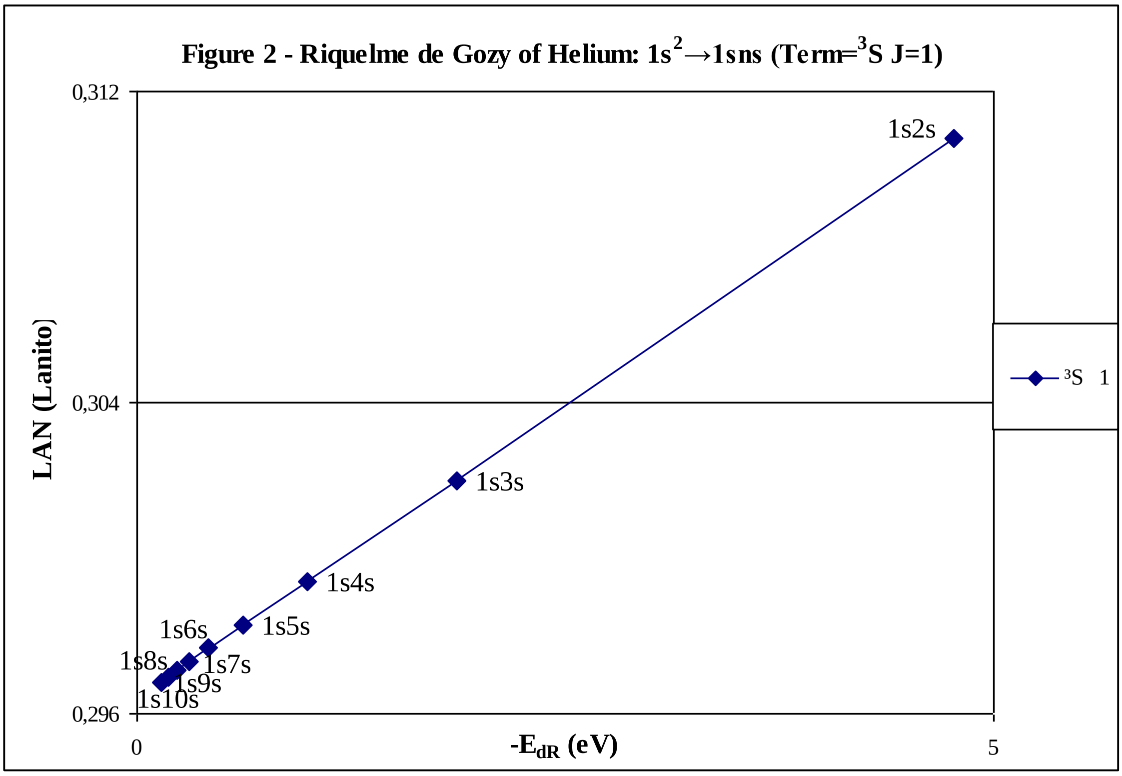


Table 1. Relation of Riquelme de Gozy for $1s^2 \rightarrow 1sns$ Helium: R^2 of linear trends for n intervals indicated.		
n interval	R^2 (Term=^1S J=0)	R^2 (Term=^3S J=1)
[2,4]	0,9996	1,0000

[4,10]	0,9988	0,9993
[2,10]	0,9994	1,0000



In conclusion, first three destiny n present linearity somewhat better than interval n=[4,10], but in general as mark R^2 of global interval n=[2,10], Riquelme de Gozy compliance is obtained without relativistic consideration.

Extrapolation of Riquelme de Gozy made with three first jumps to the remainder (n=[5,10]) can be done by solving cubic equation [2]. Resolution allows to know E_{dRI} where E_{dRI} is ideal destiny energy obtained by extrapolation from reference energy equation. E_{jRI} (ideal jump energy obtained from E_{dRI}) is deductible from ionization energy and E_{dRI} (3). Reference data have corresponding equation with jump and destiny energy (E_{dR} and E_k) (4)

$$(3)\ E_{jRI} = E_{dRI} - IE$$

$$(4)\ E_k = E_{dR} - IE$$

Actual change (AC) (5) is a way to verify differences between energetic curves and Relative Change (RC) (6) and (7) is better comparative because is referenced. Extrapolated and reference data [10] are compared by (5), (6) and (7) for Helium $1s^2 \rightarrow 1sns$ (Term=^3S J=1) in **Table 2**. Differences are very small and are still more reduced as destiny n increases. This concordance between extrapolated and reference data allows to corroborate Riquelme de Gozy application to $1s^2 \rightarrow 1sns$ Helium without need to include relativistic modifications.

$$(5)\ \text{Actual Change} = AC = \Delta = E_k - E_{jRI} = E_{dR} - E_{dRI}$$

$$(6) RC(E_{dR}) = \frac{E_k - E_{jRI}}{/E_{dRI}/} = \frac{E_{dR} - E_{dRI}}{/E_{dRI}/}$$

$$(7) RC(E_k) = \frac{E_k - E_{jRI}}{/E_{jRI}/} = \frac{E_{dR} - E_{dRI}}{/E_{JRI}/}$$

Table 2 - Helium: $1s^2 \rightarrow 1sns$ (Term=^3S J=1). AC (5) and RC (6) and (7) between [10] and Relation of Riquelme de Gozy extrapolated in n=[5-10]

n	AC (eV)	RC (Ed_R)	RC (Ek)
5	-1,58E-05	-1,59E-05	-6,60E-07
6	-9,97E-06	-1,62E-05	-4,13E-07
7	-5,56E-06	-1,33E-05	-2,29E-07
8	-2,75E-06	-9,09E-06	-1,13E-07
9	-1,02E-06	-4,44E-06	-4,17E-08
10	5,84E-08	3,25E-07	2,39E-09

2) General situation for Relation of Riquelme de Gozy when Z increases

Riquelme de Gozy application for high n has only been seen when Z (atomic number) is low: Helium (Z=2) in previous point and Lithium (Z=3) [2]. Present point is centred on $n_s s \rightarrow ns$ as Lithium, but now with other alkaline metals (Na, K, Rb and Cs) that has higher Z and same z_s=1. Main conclusion to be confirmated at this point: LAN provided by [10] without relativistic effects are further diverted from linearity as Z increases.

Relation of Riquelme de Gozy for Sodium in [Ne]3s→[Ne]ns jump is represented in **Figure 3** where LAN with reference data is LANr and extrapolated from RG relation is LANi or LAN ideal. LANr is progressively diverted from RG linearity as n increases and consequently ($-E_d$) decreases. RG line equation is made only with two data: non-excited state (LANP50) and first excited state LAN(4s). Line equations were performed with 3 points [2,3] to check fulfilment of RG relation for low n. Although LAN with reference data [10] (LANr in Figure or LAN_R in equation (8)) progressively move away from linearity, distance between LAN_R and ideal LAN or LAN_i is low (LAN_i-LAN_R=0.01Lanitos=10 mLanitos when excited state is [Ne]20s) and causes difference between real and ideal destiny energies to be small and not visible to naked eye (**Figure 4**). Numerically, differential (E_{dR}- E_{dRI})≈$1.7\cdot10^{-4}$ eV for n=5 and gradually decreases to (E_{dR}- E_{dRI})≈$4.2\cdot10^{-5}$ eV for n=20. E_{dRI} is also expressed as E_d RG indicating that it comes from Relation of Riquelme de Gozy.

$$(8) - LAN \approx -LAN_R = \left(\frac{z_s^2 E_o}{z_o^2 E_{dR}}\right)^{1/2} - n = \left(\frac{z_s^2 E_o}{z_o^2 (E_K + IE)}\right)^{1/2} - n$$

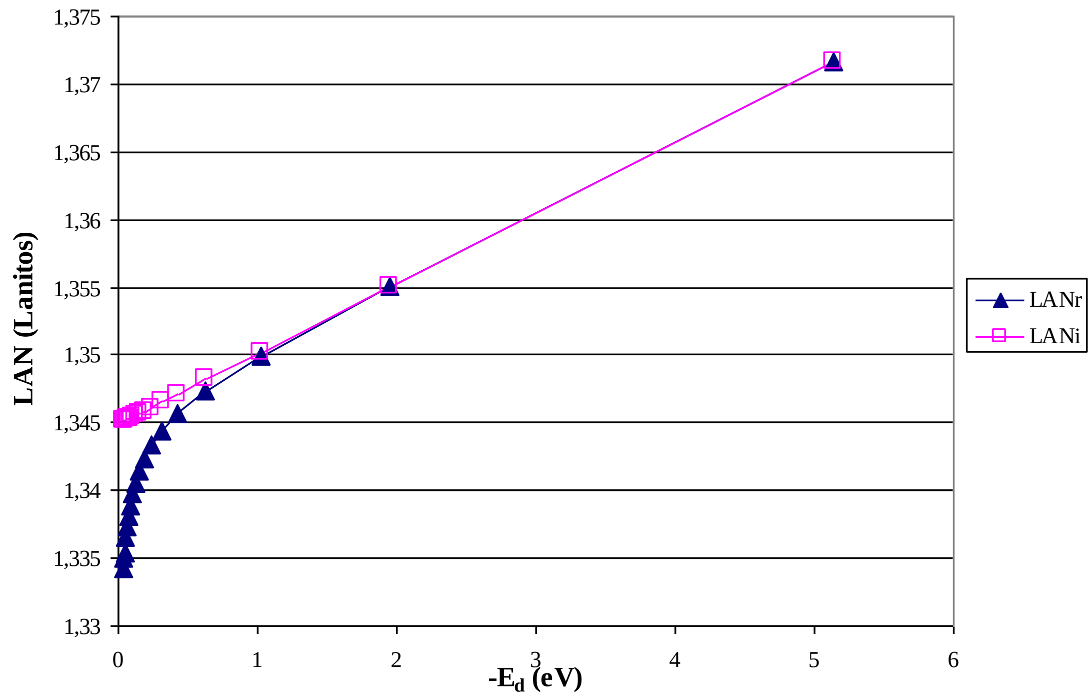


Figure 3 - RG of Sodium: 3s→ns (Term=^{2}S J=1/2) with n=[4,20]

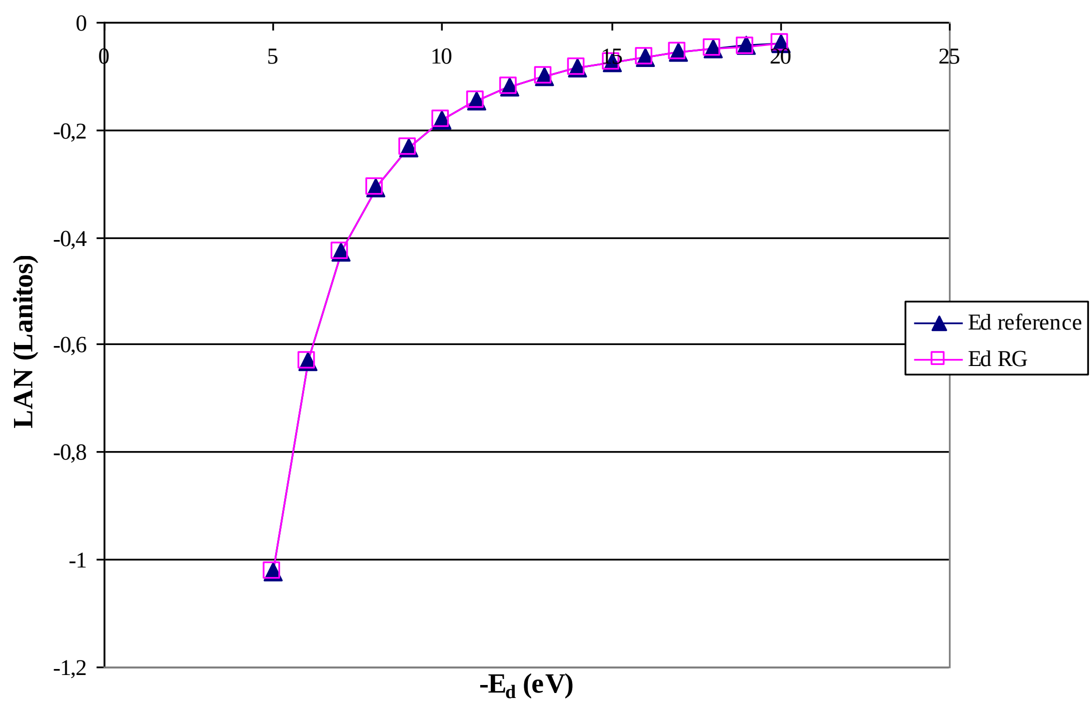


Figure 4 - Reference E_{dR} and RG relation E_{dRI} for Na: 3s→ns n=[4,20]

LAN_R (8) does not have relativistic effects, while LAN_R^* (2) considers them. Way to know relativistic effects (ER_o and ER_{dR}) should be that indicated from P61 to P64 and annex of [8], but now a brief values inclusion for factors that affect energies (F, G, x and y with formulas from (9) to (12)) also exposed in [8] is performed to bring LAN_R

curve to LAN_R^* ideal line based on RG relation. (9) and (11) modifications can be equated with single constant value and both can also be equal to (12) because E_o is constant in LAN_R. Value chosen for three factors (13) allows LAN_R curve to be transformed into straight line (possible LAN_R^* line) and is close to ideal line LAN_I (**Figure 5**). Selected y value (2.308 eV) is very near to 1s ER or ER_o that has been calculated in (14) and is another sign of P62 and P64 [8] fulfilment. x value proposed (+0.00021 eV) achieves initial adjustment for low n but its deviation is progressively greater because affects more to descending E_d and consequently this modification option is discarded.

$$(9) E_{dM} = E_d F$$

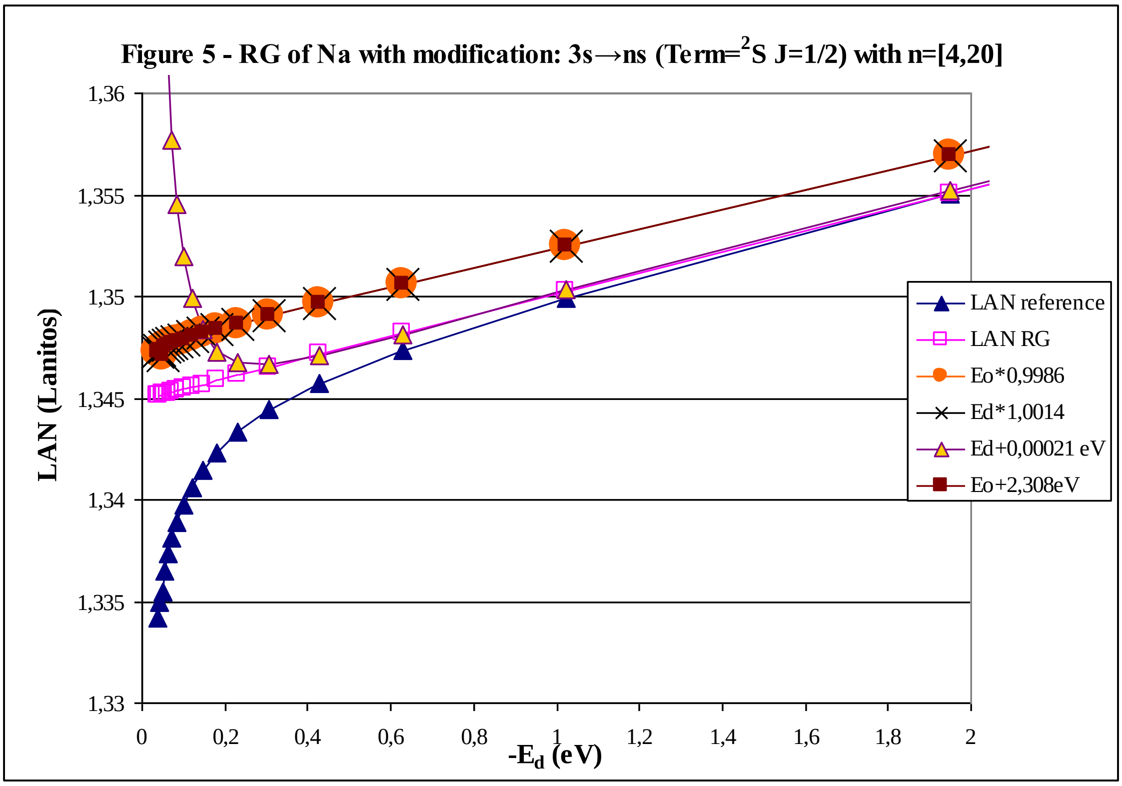
$$(10) E_{dM} = E_d + x$$

$$(11) E_{oM} = E_o G$$

$$(12) E_{oM} = E_o + y$$

$$(13)\ E_o*0.9986 = E_{dR}*1.0014 = E_o+2.308\text{eV}$$

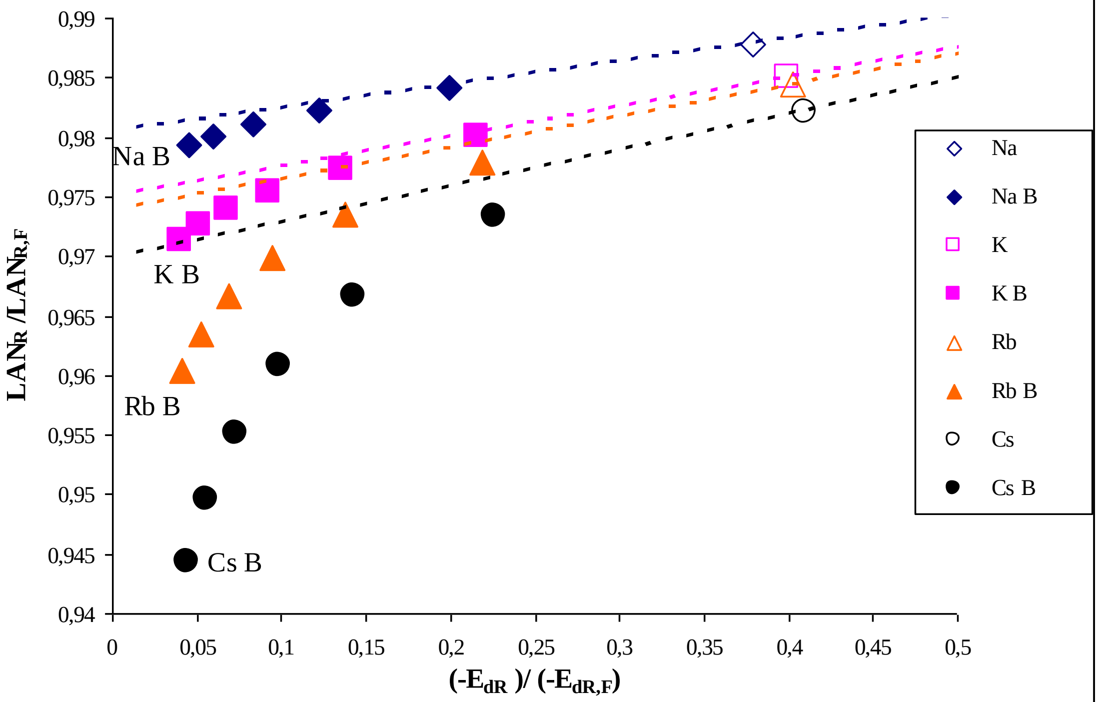
$$(14)\ 1s\ ER = E_{oT} - E_o = -13.6056899\ \text{eV} * Z^2 - E_o = 2.4135\ \text{eV}$$



Riquelme de Gozy is satisfied with linearity for high n in Helium (Z=2) (Figure 1 and 2) and Lithium (Z=3) [2]. Na has LAN_R vs. $-E_{dR}$ curvature as ↑n or ↓($-E_d$) which, if P62 (Feliz Theory of E_o vision from electron as moves away) is true and ER_o has direct relation with curvature, must be increased with following alkaline metals (K, Rb and Cs) that has higher Z and same z_s=1.

First representation for simultaneously observing LAN_R vs. $-E_{dR}$ curvatures is division of all LAN_R and $-E_d$ by their corresponding first LAN_R and $-E_{dR}$ respectively. Subscript F indicates that is first state included in RG relation that is non-excited state in $n_s s \rightarrow ns$ and first excited state in other jump type. With objective of comparing curvature under same conditions, maximum n destiny selected is the one with $-E_d \approx 0.4$ eV because last n with reference data [10] for Rb and Cs has said $-E_d$ and LAN drift is $-E_d$ function. Main conclusion sought at beginning of point is confirmed in **Figure 6**: LAN provided by [10] without relativistic effects are further diverted from linearity as Z increases. First two points that originate Riquelme de Gozy line are obviated in order to be centred in curvature section. These two points are n_s or non-excited state (point (1,1) in Figure 6) and first excited state. Other points in curvature section are called "B" points.

Figure 6 - Base 1,1 RG of Na, K, Rb and Cs: $n_s s \rightarrow ns$ (Term=^2S J=1/2)



Second representation for simultaneously observing LAN_R vs. $-E_{dR}$ curvatures starts from Figure 6 and is difference between Riquelme de Gozy line and so called B points that make up curvature. Progressive greater curvature with increasing Z leads to higher Relative Change (6) and (7) which is expressed in percentage in **Table 3** for Na and Cs $n_s s \rightarrow ns$. RC for Na, although higher than those of Helium (Table 2) and expressed without percentage, are reduced. In contrast, for RC for Cs start to be important especially when RC is referred to reference destiny energy (E_{dR}).

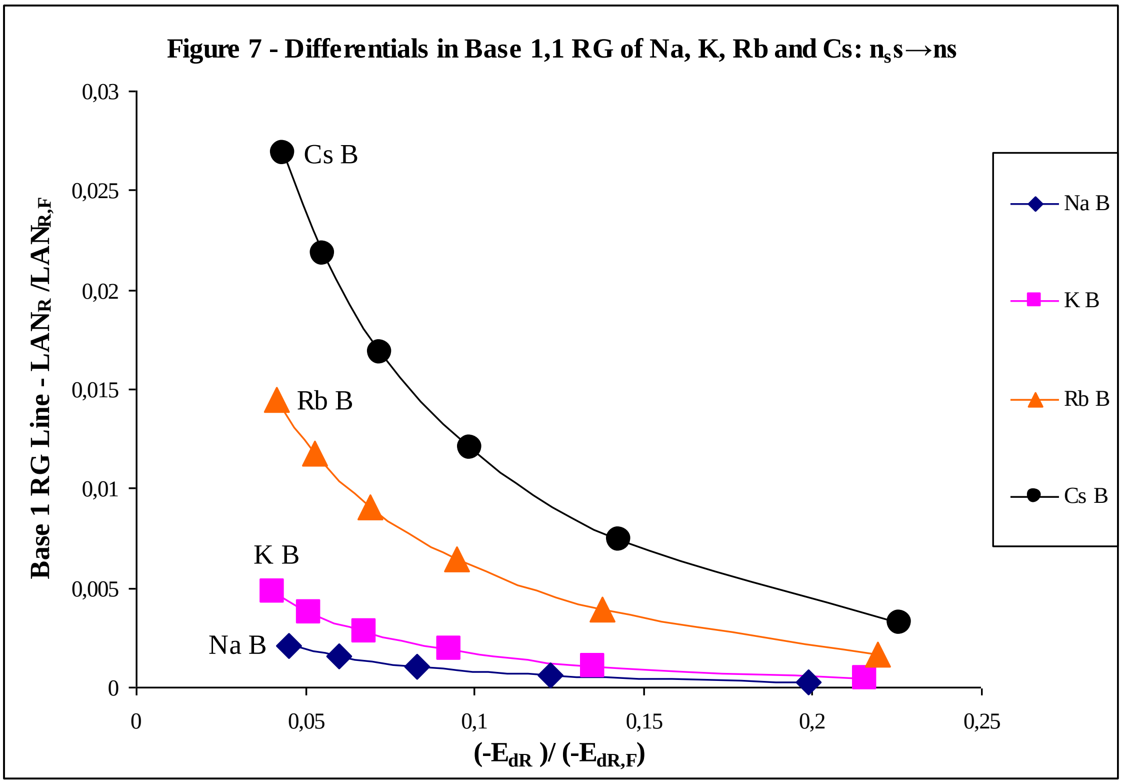


Table 3 - Na and Cs: $n_s s \rightarrow ns$ (Term=^2S J=1/2). AC (5) and RC (6) and (7) in percentage between [10] and Relation of Riquelme de Gozy extrapolated from second to seventh jump.				
	$RC(E_{dR})$ (6) in %		$RC(E_k)$ (7) in %	
Jump number	Cs	Na	Cs	Na
2^{nd}	0,66%	0,017%	0,19%	0,0042%
3^{rd}	1,21%	0,036%	0,20%	0,0050%
4^{th}	1,62%	0,051%	0,18%	0,0046%
5^{th}	1,94%	0,064%	0,15%	0,0041%
6^{th}	2,19%	0,074%	0,13%	0,0035%
7^{th}	2,39%	0,082%	0,11%	0,0030%

3) P62 and P64 Application for Relation of Riquelme de Gozy

Curvature SPA relation with respect to linear ideality has been solved with postulates from P61 to P64 [8]. Relation of Silva de Peral y Alameda refers to one single excited state and to all atoms [5,8]. Excited electron relativistic excess (ER_{dR}) is not negligible throughout SPA relation because there are high z_s (all atoms) and also IE/z_s ratio is second highest ($1s^2$) since treated jump is: $1s^2 \rightarrow 1s2s$ (Term=^1S and J=0). [8]

As Riquelme de Gozy is for one single atom and jump made from same initial state to defined excited state where only n is varied [2,3], jump with low IE can be selected and therefore ER_{dR} may be negligible and (2) passes to (15). In addition, P64, Feliz representation of E_o vision from electron as moves away, is performed with all destiny n and ER_o is best seen.

$$(15)\ -LAN_R^{*}(ER_{dR} \to 0) = \frac{(-E_o^{*})^{1/2} z_s}{(-E_{dR}^{*})^{1/2} z_o} - n = \frac{(-E_o - ER_o)^{1/2} z_s}{(-E_{dR} - ER_{dR})^{1/2} z_o} - n = \frac{(-E_o - ER_o)^{1/2} z_s}{(-E_{dR})^{1/2} z_o} - n$$

P62, Feliz Theory of E_o vision from electron as moves away, allows linearity drift resolution in LAN_R vs. E_{dR} by progressive 1s ER (14) elimination in the vision of said 1s ER (14) by electron as it moves away.

First Feliz theory approximation: E_o change by E_{oT}

First approximation is to consider that E_{oT} (16) must be employed instead of E_o [9] in (15). LAN with this first approximation is given by LAN(E_{oT}) (17) and K_{LAN} by theoretical K_{LAN-T} (18). Change form curvature to lineal is correct with this

$$(16)\ E_{oT} = -13.6056899\ \text{eV} * Z^2$$

$$(17)\ -LAN_R(E_{oT}\ \text{and}\ ER_{dR} \to 0) = \frac{(-E_{oT})^{1/2} z_s}{(-E_{dR})^{1/2} z_o} - n$$

$$(18)\ K_{LAN-T} = \frac{(-E_{oT})^{1/2} z_s}{z_o}$$

This total ER_o elimination follows correct linearity observed for Na jump, [Ne]3s→[Ne]ns, in Figure 5 where is indicated: Selected y value (2.308 eV) is very near to 1s ER or ER_o that has been calculated in (14) and is another sign of P62 and P64 [8] fulfilment.

Step from E_o to E_{oT} is realized progressively to observe how affects RG relation curvature in Cesium 6s→ns (**Figure 8**). Change form curvature to linear is correct with this first Feliz theory approximation as can be checked in Figure 8 and **Table 4**. However, being critical there is outstanding improvement, but no perfect linearity that allows to continue considering of progressive 1s ER (14) elimination in the vision of said 1s ER (14) by electron as it moves away.

Table 4 - R^2 linearity coefficient of Riquelme de Gozy: Cesium 6s→ns (Term=^{2}S J=1/2).

n interval	R^2 with E_o	R^2 with E_{oT}
[6-13]	0,8429	0,9990
[8-13]	0,9067	0,9999
[6-8]	0,9900	0,9997

Figure 8 - Cs RG from E_o to E_{oT}: 6s→ns (Term=^{2}S J=1/2) with n=[6,13]

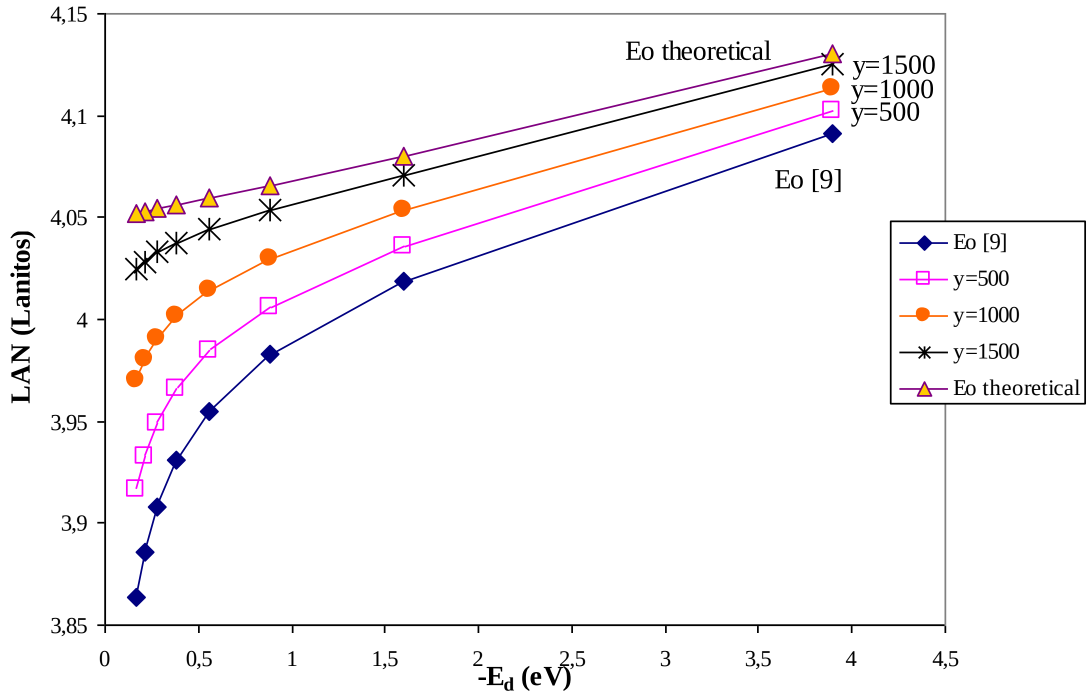


Table 5 includes several more examples on influence of working with E_o or E_{oT}. There are three intervals: three first LAN, next to last with data [10] and overall set as seen in Table 4 with Cs. Conclusion is maintained and progressive 1s ER (14) elimination is considered: there is outstanding improvement using E_{oT} instead E_o, but no perfect linearity and linearity for first jumps is very good with E_o. Linearity for first jumps is only correct with E_o in Cesium case (R^2=0.9900 with E_o and n=[6,8] in Table 4) because ER_o=1755.78 eV is very important and curvature is significantly initiated from beginning.

Table 5 - R^2 linearity coefficient of Riquelme de Gozy for several jumps

Electron jump	n interval	R^2 with E_o	R^2 with E_{oT}
Na I: 3s→ns (Term=^{2}S J=1/2)	[3-15]	0,9545	0,9995
	[5-15]	0,8924	0,9980
	[3-5]	0,9999	0,9999
Al I: 3p→ns (Term=^{2}S J=1/2)	[4-6]	0,9999	0,9997
	[4-15]	0,9898	0,9984
	[6-15]	0,9585	0,9998
Mg I: $3s^2$→3snp (Term=^{1}P^o J=1)	[3-5]	0,9980	0,9986
	[3-11]	0,9951	0,9986
	[5-9]	0,9977	0,9990

Na I: 3s→np (Term=$^2P^o$ J=3/2)	[3-5]	1,00000	0,9997
	[3-15]	0,9710	0,9988
	[5-15]	0,9299	0,9987
S VI: 3s→np (Term=$^2P^o$ J=3/2)	[3-5]	1,00000	0,9990
	[3-9]	0,99329	0,9975
	[5-9]	0,9836	0,9997
K I: 4s→np (Term=$^2P^o$ J=3/2	[4-6]	1,0000	0,9996
	[4-14]	0,9614	0,9989
	[6-14]	0,9281	0,9999

P62 Feliz Theory of E_o vision from electron as moves away. Application to RG.

Once considered possible IE Excess Relativistic (P61), linearity drift resolution in LAN vs. ($-E_{dR}$) is obtained with progressive 1s ER (14) elimination in the vision of said 1s ER (14) by electron as it moves away. In previously treated cases, IE is low and $ER_{dR}\rightarrow 0$ and LAN_R^* is calculated with (15).

LAN_R^* and relation of Riquelme de Gozy are equal in (19) where RG line equation is made with two first data:

$n_s s\rightarrow ns$	non-excited state (LANP50) and first excited state
Other jumps	two first excited states

$$(19) - LAN_R^*(ER_{dR} \rightarrow 0) = \frac{(-E_o - ER_o)^{1/2} z_s}{(-E_{dR})^{1/2} z_o} - n = a + bE_{dR}$$

As $-E_o^*=-E_o-ER_o$ (2), (19) is changed to (20):

$$(20) - LAN_R^*(ER_{dR} \rightarrow 0) = \frac{(-E_o^*)^{1/2} z_s}{(-E_{dR})^{1/2} z_o} - n = a + bE_{dR}$$

E_o^* (21) is obtained from (20). RG relation points are not exactly the same with or without ER_o inclusion as is shown below. Therefore, ER_o is (22):

$$(21) E_o^* = \left((a + bE_{dR} + n)\frac{z_o}{z_s}\right)^2 E_{dR}$$

$$(22) ER_o = \left((a + bE_{dR} + n)\frac{z_o}{z_s}\right)^2 E_{dR} - E_o$$

P64 Feliz representation of E_o vision from electron as moves away.

Feliz representation of E_o vision from electron as moves away is ER_o vs. $(-E_{dR})^{1/2}$ curve (23). Y-intercept must be equal to 1s ER (14) and therefore said 1s ER must be obtained from extrapolation of experimental data. (24) [8]

$$(23) ER_o \propto (-E_{dR})^{1/2}$$

$$(24)\ 1s\ ER = ER_o(E_{dR} \to 0) = E_{oT} - E_o = -13.6056899\ eV * Z^2 - E_o$$

In [8], Feliz representation is carried out with Kr $1s^2 \to 1sns$ (Term=^1S and J=0 and n=[2,4]) and three first jumps are adjusted to grade two polynomial regression (25). Y-intercept provided by equation is 295 eV and therefore very close to that expected: 1s ER=303,23 eV. In addition, $ER_o \to 0$ when is Ed_R of 1s4s: $(-Ed_R)^{1/2}=(-4269{,}834\ eV)^{1/2}=65{,}344\ eV^{1/2}$

$$(25) ER_o = a + b(-E_{dR})^{1/2} + c(-E_{dR})$$

Inclusion of these two points, (0, 303.23) and (65.344, 0) provide $R^2=0.9999$ in grade two polynomial regression. Finally, two other examples, Ga and Ti also give values with very good approximation with Y-intercept of 161 and 42 eV against 164 and 41 eV provided by (14).

ER_o (22) is obtained for Na 3s→ns and represented in **Figure 9**. Start or no-excited state (3s) and first excited state (4s) are not included in Figure 9 because these two points create line equation. RG is indicated in Figure 9 because, as has been seen in [8], ERo can also be calculated from SPA relation. Two regressions are performed:

A) Three first jumps with ER_o are adjusted to grade two polynomial regression (25) as in previous Kr case. These jumps are Na 3s→ns with n=[5,7]. Grade two polynomial regression tends on both sides to fulfil the same as in previous Kr case:

* Y-intercept provided by equation is 2,68 eV and therefore very close to that expected: 1s ER=2,41 eV.
* $ER_o \to 0$ when is Ed_R of [Ne]4s: $(-Ed_R)^{1/2}=(-1{,}9477236\ eV)^{1/2}= 1{,}39560868\ eV^{1/2}$. [Ne]4s has been considered with $ER_o \to 0$ and RG relation has been realized with [Ne]3s and [Ne]4s and grade two polynomial regression is in agreement with this $ER_o \to 0$ in [Ne]4s.

All this analogous situation occurs even:

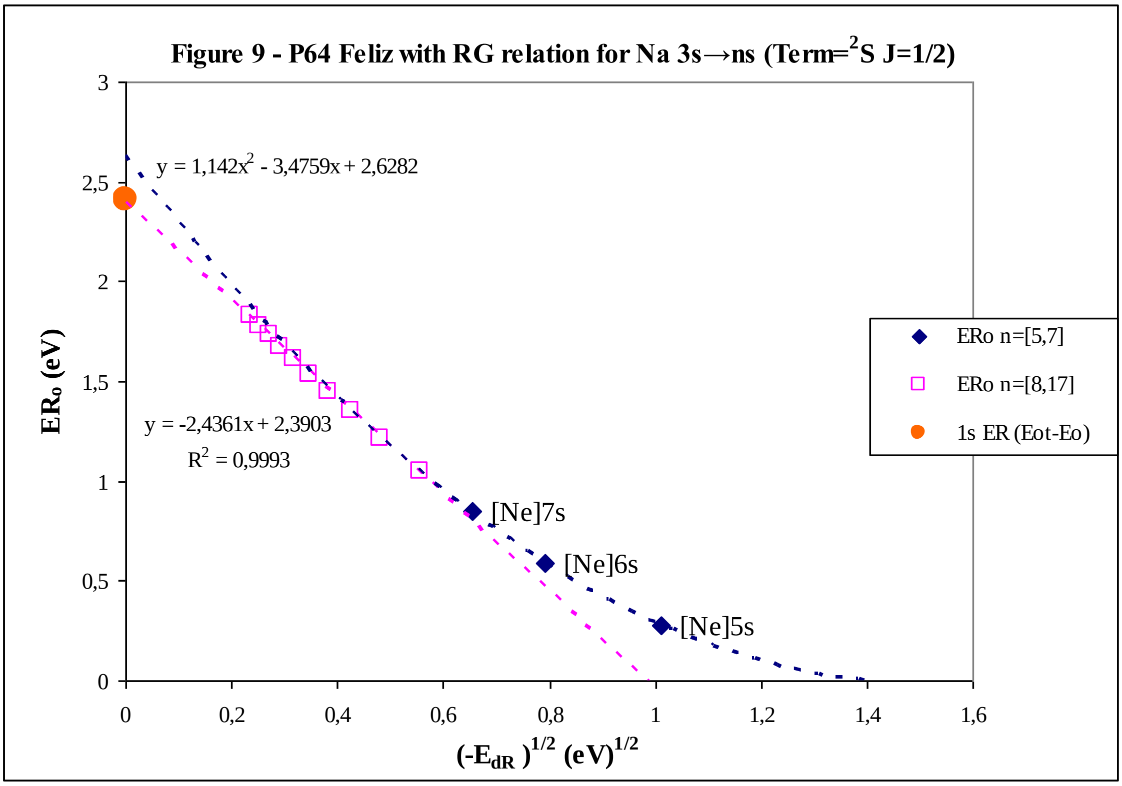
* Being two different electron jumps: Kr $1s^2 \to 1sns$ (Term=^1S and J=0) and Na 3s→ns and also with two different types of energetic correlation: Relation of Silva de Peral y Alameda: $1s^2 \to 1sns$ has PEC and 3s→ns has FEC.
* With extremely disparate 1s ER:

1s ER (Kr)= 303,23 eV>> 1s ER (Na)= 2,4135V

B) Posterior destiny n present good linear behaviour as [8] has advanced. [8] conclusion highlights aspects to be studied in present article that works with RG instead of SPA relation. One of them is following one: ER_o vs. $(-E_{dR})^{1/2}$ section with medium-high n is approximated to line equation (26) from curve adjusted to grade two polynomial regression (25).

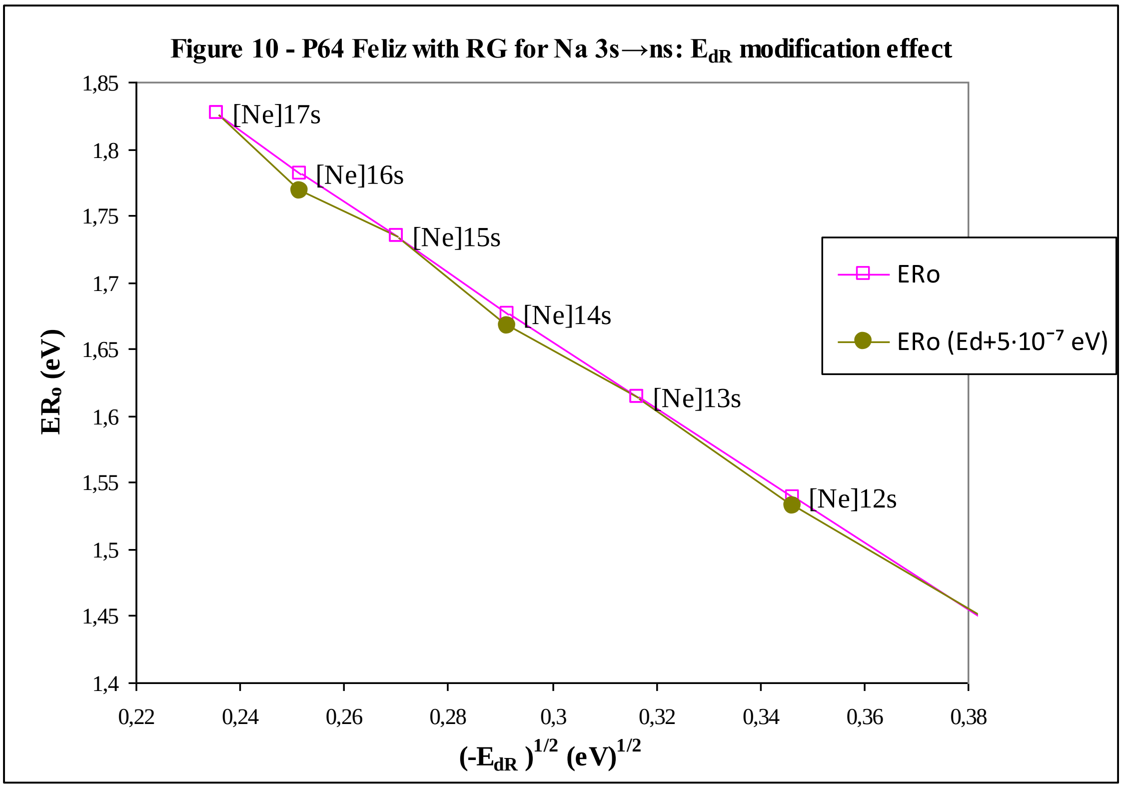
$$(26) ER_o \approx a + b(-E_{dR})^{1/2} \text{ Approximation for posterior jumps}$$

Linear regression has very good R^2=0.9993 considering that is for medium-high n destiny (n=[8,17]). Linear regression Y-intercept equal to 2.39 eV is even closer to calculated in (14), 2.4135 eV, than value estimated at point A) (2.68 eV)



P64 Feliz representation sensibility to energetic variations

$5 \cdot 10^{-7}$ eV is added to E_{dR} in Na 3s→ns with destiny n=12, 14 and 16 (**Figure 10**). Figure 10 is P64 representation (ER_o vs. $(-E_{dR})^{1/2}$) and is Figure 9 enlargement in low $(-E_{dR})^{1/2}$ area. This modification is very limited: $5 \cdot 10^{-7}$ eV/$(-E_{dR}) \approx 10^{-6}$ and $5 \cdot 10^{-7}$ eV/$(-E_k) \approx 10^{-7}$ where E_{dR} and E_k are destiny and jump energies for Na 3s→ns with destiny n=12, 14 and 16. E_{dR} modification effect on ER_o vs. $(-E_{dR})^{1/2}$ linearity is visible to naked eye even when modification is small.



P64 Feliz representation of E_o vision for Cesium in medium-high n.

P64 Feliz representation of E_o vision for Cesium in medium-high n is represented in **Figure 11**. Start or no-excited state (6s) and first excited state (7s) are not included in Figure 11 because these two points create line equation. Three first jumps with ER_o (from 8s to 10s) are also not in Figure 11 because are adjusted to grade two polynomial regression and Figure 11 is focused on ER_o vs. $(-E_{dR})^{1/2}$ section with medium-high n that is approximated to line equation (26). Both regression provide Y-intercept ≈ Eo_T-Eo (**Table 6**). Two different jumps covering wide 1s ER range have been carefully represented an are in accordance what is postulated as P62 and P64:

$1s^2$→1sns (Term=^1S and J=0) with Ti, Ga and Kr as examples. [8]
n_ss→ns (Term=^2S J=1/2) with Na and Cs as examples.

Complementarily, other jump examples that corroborate P62 and P64 accomplishment are summarized in **Table 7**.

Table 6 - P64 Feliz representation of E_o vision for Cesium 6s→ns and np. R^2 and $ER_o(E_{dR}\to 0)$. L is linear regression and P is grade two polynomial regression.
1s ER = E_{oT}-E_o = 1755,78 eV

Electron jump	n interval	Regression	R^2	Y-intercept ≈ E_{oT}-E_o
Cs I: 6s→ns (Term=^2S J=1/2)	[11-13]	L	0,9999	1696
	[12-13]	L		1708
	[11-13]	P		1786

Cs I: 6s→np (Term=^{2}P° J=3/2)	[11-21]	L	0,9995	1716
	[15-21]	L	0,9999	1736
	[18-21]	L	0,9991	1741
	[11-21]	P	1,0000	1774
Cs I: 6s→np (Term=^{2}P° J=1/2)	[11-21]	L	0,9995	1714
	[15-21]	L	0,9999	1735
	[18-21]	L	0,9989	1739

Figure 11 - P64 Feliz with RG relation for Cs 6s→ns and np

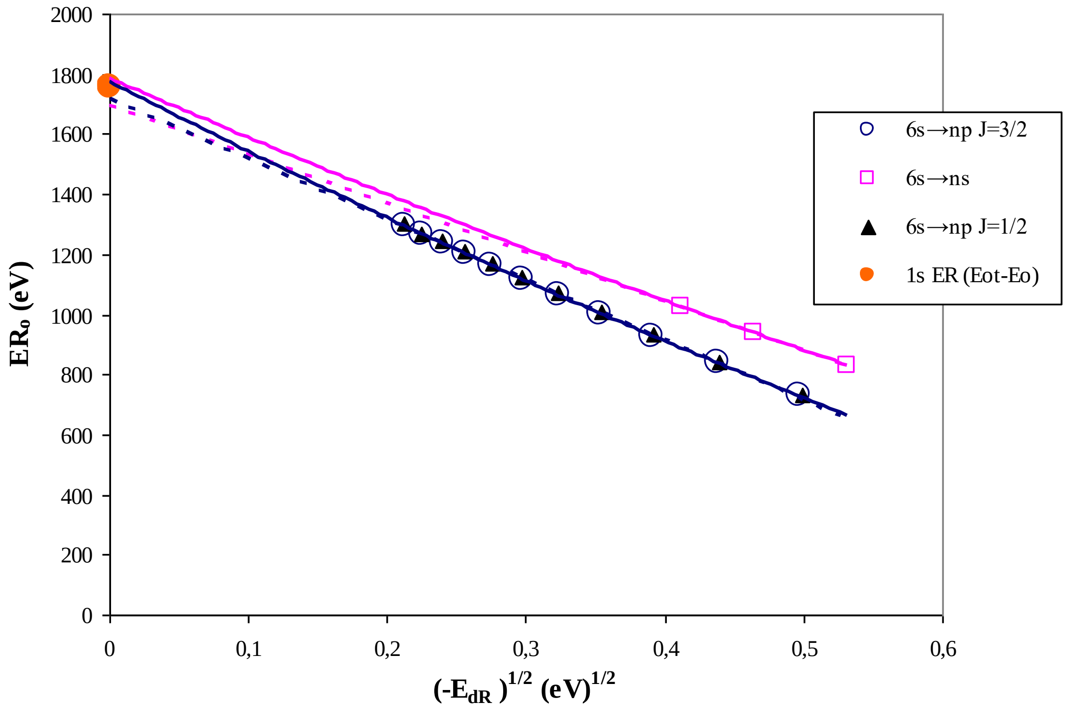


Table 7 - P64 Feliz representation of E_o vision for several electron jump examples with line equation approximation in medium-high n. R^2 and $ER_o(E_{dR}\to 0)$				
Electron jump	n interval	R^2	Y-intercept	E_{oT}-E_o
Na I 3s→ns (Term=^{2}S J=1/2)	[7-17]	0,9986	2,37	2,414
	[11-17]	0,9998	2,43	
Na I 3s→np (Term=^{2}P^0 J=3/2)	[9-15]	0,9993	2,32	
	[13-15]	1,0000	2,40	
Na I 3s→nd (Term=^{2}D J=3/2)	[11-15]	0,9999	2,53	
	[13-15]	1,0000	2,51	

Al I 3p→ns (Term=^{2}S J=1/2)	[12-15]	0,9993	4,32	4,778
	[13-15]	1,0000	4,41	
S I 3p^4→3p^3(^{4}S^0)ns (Term=^{3}S^0 J=1)	[10-12]	1,0000	10,76	11,1326
	[11-12]		10,82	
K I 4s→ns (Term=^{2}S J=1/2)	[10-13	0,9997	21,8	22,392
	[11-13]	0,9999	22,0	
K I 4s→np (Term=^{2}P^0 J=3/2)	[11-14]	0,9993	21,8	
	[12-14]	0,9997	22,2	
K I 4s→nd (Term=^{2}D J=3/2)	[8-11]	0,9996	21,4	
	[10-11]		21,9	
Ga I 4p→ns (Term=^{2}S J=1/2)	[9-15]	0,9965	155	164,420
	[12-15]	0,9775	156	
	[13-15]	0,9961	167	
Rb I 5s→ns (Term=^{2}S J=1/2)	[11-12]		312	339,326
Rb I 5s→np (Term=^{2}P^0 J=3/2)	[11-17]	0,9996	338	
	[11-25]	0,997	349	
Xe I 5p^6→5p^5(^{2}P$^0_{3/2}$)ns ^{2}[3/2] 1	[13-20]	0,9993	1606	1626
	[16-20]	0,9995	1631	
Xe I: 5p^6→5p^5(^{2}P$^0_{3/2}$)np ^{2}[5/2] 3	[10-15]	0,991	1596	
	[11-13]	0,9998	1591	
	[11-15]	0,987	1638	
Fr I 7s→ns (Term=^{2}S J=1/2)	[11-20]	0,9996	12670	12878
	[15-20]	1,0000	12808	
Fr I 7s→np (Term=^{2}P^0 J=3/2)	[11-20]	0,9995	12594	
	[15-20]	1,0000	12773	
Ra I 7s^2→7snp (Term=^{1}P^0 J=1)	[20-52]	0,9907	13523	13569

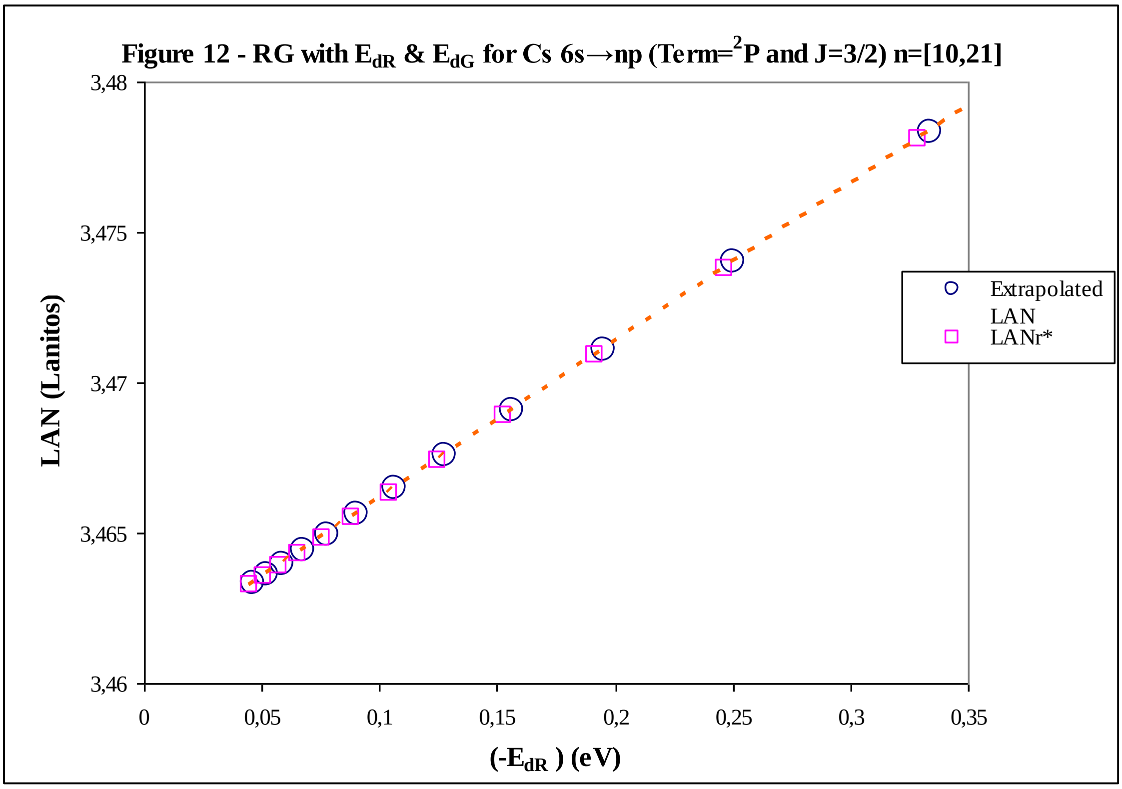
RG relation displacement

Linearity drift resolution in RG relation (LAN_R vs. E_{dR}) has been achieved only by considering ER_o and admitting that $ER_{dR}\rightarrow 0$ because examples have been selected with low IE. Consequently, F≠G since F=1 and G is variable number related to y= ER_o (27) where y=[0, 1s $ER=E_{oT}-E_o$]. Therefore, E_{dI} (ideal destiny energy) obtained from cubic equation resolution [2] without relativistic considerations is slightly different from E_{dR}. Finally, implies that $LAN_{RI}\neq LAN_R^*(ER_{dR}\rightarrow 0)$ (28) and (15) and data pairs are displaced within same Riquelme de Gozy line (**Figure 12**). LAN_{RI} is ideal LAN extrapolated from initial references [2].

$$ER_o = [0,\ 1s\ ER=E_{oT}-E_o] \text{ and } ER_{dR}\rightarrow 0$$
$$\downarrow$$
$$E_{dI}\neq E_{dR}$$
$$\downarrow$$
$$LAN_{RI}\neq LAN_R^*(ER_{dR}\rightarrow 0)$$
$$\downarrow$$
RG relation displacement

$$(27) G = \frac{E_o + y}{E_o}$$

$$(28) - LAN_{RI} = \left(\frac{z_s^2 E_o}{z_o^2 E_{dI}}\right)^{1/2} - n$$



This RG relation displacement along with cancelation possibility with balance between F and G provoked by ER_{dR} and ER_o respectively should be analyzed later.

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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. 14, 15, 16 and 17 are [5] [6] [7] and [8] respectively. 18 is present article.

Abbreviation	14	15	16	17	18	Meaning
AC	X				X	Actual Change
AFEC			X	X		FEC adapted
BES	X					Born Electronic System
E_{dR}	X	X		X	X	Reference destiny energy
E_{dR}^*				X	X	Reference destiny energy with ER_{dR}
E_{dRI}					X	Ideal E_{dR} obtained from extrapolation of others E_{dR} satisfying Relation of Riquelme de Gozy
E_{jRI}						Ideal jump energy obtained from E_{dRI}
E_k	X	X	X	X		Reference Jump energy
$E_{k\text{-}SPA}$	X					E_k from LAN-SPA equality
E_o	X	X		X	X	1s OES Ionization energy
E_o^*				X	X	1s OES Ionization energy with ER_o

E_{oT}				X	X	1s theoretical ionization energy
EC	X					Energetic correlation in SPA
ER				X	X	Excess Relativistic
ER_{dR}				X	X	Excess Relativistic of E_{dR}
ER_o				X	X	Excess Relativistic of 1s ionization energy (E_o)
FEC	X	X	X	X		Fundamental Energetic Correlation
FPG	X				X	Relation of Flui Piep de Garberí
IE	X	X	X	X	X	Ionization energy
LAN	X	X	X	X	X	Serelles Secondary Lines Factor
LAN_M				X	X	LAN with modification
LAN_R*				X		LAN with reference data and considering ER
LAN_R	X	X	X	X	X	LAN with reference data
LAN_I LAN_{RI}		X				Ideal LAN obtained from E_d or E_{dRI}
LAN(P50)				X		Initial LAN value in ns to ns jump. LAN with IE
n	X	X	X	X	X	Principal quantum number
$n_{initial}$ or n_s	X	X	X	X	X	n of non-excited electron
OES	X					Origin Electronic System
PEC				X		Primitive energetic correlation of SPA
Piepflui				X		Constant spacing in Silpovgar IV
RC	X			X		Relative Change
RG	X	X			X	Relation of Riquelme de Gozy
SPA	X	X	X	X	X	Relation of Silva de Peral y Alameda
Z	X			X		Atomic Number
z_o	X	X			X	1s Origin charge according to P46
z_s	X	X		X	X	Start charge according to P46

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