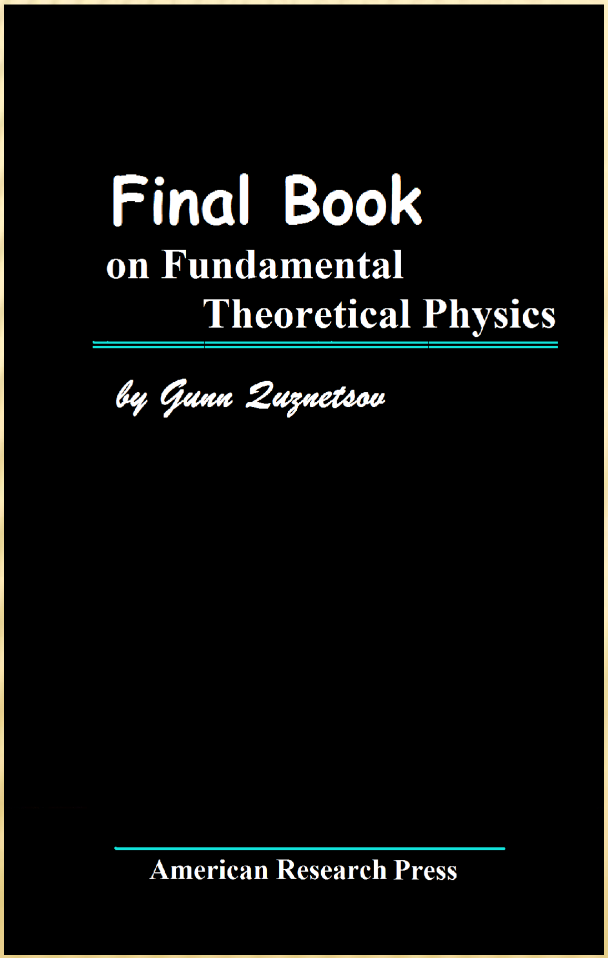
ZERO.
PROBABILYSTIC FOUNDATION
OF
THEORETYICAL PHYSICS

For a detailed discussion of this PRESENTATION formulas read In this book

HTTP://VIXRA.ORG/ABS/1111.0051



A reference of type [p.X] means: "on the page X"

Let $A(\underline{x})$ be a dot event in a 3+1 point $\underline{x}$

$(\underline{x} = \left(x_0, \vec{x}\right) = \langle x_0, x_1, x_2, x_3 \rangle)$.

Let $\wp$ be a probability function defined on the set of dot events in the 3+1 space-time.

Let $\left\langle X_{A,0}, X_{A,1}, X_{A,2}, X_{A,3} \right\rangle$ be random coordinates of event A.

Let F_A be a Cumulative Distribution Function i.e.:

$$F_A\left(x_0, x_1, x_2, x_3\right) =$$
$$= \wp\left(\left(X_{A,0} < x_0\right) \wedge \left(X_{A,1} < x_1\right) \wedge \left(X_{A,2} < x_2\right) \wedge \left(X_{A,3} < x_3\right)\right)$$

Let

$$j_0 := \frac{\partial^3 F}{\partial x_1 \partial x_2 \partial x_3}$$

And if $\rho := j_0 / c$

then ρ is *a probability density of event***.**

A probability density of event is not invariant under the Lorentz transformations.

If

$$j_1 := -\frac{\partial^3 F}{\partial x_0 \partial x_2 \partial x_3},$$

$$j_2 := -\frac{\partial^3 F}{\partial x_0 \partial x_1 \partial x_3},$$

$$j_3 := \frac{\partial^3 F}{\partial x_0 \partial x_1 \partial x_2}$$

then $\left\langle c\rho, j_1, j_2, j_3 \right\rangle := \left\langle j_0, \vec{j} \right\rangle$ *is a probability current*

vector of event.

If $\vec{u} := \vec{j} / \rho$ then vector $\vec{u}$ is *a velocity of the probability*

propagation.

For example:

$$u_2 = \frac{j_2}{\rho} = \frac{\left(-\frac{\partial^3 F}{\partial x_0 \partial x_1 \partial x_3}\right)c}{\left(\frac{\partial^3 F}{\partial x_1 \partial x_2 \partial x_3}\right)} \approx \left(-\frac{\Delta_{013}F}{\Delta_{123}F}\frac{\Delta x_2}{\Delta x_0}\right)c$$

I consider events which obey the following condition:

$$u_{A,1}{}^2 + u_{A,2}{}^2 + u_{A,3}{}^2 \le c^2$$

(*Traceable events*)

Denote:

$$1_2 := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, 0_2 := \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \beta^{[0]} := -\begin{bmatrix} 1_2 & 0_2 \\ 0_2 & 1_2 \end{bmatrix} = -1_4,$$

The Pauli matrices:

$$\sigma_1 := \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, \sigma_2 := \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}, \sigma_3 := \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}.$$

A set $\overline{C}$ of complex n x n matrices is called *a Clifford set of rank n* if the following conditions are fulfilled:

$$if\ \ \alpha_k \in \overline{C}, \alpha_s \in \overline{C} \quad then \quad \alpha_k \alpha_s + \alpha_s \alpha_k = 2\delta_{k,s};$$

$$if\ \ \alpha_k \alpha_s + \alpha_s \alpha_k = 2\delta_{k,s}$$

$$\text{for all elements}\, \alpha_s \text{ of set } \overline{C} \quad then \quad \alpha_k \in \overline{C}.$$

If n = 4 then a Clifford set either contains 3 matrices (*a Clifford triplet*) or contains 5 matrices (*a Clifford pentad*)

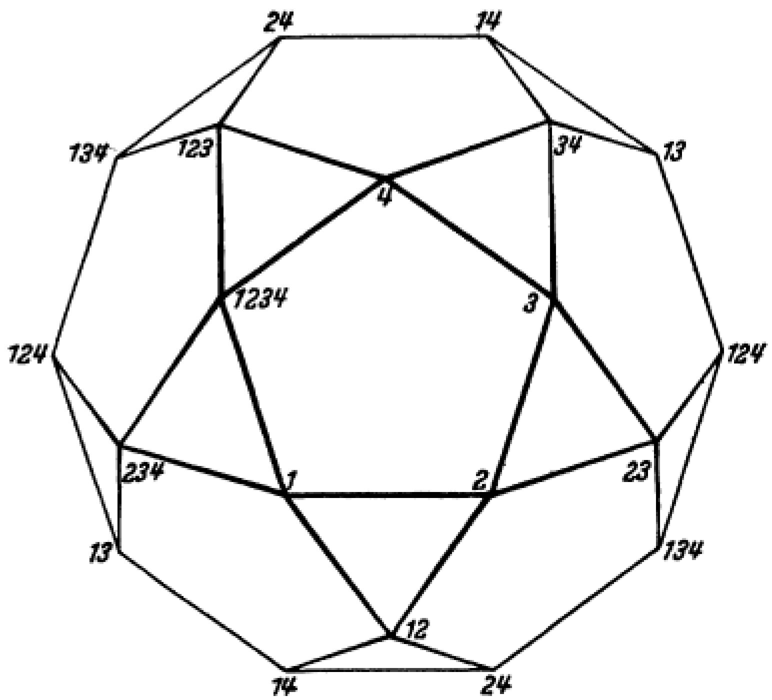


Abb. 1. CLIFFORDsche Zahlen.

[Madelung, E., *Die Mathematischen Hilfsmittel des Physikers. Springer* Verlag, (1957) p.29].

If n = 4 then a Clifford set either contains 3 matrices (a Clifford triplet) or contains 5 matrices (a Clifford pentad).

Here exist only six Clifford pentads [pp.59-60]:

one *light pentad* *β:*

$$\beta^{[k]} := \begin{bmatrix} \sigma_k & 0_2 \\ 0_2 & -\sigma_k \end{bmatrix} \; for\, k \in \{1,2,3\};$$

$$\gamma^{[0]} := \begin{bmatrix} 0_2 & 1_2 \\ 1_2 & 0_2 \end{bmatrix}, \beta^{[4]} := i \times \begin{bmatrix} 0_2 & 1_2 \\ -1_2 & 0_2 \end{bmatrix}.$$

three *chromatic pentads:*

the red pentad ζ*:*

$$\zeta^{[1]} := \begin{bmatrix} -\sigma_1 & 0_2 \\ 0_2 & \sigma_1 \end{bmatrix}, \zeta^{[2]} := \begin{bmatrix} \sigma_2 & 0_2 \\ 0_2 & \sigma_2 \end{bmatrix}, \zeta^{[3]} := \begin{bmatrix} -\sigma_3 & 0_2 \\ 0_2 & -\sigma_3 \end{bmatrix},$$

$$\gamma_\zeta^{[0]} := \begin{bmatrix} 0_2 & -\sigma_1 \\ -\sigma_1 & 0_2 \end{bmatrix}, \zeta^{[4]} := i \times \begin{bmatrix} 0_2 & \sigma_1 \\ -\sigma_1 & 0_2 \end{bmatrix};$$

the green pentad η*:*

$$\eta^{[1]} := \begin{bmatrix} -\sigma_1 & 0_2 \\ 0_2 & -\sigma_1 \end{bmatrix}, \eta^{[2]} := \begin{bmatrix} -\sigma_2 & 0_2 \\ 0_2 & \sigma_2 \end{bmatrix}, \eta^{[3]} := \begin{bmatrix} \sigma_3 & 0_2 \\ 0_2 & \sigma_3 \end{bmatrix},$$

$$\gamma_\eta^{[0]} := \begin{bmatrix} 0_2 & -\sigma_2 \\ -\sigma_2 & 0_2 \end{bmatrix}, \eta^{[4]} := i \times \begin{bmatrix} 0_2 & \sigma_2 \\ -\sigma_2 & 0_2 \end{bmatrix};$$

the blue pentad: Θ

$$\theta^{[1]} := \begin{bmatrix} \sigma_1 & 0_2 \\ 0_2 & \sigma_1 \end{bmatrix}, \theta^{[2]} := \begin{bmatrix} -\sigma_2 & 0_2 \\ 0_2 & -\sigma_2 \end{bmatrix}, \theta^{[3]} := \begin{bmatrix} -\sigma_3 & 0_2 \\ 0_2 & \sigma_3 \end{bmatrix},$$

$$\gamma_\theta^{[0]} := \begin{bmatrix} 0_2 & -\sigma_3 \\ -\sigma_3 & 0_2 \end{bmatrix}, \theta^{[4]} := i \times \begin{bmatrix} 0_2 & \sigma_3 \\ -\sigma_3 & 0_2 \end{bmatrix};$$

two *gustatory pentads:*

the sweet pentad $\underline{\Delta}$:

$$\underline{\Delta}^{[1]} := \begin{bmatrix} 0_2 & -\sigma_1 \\ -\sigma_1 & 0_2 \end{bmatrix}, \underline{\Delta}^{[2]} := \begin{bmatrix} 0_2 & -\sigma_2 \\ -\sigma_2 & 0_2 \end{bmatrix}, \underline{\Delta}^{[3]} := \begin{bmatrix} 0_2 & -\sigma_3 \\ -\sigma_3 & 0_2 \end{bmatrix}, -$$

$$\underline{\Delta}^{[0]} := \begin{bmatrix} -1_2 & 0_2 \\ 0_2 & 1_2 \end{bmatrix}, \Delta^{[4]} := i \begin{bmatrix} 0_2 & 1_2 \\ -1_2 & 0_2 \end{bmatrix};$$

the bitter pentad $\underline{\mathbf{\Gamma}}$*:*

$$\underline{\Gamma}^{[1]} := i\begin{bmatrix} 0_2 & -\sigma_1 \\ \sigma_1 & 0_2 \end{bmatrix}, \underline{\Gamma}^{[2]} := i\begin{bmatrix} 0_2 & -\sigma_2 \\ \sigma_2 & 0_2 \end{bmatrix}, \underline{\Gamma}^{[3]} := i\begin{bmatrix} 0_2 & -\sigma_3 \\ \sigma_3 & 0_2 \end{bmatrix}, -$$

$$\underline{\Gamma}^{[0]} := \begin{bmatrix} -1_2 & 0_2 \\ 0_2 & 1_2 \end{bmatrix}, \underline{\Gamma}^{[4]} := \begin{bmatrix} 0_2 & 1_2 \\ 1_2 & 0_2 \end{bmatrix};$$

Further we do not consider gustatory pentads since these pentads are not used yet in the contemporary physics.

For all $\left\langle j_0, \vec{j} \right\rangle$: if $u_1{}^2 + u_2{}^2 + u_3{}^2 \leq c^2$

then a 4X1 complex matrix function φ exists which obeys to the following conditions: [pp.61—62]

$$\rho = \sum_{s=1}^{4} \varphi_s^* \varphi_s, \ \frac{j_{,\alpha}}{c} = -\sum_{k=1}^{4}\sum_{s=1}^{4} \varphi_s^* \beta_{s,k}^{[\alpha]} \varphi_s$$

Because

$$\frac{\partial \rho}{\partial x_0} + \frac{\partial j_1}{\partial x_1} + \frac{\partial j_2}{\partial x_2} + \frac{\partial j_3}{\partial x_3} = 0$$

then

$$\varphi^{\div}\left(\frac{\partial}{\partial x_0}-\beta^{[1]}\frac{\partial}{\partial x_1}-\beta^{[2]}\frac{\partial}{\partial x_2}-\beta^{[3]}\frac{\partial}{\partial x_3}\right)^{+}\varphi+$$

.

$$+\varphi^{\div}\left(\frac{\partial}{\partial x_0}-\beta^{[1]}\frac{\partial}{\partial x_1}-\beta^{[2]}\frac{\partial}{\partial x_2}-\beta^{[3]}\frac{\partial}{\partial x_3}\right)\varphi=0$$

Let

$$\hat{Q}:=\frac{\partial}{\partial x_0}-\sum_{s=1}^{3}\beta^{[s]}\frac{\partial}{\partial x_s}$$

Hence

$$\varphi^{+}\left(\hat{Q}^{+}+\hat{Q}\right)\varphi=0$$

$$\hat{Q}^{+}=-\hat{Q}$$

Therefore, for every function φ_j here exists an operator $Q_{j,k}$ such that a dependence of φ_j on *t* is described by the following differential equation [pp.65—68]:

$$\partial_t \varphi_j = c \sum_{k=1}^{4} \left(\sum_{s=1}^{3} \beta_{j,k}^{[s]} \partial_s + Q_{j,k} \right) \varphi_k$$

and

$$Q_{j,k}^{*} = -Q_{k,j}$$

If $\gamma^{[5]} := \begin{bmatrix} 1_2 & 0_2 \\ 0_2 & -1_2 \end{bmatrix}$

then this equation can be transformed to the following form [pp.78—82]:

$$\left(-\left(\partial_0 + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right) + \sum_{k=1}^{3} \begin{array}{l}\beta^{[k]}\left(\partial_k + i\Theta_k + i\Upsilon_k\gamma^{[5]}\right)\\ + 2i\left|\left(M_0\gamma^{[0]} + M_4\beta^{[4]}\right)\right|\end{array}\right)\varphi +$$

$$\left(-\left(\partial_0 + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right) - \sum_{k=1}^{3} \begin{array}{l}\varsigma^{[k]}\left(\partial_k + i\Theta_k + i\Upsilon_k\gamma^{[5]}\right)\\ + 2i\left|\left(-M_{\varsigma,0}\gamma_{\varsigma}^{[0]} + M_{\varsigma,4}\varsigma^{[4]}\right)\right|\end{array}\right)\varphi +$$

$$\left(\left(\partial_0 + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right) - \sum_{k=1}^{3} \begin{array}{l}\eta^{[k]}\left(\partial_k + i\Theta_k + i\Upsilon_k\gamma^{[5]}\right)\\ + 2i\left|\left(-M_{\eta,0}\gamma_{\eta}^{[0]} - M_{\eta,4}\eta^{[4]}\right)\right|\end{array}\right)\varphi +$$

$$\left(-\left(\partial_0 + i\Theta_0 + i\Upsilon_0\gamma^{[5]}\right) - \sum_{k=1}^{3} \begin{array}{l}\theta^{[k]}\left(\partial_k + i\Theta_k + i\Upsilon_k\gamma^{[5]}\right)\\ + 2i\left|\left(M_{\theta,0}\gamma_{\theta}^{[0]} + M_{\theta,4}\theta^{[4]}\right)\right|\end{array}\right)\varphi = 0$$

with real

$$M_0, M_4, M_{\varsigma,0}, M_{\varsigma,4}, M_{\eta,0}, M_{\eta,4}, M_{\theta.0}, M_{\theta,4}, \Theta_k, \Upsilon_k \left(k \in \{0,1,2,3\}\right)$$

Because $\varsigma^{[k]} + \eta^{[k]} + \theta^{[k]} = -\beta^{[h]}$ then [p.82]

$$\left(\begin{array}{l} \sum_{k=0}^{3} \beta^{[k]} \left(\partial_k + i\Theta_k + i\Upsilon_k \gamma^{[5]} \right) + \\ + iM_0 \gamma^{[0]} + iM_4 \beta^{[4]} - iM_{\varsigma,0} \gamma_{\varsigma}^{[0]} + iM_{\varsigma,4} \varsigma^{[4]} - \\ - iM_{\eta,0} \gamma_{\eta}^{[0]} - iM_{\eta,4} \eta^{[4]} + iM_{\theta,0} \gamma_{\theta}^{[0]} + iM_{\theta,4} \theta^{[4]} \end{array} \right) \varphi = 0$$

Let

$$M_{\varsigma,0} = M_{\varsigma,4} = M_{\eta,0} = M_{\eta,4} = M_{\theta.0} = M_{\theta,4} = 0$$

then

$$\left(\sum_{k=0}^{3} \beta^{[k]}\left(\partial_k + i\Theta_k + i\Upsilon_k \gamma^{[5]}\right) + iM_0\gamma^{[0]} + iM_4\beta^{[4]}\right)\varphi = 0$$

Such equation is called *a lepton's equation* [p.83]

Let $j_{A,4} := -c\varphi^{+}\beta^{[4]}\varphi \quad j_{A,5} := -c\varphi^{+}\gamma^{[0]}\varphi$

$$u_{A,4} := \frac{j_{A,4}}{\rho_A}, \quad u_{A,5} := \frac{j_{A,5}}{\rho_A}$$

There [p.83]:

$$u_{A,1}^2 + u_{A,2}^2 + u_{A,3}^2 + u_{A,4}^2 + u_{A,5}^2 = c^2$$

Thus, only all 5 elements of Clifford Pentada provide a full set of speed components and, for completeness, two more "space" coordinates x_5 and x_4 should be added to our three x_1, x_2, x_3.

Coordinates x_5 and x_4 are not of any events coordinates. Hence, our devices do not detect of its as space coordinates.

Let $\tilde{\varphi}(t, x_1, x_2, x_3, x_4, x_5) := \varphi(t, x_1, x_2, x_3) \times$

$$\times (\exp(i(x_5 M_0(t, x_1, x_2, x_3) + x_4 M_4(t, x_1, x_2, x_3))))$$

In this case a lepton equation of moving has the following shape [p.84]:

$$\left(\sum_{k=0}^{3} \beta^{[k]}\left(i\partial_k - \Theta_k - \Upsilon_k \gamma^{[5]}\right) - \gamma^{[0]} i\partial_5 - \beta^{[4]} i\partial_4\right)\tilde{\varphi} = 0$$

For every real Θ_k and Υ_k real F_k , B_k , and a constant g_1 exist which obey to following condition [p.84]:

$$-\Theta_k - \Upsilon_k \gamma^{[5]} = F_k + 0.5 g_1 Y B_k$$

with $Y := -\begin{bmatrix} 1_2 & 0_2 \\ 0_2 & 2 \times 1_2 \end{bmatrix}$

That is [p.85]:

$$\left(\sum_{k=0}^{3}\beta^{[k]}\left(i\partial_k + F_k + 0.5g_1 Y B_k\right) - \gamma^{[0]} i\partial_5 - \beta^{[4]} i\partial_4\right)\tilde{\varphi} = 0$$

this equation of moving is invariant under the following transformation [pp.85—89]:

$$\tilde{\varphi} \to \tilde{\varphi}' := \tilde{U}\tilde{\varphi}$$

$$x_4 \to x_4' := x_4 \cos\frac{\chi}{2} - x_5 \sin\frac{\chi}{2},$$

$$x_5 \to x_5' := x_5 \cos\frac{\chi}{2} + x_4 \sin\frac{\chi}{2}$$

$$x_\mu \to x_\mu' := x_\mu \;\; for\ \mu \in \{0,1,2,3\}$$

$$B_k \to B_k' := B_k - \frac{1}{g_1}\partial_k \chi, \quad F_k \to F_k' := \tilde{U} F_k \tilde{U}^+$$

if $\chi(x_0, x_1, x_2, x_3)$ is a real function and

$$\tilde{U}(\chi) := \begin{bmatrix} \exp\left(i\frac{\chi}{2}\right)\times 1_2 & 0_2 \\ 0_2 & \exp(i\chi)\times 1_2 \end{bmatrix}$$

Therefore, B_k likes to the B-boson field of the Standard

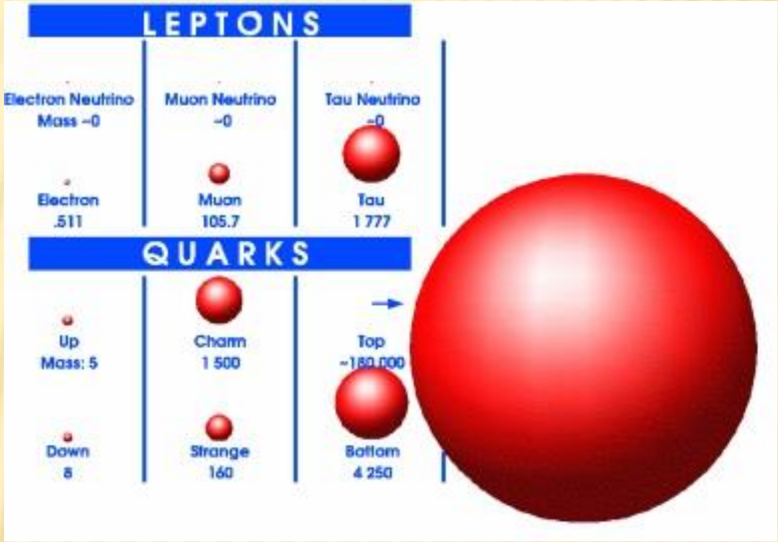
photon

?

$$\begin{pmatrix} A_\mu \\ Z_\mu \end{pmatrix} = \begin{pmatrix} \cos\theta_W & \sin\theta_W \\ -\sin\theta_W & \cos\theta_W \end{pmatrix} \begin{pmatrix} B_\mu \\ (W_\mu)_3 \end{pmatrix}$$

Z particle

MASSES


LEPTONS
Electron Neutrino
Mass ~0
Muon Neutrino
~0
Tau Neutrino
~0
Electron
.511
Muon
105.7
Tau
1 777
QUARKS
Up
Mass: 5
Charm
1 500
Top
~180 000
Down
8
Strange
160
Bottom
4 250

Let

$$\varepsilon_1 := \begin{bmatrix}1\\0\\0\\0\end{bmatrix}, \varepsilon_2 := \begin{bmatrix}0\\1\\0\\0\end{bmatrix}, \varepsilon_3 := \begin{bmatrix}0\\0\\1\\0\end{bmatrix}, \varepsilon_4 := \begin{bmatrix}0\\0\\0\\1\end{bmatrix}$$

Functions of type :

$$\frac{h}{2\pi c}\exp\left(-i\frac{h}{c}(sx_4 + nx_5)\right)\varepsilon_k$$

with an integer *n* and s form orthonormal basis of some unitary space $\mathfrak{I}$ with scalar productof the following shape:

$$(\tilde{\varphi}, \tilde{\chi}) := \int_{-\frac{\pi c}{h}}^{\frac{\pi c}{h}} dx_5 \int_{-\frac{\pi c}{h}}^{\frac{\pi c}{h}} dx_4 \times \tilde{\varphi}^{+} \tilde{\chi}$$

In that case [p.90]

$$(\tilde{\varphi}, \tilde{\varphi}) = \rho_A$$

$$(s \in \{1,2,3\})$$

$$\left(\tilde{\varphi}, \beta^{[s]} \tilde{\varphi}\right) = -\frac{j_{A,s}}{c}$$

Let

$$N_{\vartheta}(t, x_1, x_2, x_3) := \operatorname{trunc}\left(\frac{cM_0}{h}\right)$$

$$N_{\varpi}(t, x_1, x_2, x_3) := \operatorname{trunc}\left(\frac{cM_4}{h}\right)$$

In that case to high precision:

$$\tilde{\varphi}(t, x_1, x_2, x_3, x_4, x_5) =$$

$$= \varphi(t, x_1, x_2, x_3) \exp\left(-i \left(\begin{array}{l} x_5 \dfrac{h}{c} N_{\vartheta}(t, x_1, x_2, x_3) + \\ + x_4 \dfrac{h}{c} N_{\varpi}(t, x_1, x_2, x_3) \end{array} \right) \right)$$

A Fourier series for $\tilde{\varphi}$ is of the following form [p.91]:

$$\tilde{\varphi}\left(t, \vec{x}, x_5, x_4\right) = \varphi\left(t, \vec{x}\right) \times$$

$$\times \sum_{n,s} \delta_{-nN_{\vartheta}(t,\vec{x})} \delta_{-sN_{\varpi}(t,\vec{x})} \exp\left(-i \frac{h}{c} \left(n x_5 + s x_4 \right) \right)$$

From properties of δ: in every point $\langle t, \vec{x} \rangle$: either

$$\tilde{\varphi}(t, \vec{x}, x_5, x_4) = 0$$

or integer numbers n_0 and s_0 exist for which:

$$\tilde{\varphi}(t, \vec{x}, x_5, x_4) = \varphi(t, \vec{x}) \exp\left(-i \frac{h}{c} (n_0 x_5 + s_0 x_4) \right)$$

If $m := \left(\frac{h}{c} \right)^2 \sqrt{n_0^2 + s_0^2}$

then m is denoted *mass* of $\tilde{\varphi}$

.That is for every space-time point: either this point is empty or single mass is placed in this point [p.91].

Under the transformation $\tilde{U}(\chi)$:

$$n_0 x_5 + s_0 x_4 \to n_0' x_5 + s_0' x_4 =$$

$$= \left(n_0 \cos\frac{\chi}{2} - s_0 \sin\frac{\chi}{2} \right) x_5 + \left(s_0 \cos\frac{\chi}{2} + n_0 \sin\frac{\chi}{2} \right) x_4$$

Therefore, a mass is invariant under this transformation

Mass expressed hypotenuse of a Pythagorean triangle. Therefore, this invariance requires a fairly large amount of such triangles from this hypotenuse [pp.91-93].

For each natural number *n*, there exist at least *n* different Pythagorean triples with the same hypotenuse. Sierpinski, 2003, c. 31. — Dover, 2003. — ISBN 978-0-486-43278-6.

John F. Goehi Jr. TRIPLES, QUARTETS, PENTADS

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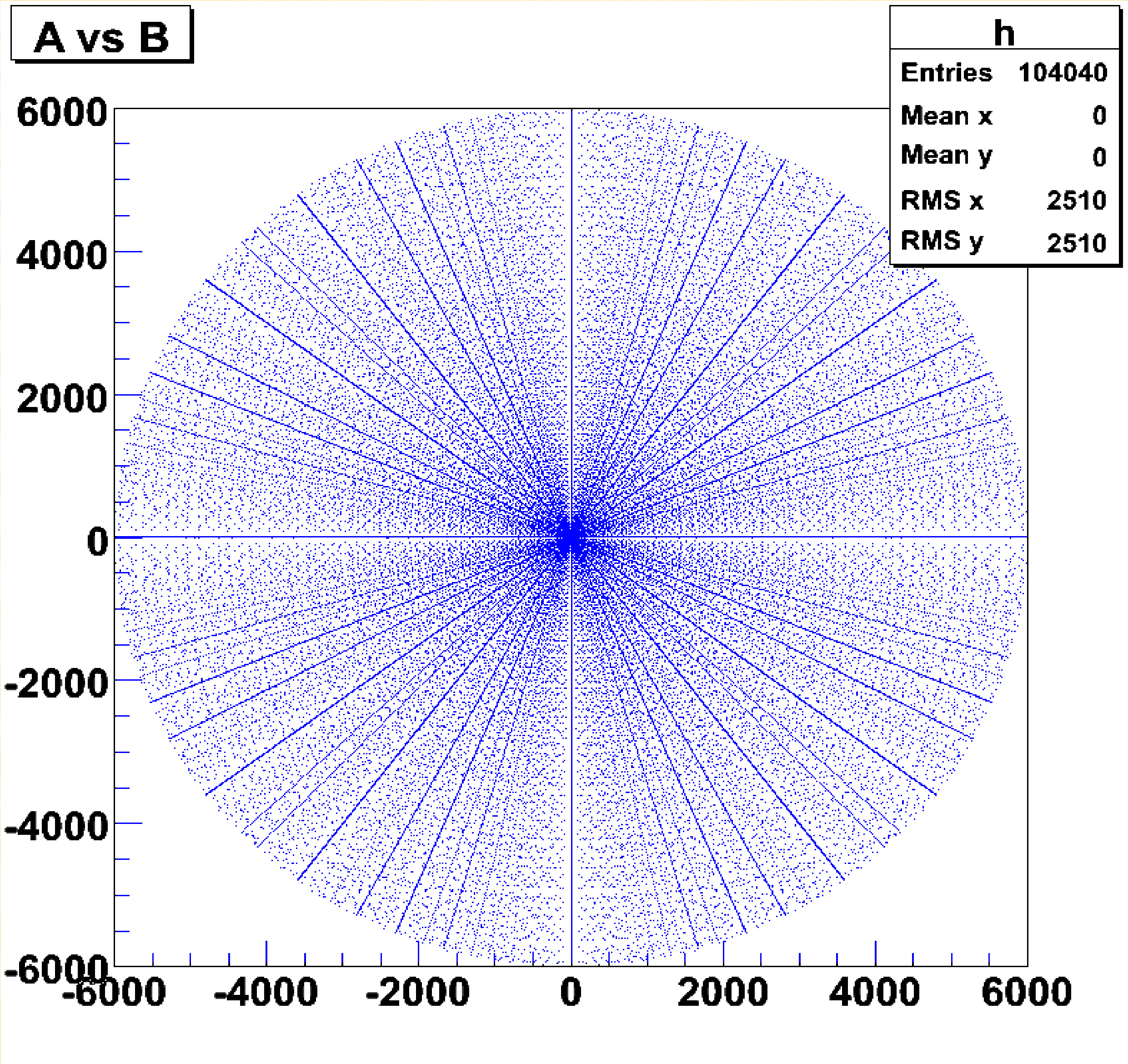


A vs B
h
Entries 104040
Mean x 0
Mean y 0
RMS x 2510
RMS y 2510
6000
4000
2000
0
-2000
-4000
-6000
-6000
-4000
-2000
0
2000
4000
6000

ELECTRO-WEAK FIELD

If equation

$$\left(\begin{array}{l}\sum_{k=0}^{3}\beta^{[k]}\left(\partial_k + i\Theta_k + i\Upsilon_k\gamma^{[5]}\right)+ \\ + iM_0\gamma^{[0]} + iM_4\beta^{[4]} - iM_{\varsigma,0}\gamma_{\varsigma}^{[0]} + iM_{\varsigma,4}\varsigma^{[4]} - \\ - iM_{\eta,0}\gamma_{\eta}^{[0]} - iM_{\eta,4}\eta^{[4]} + iM_{\theta,0}\gamma_{\theta}^{[0]} + iM_{\theta,4}\theta^{[4]}\end{array}\right)\varphi = 0$$

does not contain the chromatic members then [p.141]:

$$\left(\sum_{s=0}^{3}\beta^{[s]}i\left(\partial_s + ie\tilde{A}_s - i0.5\left(\tilde{Z}_s + \tilde{W}_s\right)\right) + \gamma^{[0]}im_1 + \beta^{[4]}m_2\right)\begin{bmatrix}\mu \\ e\end{bmatrix} = 0$$

Here the vector field $\tilde{A}$ is similar to the

electromagnetic potential and $\tilde{Z} + \tilde{W}$ is similar to

the weak potential.

Let:

$$\tilde{W}_{\nu} := \begin{bmatrix} W_{0,\nu} \\ W_{1,\nu} \\ W_{2,\nu} \end{bmatrix}$$

$$\frac{\partial^2 u}{\partial t^2} = c^2 \nabla^2 u$$

The components of $\hat{W}$ obey to the Klein-Gordon equation [pp.130--137

$$\left(-\frac{1}{c^2}\partial_t^2 + \sum_{s=1}^{3}\partial_s^2\right)W_{\nu,\mu} = g_2^2\left(\tilde{W}_0^2 - \sum_{s=1}^{3}\tilde{W}_s^2\right)W_{\nu,\mu} +$$

$$+\aleph\left(W_{i,j}\{W_{i,j} \neq W_{\nu,\mu}\}\right)$$

with "mass" $m = \frac{h}{c} g_2 \sqrt{\tilde{W}_0^{\,2} - \sum_{s=1}^{3} \tilde{W}_s^{\,2}}$

This "mass" is invariant under rotation in the 3-space, under the Lorentz transformations, and under global SU(2)-transformations [pp.130--139]

But it is not invariant under local SU(2) transformations and this “mass” depends on the points coordinates.

But these circumstances are

insignificant

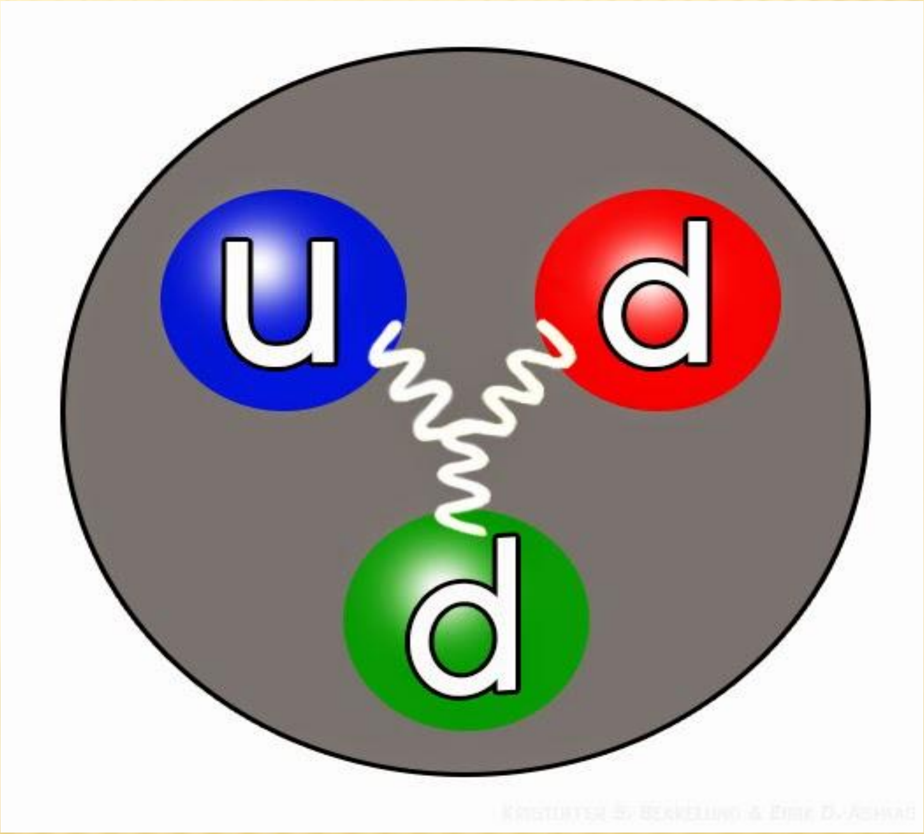
for $W_{0,\mu}$, $W_{1,\mu}$, $W_{2,\mu}$ since all three particles are very short-lived (3×10^{-25} c.)

and a measurement

of masses of these particles is practically possible only at the point $<t \approx 0; \mathrm{x} \approx 0>$.

And if $\alpha := \mathrm{arctg}\,\frac{g_1}{g_2}$ then $m_Z = \frac{m_W}{\cos\alpha}$ [p.139]

QUARKS , GLUONS
and
GRAVITATION



$$\begin{pmatrix} \sum_{k=0}^{3} \beta^{[k]} \left(-\mathrm{i}\partial_k + \Theta_k + \Upsilon_k \gamma^{[5]}\right) - \\ -M_{\zeta,0}\gamma_{\zeta}^{[0]} + M_{\zeta,4}\zeta^{[4]} + \\ -M_{\eta,0}\gamma_{\eta}^{[0]} - M_{\eta,4}\eta^{[4]} + \\ +M_{\theta,0}\gamma_{\theta}^{[0]} + M_{\theta,4}\theta^{[4]} \end{pmatrix} \varphi = 0.$$

It is a chromatic equation of moving [p.146].

The mass members of this equation form the following matrix sum [p.146]:

$$\widehat{M} := \left(\begin{array}{c} -M_{\zeta,0}\gamma_{\zeta}^{[0]} + M_{\zeta,4}\zeta^{[4]} - \\ -M_{\eta,0}\gamma_{\eta}^{[0]} - M_{\eta,4}\eta^{[4]} + \\ +M_{\theta,0}\gamma_{\theta}^{[0]} + M_{\theta,4}\theta^{[4]} \end{array} \right) =$$

$$\begin{bmatrix} 0 & 0 & -M_{\theta,0} & M_{\zeta,0} - \mathrm{i}M_{\eta,0} \\ 0 & 0 & M_{\zeta,0} + \mathrm{i}M_{\eta,0} & M_{\theta,0} \\ -M_{\theta,0} & M_{\zeta,0} - \mathrm{i}M_{\eta,0} & 0 & 0 \\ M_{\zeta,0} + \mathrm{i}M_{\eta,0} & M_{\theta,0} & 0 & 0 \end{bmatrix} +$$

$$\mathrm{i} \begin{bmatrix} 0 & 0 & -M_{\theta,4} & M_{\zeta,4} + \mathrm{i}M_{\eta,4} \\ 0 & 0 & M_{\zeta,4} - \mathrm{i}M_{\eta,4} & M_{\theta,4} \\ -M_{\theta,4} & -M_{\zeta,4} - \mathrm{i}M_{\eta,4} & 0 & 0 \\ -M_{\zeta,4} + \mathrm{i}M_{\eta,4} & M_{\theta,4} & 0 & 0 \end{bmatrix}.$$

Elements of these matrices are rotated by transformations which similar to:

$$\begin{pmatrix} \cos\frac{\theta}{2} & \mathrm{i}\sin\frac{\theta}{2} \\ \mathrm{i}\sin\frac{\theta}{2} & \cos\frac{\theta}{2} \end{pmatrix} \begin{pmatrix} Z & X-\mathrm{i}Y \\ X+\mathrm{i}Y & -Z \end{pmatrix} \begin{pmatrix} \cos\frac{\theta}{2} & -\mathrm{i}\sin\frac{\theta}{2} \\ -\mathrm{i}\sin\frac{\theta}{2} & \cos\frac{\theta}{2} \end{pmatrix}$$

$$= \begin{pmatrix} Z\cos\theta - Y\sin\theta & X - \mathrm{i}\,(Y\cos\theta + Z\sin\theta) \\ X + \mathrm{i}\,(Y\cos\theta + Z\sin\theta) & -Z\cos\theta + Y\sin\theta \end{pmatrix}.$$

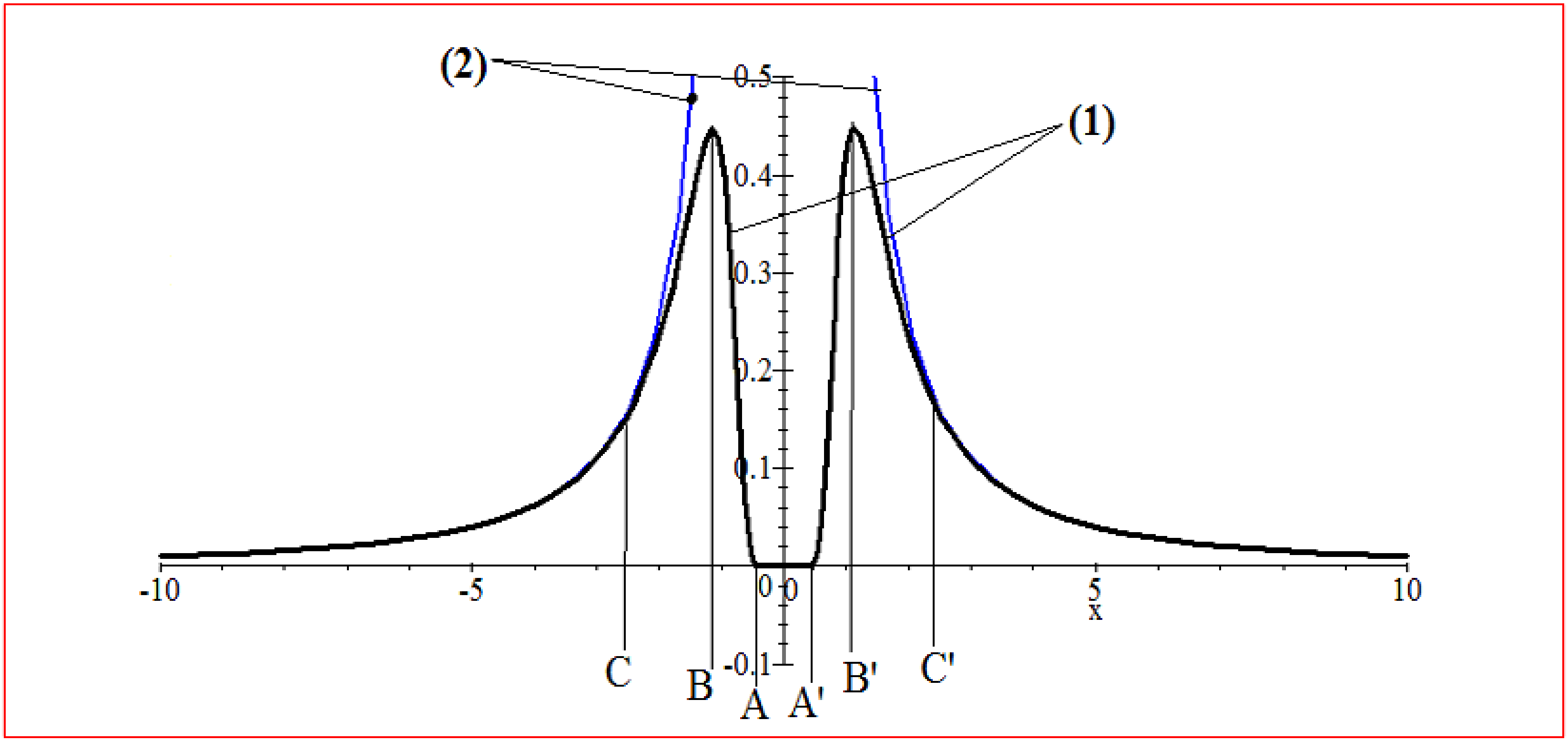
There exist only eight of such transformations

These transformations add to chromatic equation eight more gauge fields:

$$U^{-1}\left(\partial_s U\right) = \frac{g_3}{2}\sum_{r=1}^{8}\Lambda_r G_s^r$$

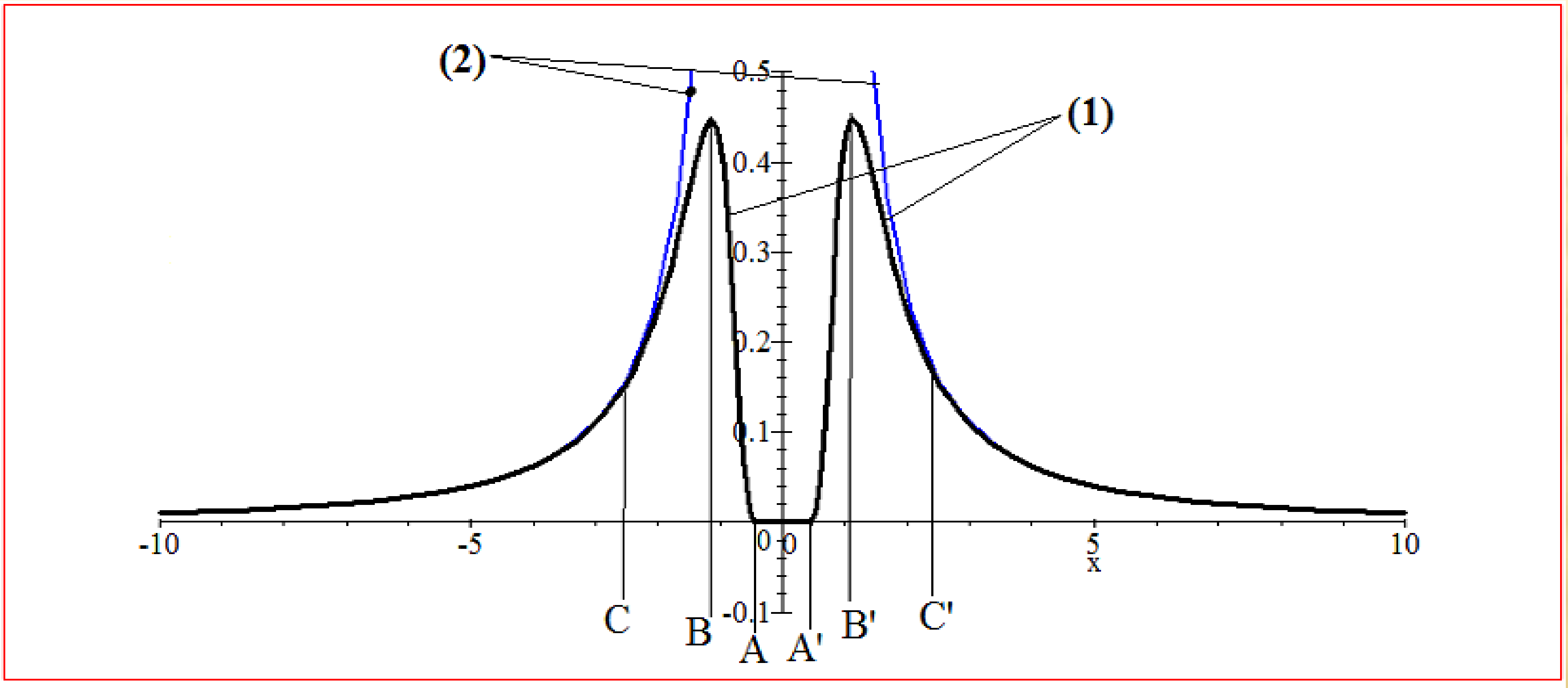
with some real constant g_3 (similar to 8 gluons) [pp.146--.157]

Some of these transformations bend space-time so, as shown by the following figure [pp.161,179]:.



Here function $g(t; x_1)$ represents the acceleration of the curved coordinate system relative to the original system [p.160].

{1) $g(t,\vec{x}) = c\lambda / \left(\vec{x}^2 \cosh^2\left(\lambda t / \vec{x}^2\right)\right)$ (2) $\lambda / \vec{x}^2$



Hence, to the right from point *C' and to the left from poin C the* Newtonian gravitation law *is carried out.*

AA' is the Asymptotic Freedom Zone.

CB and B'C' is the Confinement Zone.

What is DARK MATTER?

Some oscillations of chromatic states bend space-time as follows [pp.148,164]:

$$\frac{\partial}{\partial x'} = \cos 2\alpha \times \frac{\partial}{\partial x} - \sin 2\alpha \times \frac{\partial}{\partial y},$$

$$\frac{\partial}{\partial y'} = \cos 2\alpha \times \frac{\partial}{\partial y} + \sin 2\alpha \times \frac{\partial}{\partial x}.$$

Let $z = x + iy$, i.e. $z = re^{i\theta}$. $z' = x' + iy'$

Because linear velocity of the curved coordinate system ⟨x′;y′⟩ into the initial system ⟨x;y⟩ is the following

$$v = \left(\left(\frac{\partial x'}{\partial t} \right)^2 + \left(\frac{\partial y'}{\partial t} \right)^2 \right)^{\frac{1}{2}}$$

then $$v = \left| \frac{\partial z'}{\partial t} \right|$$ Let function z′ be a holomorphic function. Hence, in accordance with the Cauchy-Riemann conditions the following equations are fulfilled:

$$\frac{\partial x'}{\partial x} = \frac{\partial y'}{\partial y}, \quad \frac{\partial x'}{\partial y} = -\frac{\partial y'}{\partial x}.$$

Therefore, $dz' = e^{-i(2\alpha)} dz$

where 2α is an holomorphic function, too.

For example, let $$2\alpha = \frac{1}{t}\left(\left(y - x\right) - i\left(x + y\right)\right)^2$$ In this case:

[pp.166—167]

$$z' = \int \frac{\left(\left(x + y\right) + i\left(y - x\right)\right)^2}{t} dx + i \int \frac{\left(\left(x + y\right) + i\left(y - x\right)\right)^2}{t} dy$$

Let *k* = *y*/*x*. Hence,

$$z' = \int \exp\left(\frac{\left((x+kx)+i(kx-x)\right)^2}{t}\right)dx +$$

$$+\, i\int \exp\left(\frac{\left(\left(\frac{y}{k}+y\right)+i\left(y-\frac{y}{k}\right)\right)^2}{t}\right)dy$$

Calculate::

$$\int \exp\left(\frac{\left((x+kx)+i\,(kx-x)\right)^2}{t}\right)dx =$$

$$=\frac{1}{2}\sqrt{\pi}\,\frac{\operatorname{erf}\left(x\sqrt{-\frac{1}{t}(2ik+4k-2i)}\right)}{\sqrt{-\frac{1}{t}(2ik+4k-2i)}},$$

$$i\int \exp\left(\frac{\left(\left(\frac{y}{k}+y\right)+i\left(y-\frac{y}{k}\right)\right)^2}{t}\right)dy = \frac{1}{2}\sqrt{\pi}\,\frac{\operatorname{erf}\left(y\sqrt{-\frac{1}{k^2 t}\left(2ik^2+4k-2i\right)}\right)}{\sqrt{-\frac{1}{k^2 t}\left(2ik^2+4k-2i\right)}}$$

$$\frac{\partial z'}{\partial t} = \frac{1}{-8i\sqrt{t}\,(k-i)^3\sqrt{-2i}}\left(\begin{array}{l} -4y(k-i)^2\sqrt{-\frac{1}{t}2i(k-i)^2}\,\exp\left(\frac{1}{k^2 t}y^2 2i(k-i)^2\right) \\ +4ikx(k-i)^2\sqrt{-\frac{1}{k^2 t}2i(k-i)^2}\,\exp\left(\frac{1}{t}x^2 2i(k-i)^2\right) \\ +i\sqrt{\pi}k^2 t2i(k-i)^2\sqrt{\frac{1}{k^2 t}}\operatorname{erf}\left(y\sqrt{-\frac{1}{k^2 t}2i(k-i)^2}\right) \\ +\sqrt{\pi}kt2i(k-i)^2\sqrt{\frac{1}{k^2 t^2}}\operatorname{erf}\left(x\sqrt{-\frac{1}{t}2i(k-i)^2}\right) \end{array}\right)$$

For large *t*:

$$\frac{\partial z'}{\partial t} = \frac{1}{-8i\sqrt{t}\left(k-i\right)^{3}\sqrt{-2i}}\left(i\sqrt{\pi}k^{2}t2i\left(k-i\right)^{2}\sqrt{\frac{1}{k^{2}t}}\,\mathrm{erf}\left(y\sqrt{-\frac{1}{k^{2}t}2i\left(k-i\right)^{2}}\right)\right)$$

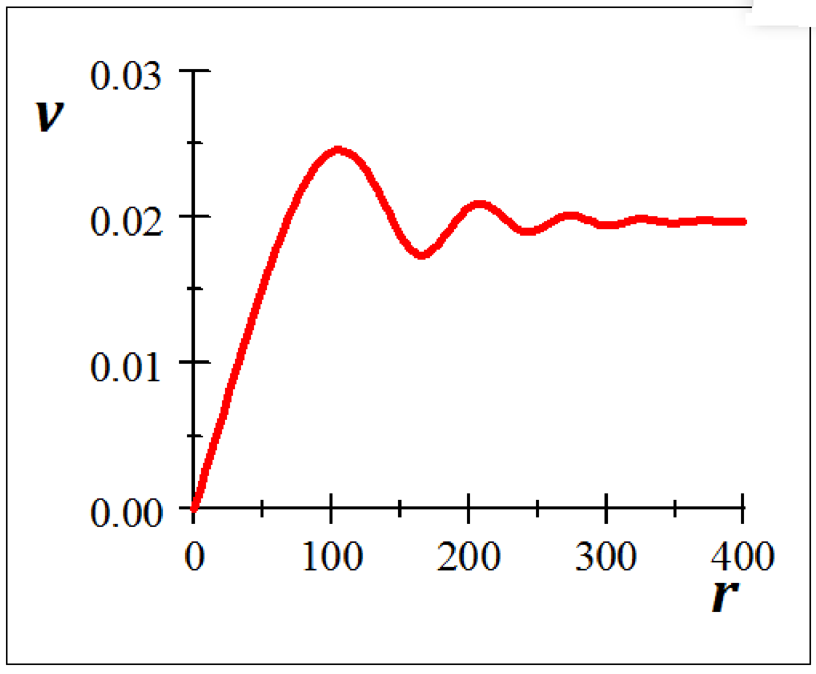
Hence,

$$v \approx \left|\frac{1}{8}\left(1-i\right)k\sqrt{\pi}\,\frac{1}{k-i}\,\mathrm{erf}\left(\sqrt{-\frac{1}{t}2i\left(k-i\right)^{2}}\right)\right|$$

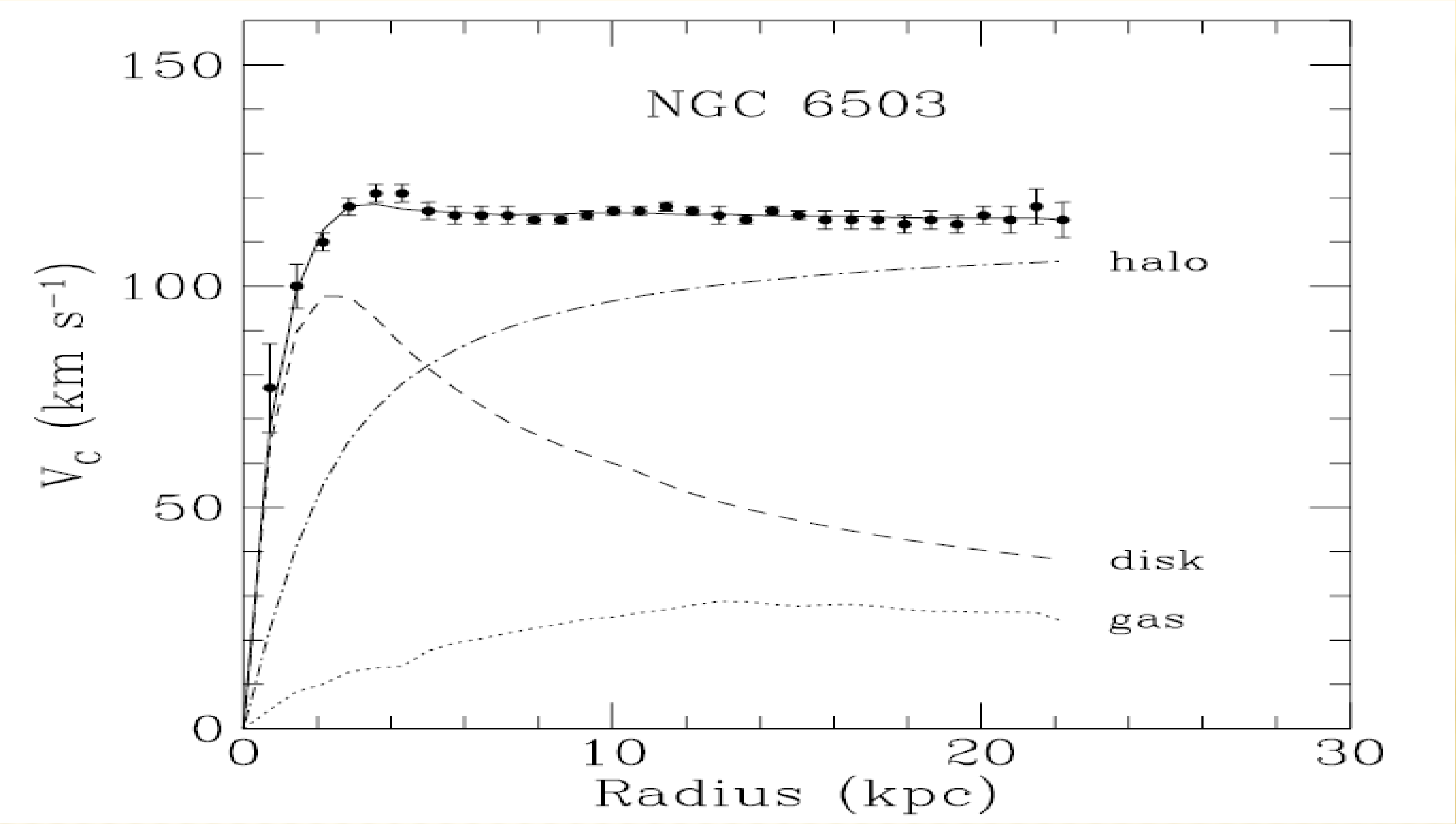
Because $k = \tan\theta, \quad x = r\cos\theta$ then

$$v \approx \left|\frac{1}{8}\left(1-i\right)\left(\tan\theta\right)\sqrt{\pi}\,\frac{1}{\left(\tan\theta\right)-i}\,\mathrm{erf}\left(r\left(\cos\theta\right)\sqrt{-\frac{1}{t}2i\left(\left(\tan\theta\right)-i\right)^{2}}\right)\right|$$

For $\theta := 0.98\pi$,
$t = 10E4$:



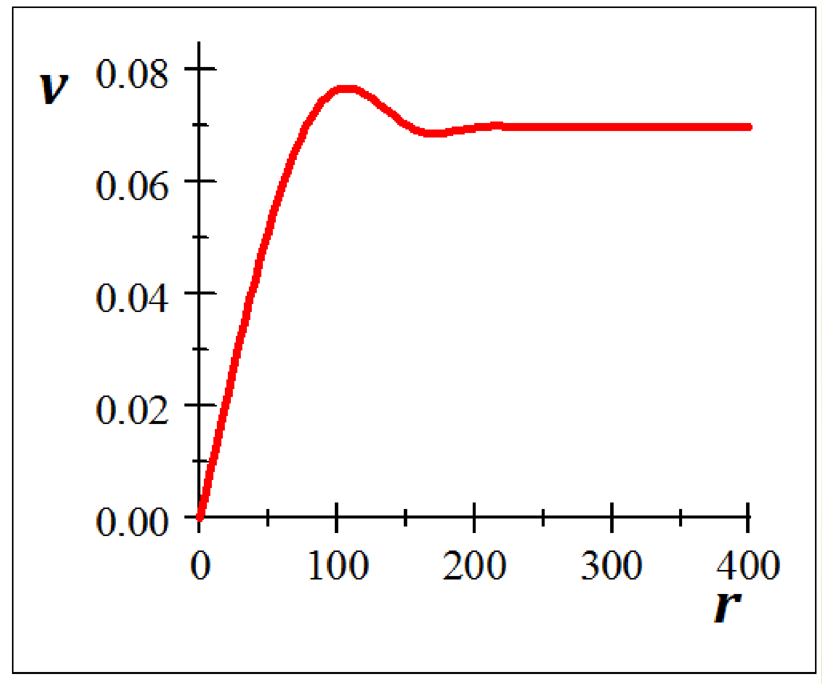
Compare with



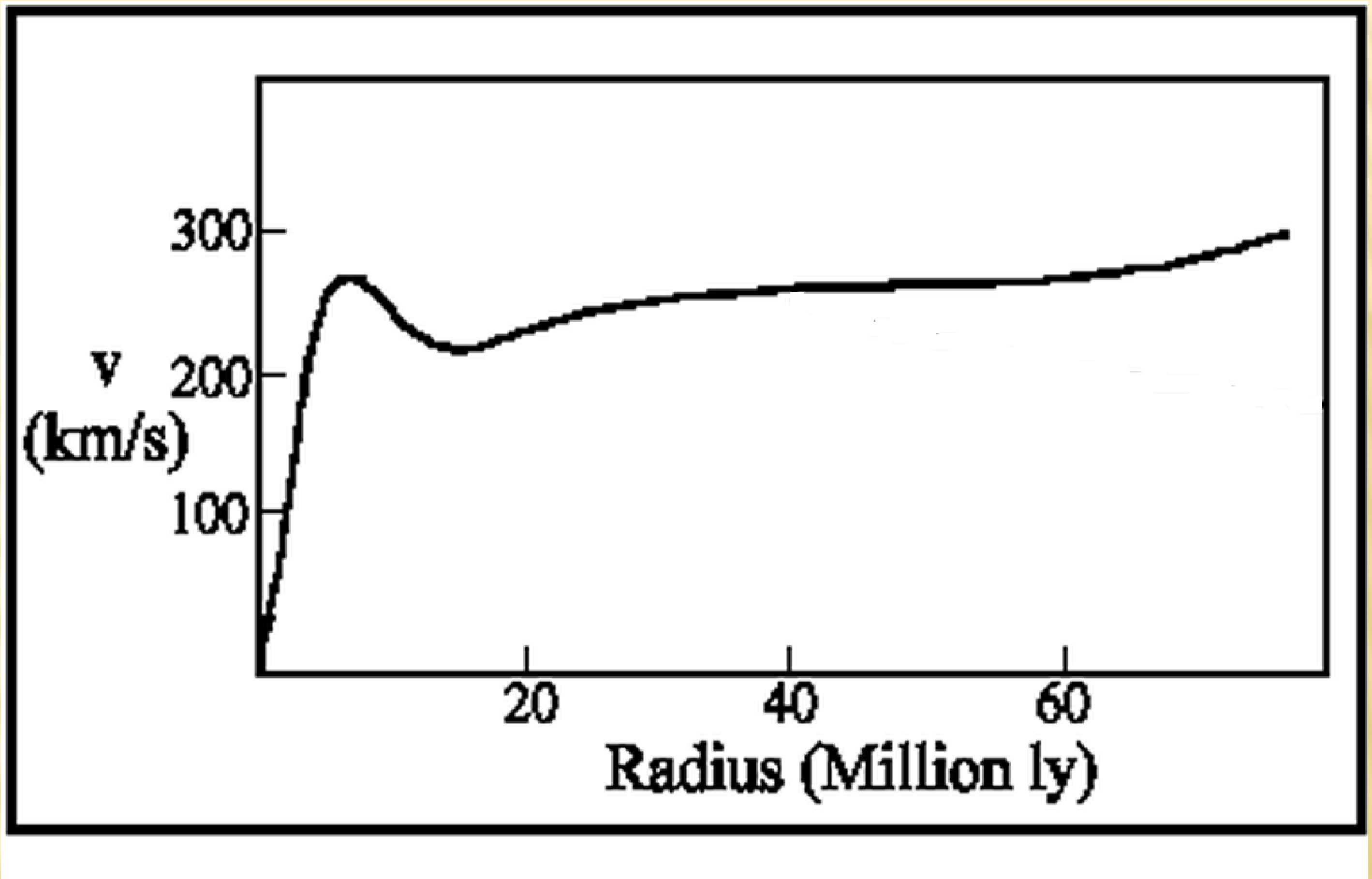
Rotation curve of NGC 6503. The dash-dotted lines are the contributions of dark matter [K. G. Begeman, A. H. Broeils and R. H. Sanders, 1991, MNRAS, 249, 523]

For $\theta = 13\pi/14$.

$t = 10E4$:



Compare with



A rotation curve for a typical spiral galaxy. The solid line shows actual measurements
(Hawley and Holcomb., 1998, p. 390)

The Dark Energy phenomena is explained jn similar way

Hence, Dark Matter and Dark Energy can be mirages in the space-time, which is curved by oscillations of chromatic states.

CHROME

The red state becomes the green state under rotation of the Cartesian system $\left\langle x_1, x_2 \right\rangle$ [168—182].

Similarly, for other Cartesian rotations, the chrome of the other quark states changes.

This explains the phenomenon of confinement and the composition of baryon families

- I shall remind you, that all aforesaid concerns to probabilities of point events,

not particles.

And the Double-Slit experiment has shown that an elementary particle is an ensemble of point events connected by probabilities. And momentums, masses, energy, spins etc. are parameters of these probabilities.

No need models - the fundamental theoretical physics is a part of classical probability theory (the part that considers the probability of dot events in the 3 + 1 space-time).