SUBSTITUTION ANGLE EXERCISES

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Introduction

The two entanglement transformations R_{lin} and R_{sub} derived in dark matter induction law represent the substitution angle θ shown in the fig 2. This angle represents two properties:

1. The exchange in spherical symmetry radial momentum and tangential momentum of the ultra light dark matter medium. Therefore a delay in exchange because it takes time at any real radius to convert the two momentums integrated up to 3D infinity (Newtonian) then given by the angle θ.
2. The angle θ is constant for any real radius R from the spherical centre.

The importance of the substitution angle shows in the **experiment for gravity levitation** because of the necessity to take care of the angle in the antenna design for the electromagnetic power sources.

Par 2. The ad hoc postulation of the substitution principle

Pseudo vector cells subjected to a radial force field emitted from a boundary condition maintaining the overall radial and angular momentum, follow the principle of substitution between their vector components.

At any radius R from the mass centre the pseudo vector cells decompose in a radial force, or acceleration component g and angular momentum vector $\underline{b}$ perpendicular to $\underline{g}$. The vector momentums R_g and R_b aligned according to the directions of the radial field are combined in R_{lin} shown fig 2.

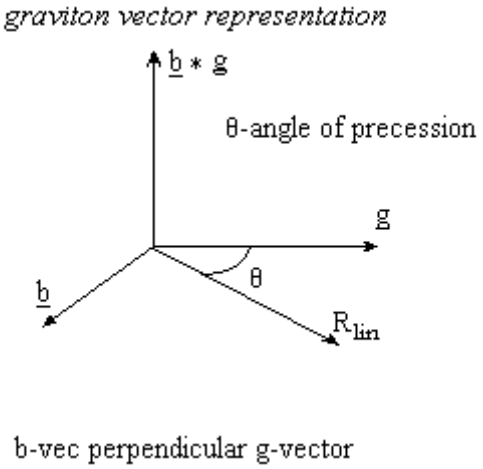

fig.2

Fig.2 defines the vector angle by introducing the substitution angle θ.

By splitting the pseudo cell into components for the angular and linear momentum at a radius R, one can write:

$R_g = R_{lin} \cos\theta$ (linear) and $R_b = R_{lin} \sin\theta$ (angular)

The energy $m_{lin}(R)$ is the hypothetical mass coming from R_{lin} at a radius R to the centre of mass M due to the uncertainty condition. Both momentum components are:

$p_g = m_g c = h / R_g$ $b_b = m_b c = h / R_b$

Then the energy is: $W_b = hc / R_b$ $W_g = hc / R_g$

Introduce the substitution definitions:

If $m_{sub} v_{sub} = m_g v_g + m_b v_b$ then $1/R_{sub} = 1/R_b + 1/R_g$

Where $m_{sub} = h / (R_{sub} v_{sub})$

The relation between (R_{lin} & R_{sub}) and (m_{lin} & m_{sub}) is:

$R_{sub}\, m_{sub}\, v_{sub} = R_{lin}\, m_{lin}\, c = h$ or $R_{sub} / R_{lin} = m_{lin}\, c /(m_{sub}\, v_{sub})$ (2.7)

With $R_{sub} = R_b\, R_g / (R_b + R_g)$

$R_{sub} /R_{lin} = R_b\, R_g /(R_b + R_g)^2 = x /(1 + x^2 + 2x)$ $x = R_g /R_b$

If $x < 0$ then $R_{sub} /R_{lin} = -x /(1 + x^2 - 2x)$ (2.8)

If $x > 0$ then $R_{sub} /R_{lin} = x /(1 + x^2 + 2x)$

Roots $x_1 = 1/x_2$ Always the roots are reciprocals independent of the polarity sign. Secondly if $x < 0$ then $R_{sub} /R_{lin} = -\omega^2$ a complex number maintaining the R_g and R_b perpendicular to each other. The property one was looking for but ω^2 could also be a mass ratio.

The reversed roots of $\omega^2 = x /(1 + x^2 - 2x)$ are:

$y^2 + 1 - 2\{1 \pm (1/2\omega^2)\}y = 0$ $y_{1,2} = (1 + (1/2\omega^2) \pm\sqrt{\{(1 + (1/2\omega^2))^2 + 1\}}$ (2.9)

Always $y_1 = 1 /y_2$ as reciprocal roots. Consider only the absolute for ω^2.

Express (2.8) in the angle θ:

$R_{sub} /R_{lin} = \sin\theta \cos\theta /(\cos\theta + \sin\theta)$ (2.10)

And

$1/(R_{sub}\, R_{lin}) = 1/(R_g\, R_b)$ Only correct if converts into $R_g\, R_b = R_{sub}{}^*\, R_{lin}{}^*$

With $R_{sub}{}^* /R_{lin}{}^* = (R_b + R_g)/R_{lin} = \sin\theta + \cos\theta$ (2.11)

With (2.10): $(R_{sub} / R_{lin})^2 = \omega^2 = ¼ \sin^2 2\theta /(1 + \sin 2\theta)$

giving: $\sin^2 2\theta - (4/\omega^2)\sin 2\theta - (4/\omega^2) = 0$ (2.12)

The rel 2.11 is a boundary condition:

For $\theta = 90^o$ $\sin\theta + \cos\theta = 1$

$\theta = 60^o$ $= 1.366025$

45° $= \sqrt{2}$ symmetric for 45°.

30° $= 1.366025$ $\omega^2 = 10.1962$

15° $= \sqrt{1.5} = 1.224744$ $\omega^2 = 24$ $\sqrt{24} = 4.898979$

$12^o.00574$ $= 1.18136$ $\omega^2 = 36$

$\theta = 9^o.73561$ $= 1.15470054$ $\omega^2 = 48$ $\sqrt{48} = 6.928203$

The last corresponding to $m/m_o = 1 /\sqrt{(1 - 0.5^2)}$ or ½c effective. The maximum momentum for a pseudo cell. However also the 1st root of $\sin 2\theta_1 = 0.3333$ giving $\theta_1 = 9^o.735605$ and 2nd root of $\sin 2\theta_2 = \text{abs}(0.25)$ to be associated to root of $\omega^2(+2x)$ in the column of table 1. Continuation of the discussion of macroscopic substitution in par 2.5.

The square root of 24 of 4.898979 can be associated with the five nodes in the mid plane of two opposing pyramids the one equilateral and the other the cubic pyramid where the node distance is 5/ 4.898979 = 1.020620 in normalised units and $(1.020620)^3$x 1728 = 1837.113 m_e very close to the proton mass. See chap 3. The hard wired real mass is 1836.153m_e and a result of the substitution interval for the pseudo vector medium. Further the chopper gap due to the cube dimension between the two cubic pyramids opposing in a body diagonal of a cube is $\sqrt{3} - 2$ x $1/6\sqrt{3} = 1.15470054$. Note at $\omega^2 = 48.2487$ then x = 1.154700. At x = 1.55129 then $\omega^2 = 48$ exactly. The last x exceeds the limit of 1.154700 discussed in the next paragraph..

Par 2.3 The substitution interval for the H atom.

Determining the validity of the interval for $R_{sub} /R_{lin} = \omega^2$ seen as absolute.

The two quadratic reciprocal equations for the parameter ω^2:

$\omega^2 = x /(1 + x^2 \pm 2x)$ $y^2 - 1 \pm 2(1 + (1/2\omega^2) = 0$

rel (2.8) rel (2.9)

Due to the constant of ω^2 if one in both quadratic equations the roots of $x_{1,2}$ and $y_{1,2}$ are always reciprocal. For any ω^2 the interval defined in table 1 the parameter $(1 + (1/2\omega^2)$ the rel 2. 9 is always regular and valid. The roots of x used in the table are to rel 2.8 and those of y roots of rel 2.9

Table 1

x	$\omega^2(+2x)$	$\omega^2(-2x)$	$1 + 1/2\omega^2$	y
2.0	0.222222	2.0	1.2500	2.0
√3	0.23205505	3.73205	1.133974	1.668669
1.5	0.2400	6.0	1.083333	1.5
			(1 + 1/12)	
√2	0.24264069	8.24264045	1.060660	1.414213 √2
		8.0	1.062500	1.421535
4/3	0.24489796	12.0	1.041667	1.333 (4/3)
1.226017	0.2474226	24.0	1.020833	1.226017
	√24 = 4.898979	5.0/√24 = 1.020620	(1+ 1/48)	√1.5 = 1.224744
1.15470054	0.24871131	48.2487246	1.010362	1.154700 √(4/3)
		48.0	(1 + 1/96)	1.155129
1.12500	0.2491349	72.0	(1 + 1/144)	1.12500 (9/8)
1.062500	0.2497704	272.0	1.001838	1.12500 (17/16)
1.06066017	0.2498336	288.249504		1.060660
		288.0	1.001736	1.060687

The asymptotic behaviour defining the interval if for $\omega^2 = 0.25$ for $x_1 = +1$ and for $x_2 = (-1)$ the denominator goes to zero. So ω^2 goes to infinity.
The range of inversion from the roots $x_1 = 0.25$ to $x_2 = 4$ gives the interval of 16. The onset is at x and y = √2 then $\omega^2 = 8.2426$ up to x and y around 1.060660 and 1.066087 with ω^2 around 288.

The table shows the boundary conditions for the interval of 16 of the inversions. As soon as the integers 8, 48 and 288 are exceeding the limits 1.060660 in $(1 + (1/2\omega^2)$ for x and y of √2, for x = 1.154700 and 1.060687 for ω^2 , these integer values are not valid which shows the spectacular result of the table. The reciprocals for x and y are respectively 0.9428091, 08660258 (cos 30°) and ½ √2 (cos 45°). Also $\cos 2\theta_1 = 0.9428091$ with $\theta_1 = 9°.7356$ shown in the previous paragraph.

Amazing is that the other integers for x = 9/8 with $\omega^2 = 72$ and 1.062500 with $\omega^2 = 272 = 4 \times 68$ while $288 = 4 \times 72$ are excluded in the limits and therefore the real hard wired integers determining the cavity parameters for the proton and the electron.

$1836 / 1728 = 1.062500 = 17/16 = \{1 + (1/16) = 1/2\omega^2)\}$, hardwired in pseudo matter.

The reduced mediating mass is $1728 / 144\sqrt{3} = \sqrt{48} = 6.928203 = 4\sqrt{3}$ is a derived parameter not hard wired in pseudo vectors but limited by the mentioned boundaries.
The end limit of $\omega^2 = 288.2495$ determines the reciprocal fine structure constant. Shown as follows:

$144 - 136 = 8$ $144 - 137.036 = 6.964 = 4 \times 8.9492\ 10^{-3} + 4\sqrt{3})$.

$8 - 6.964 = 1.036 = 0.25 + 4 \times 8.9492\ 10^{-3} = 1.035796$

The asymptotic limit of 0.25 as rest term determines 1.036 m_e as gap deviation.
The conclusion has to be that 137.036 m_e is a hard wired parameter derived from integer inversion values for the 8-interval. It also confirms the rest mass value of the τ-pseudo vector neutrinos of 34.259 m_e (4 x 34.259 = 137.036). Namely four independent opposing τ-pseudos let the string of 34.259 x 1728m_e degenerate to Higgs' limit. Namely 4 x 1⁄2√2 (35.6735 – 34.259) = 1.000202 m_e in

the degeneration of the substitution: 1 /137.36 – 1 / 3456 = 1 /142.6940 because Higgs' limit is 142.6940 x 1728 m_e = 126 GeV .

Further proton parameters:

17 x 8.9492 10^{-3} = 0.15214 in 1836.15267m_e

$\sqrt{1728} - (\sqrt{1604.175} = 137.036^{3/4}) = 41.56921 - 40.05215 = 1.517065$

3/2 x 8.9492 10^{-3} + 1.517065 = 1.53049

The difference of the observed rest masses of neutron and H atom:

1838.683135 – 1837.15267 = 1.53046 m_e .

By applying the substitution principle to the internal parameters of the proton it is shown that this principle is fundamental for the pseudo vector medium in all its qualities from τ- ,μ- to e pseudo neutrinos.

For the H-atom of 1837.153 and with a mediating mass of 250.8082m_e , See par 2.1.

The substitution angle is:

1837.153 /250.8082 = 7.325 $\omega^2 = 7.325^2$ $1 + (1/2\omega^2) = 1.009318$

Then y = x = 1.146155 $\theta = 9^o.11835$

For any atomic species the mediating mass can be calculated according to par 2.1.

Note the cantilever for the interval of 16 is $2\omega^2 = 256 = 2^8 = 4^4$ compromising two inversion intervals.

According to the table, 256 + 16 = 272 and 272 + 16 = 288.

Namely $\{1 + (1/2\omega^2)\}$= 1.003906 with y = 1.092380 having the 3rd power root of 1.029890:

1.029890^2 = 1.060675 compared to exact 1.06066017 or 1.060660 truncated.

1.029890^4 = 1.125032 with ω^2 =71.7652 instead of 72 for x = 1.125000.

For x = 1.029890 then ω^2 = 1153.248 while 288 x 4 = 1152

Also 256 /144$\sqrt{3}$ = 1.1547005 /1.12500 = 1.026400

A parameter overview explains how the integers in the interval are generated and keep the hardwired values.

Table 2

x	1/x	ω^2	substitution product		
2	½	2			
3/2	2/3	6	2 x 3		
4/3	3/4	12	3 x 4		
$\sqrt{4/3}$		48.2487			
9/8	8/9	72	8 x 9 but also 6 x 12		
17/16	16/17	272	16 x 17	2 x 136	17 x 108/(16 x 108) = 1836/1728
$\sqrt{9/8}$		288.2495	end of cycle		

Similarly for the substitution angle θ

θ	x	cos φ = 1/x	ω^2
30º	1.366025	42º.94140	10.1962
15º	$\sqrt{1.5}$ = 1.224744	35º.26438	24.24744
9º.735605	$\sqrt{4/3}$ = 1.1547005	30º	48.2487
7º.6884	9/8 = 1.12500	27º.26604	72
3º.7015	17/16 =1.062500	19º.74992	272
3º.5888	$\sqrt{8/9}$ = 1.060660	19º.47119	288.2495

Close to 2 x 9º.735605 = 19º.47121

Note the square root of 3/2 as integers is the substitution inversion for the strong interaction displayed in pyramid symmetry for the exchange dipole through the pyramid centre giving the angle of 35º.26438 to the centre height line. All seen as the internal pseudo vector parameters for the quark cell of 1728 m_e .

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