

Some Phenomena that can be understood in terms of the [D4-D5-E6-E7-E8 VoDou Physics Model](#)

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Atmospheric and Solar [Neutrino](#) Observations

Consider the three generations of neutrinos:
nu_e (electron neutrino); **nu_m** (muon neutrino); **nu_t**
 and three neutrino mass states: **nu_1** ; **nu_2** : **nu_3**
 and
 the division of 8-dimensional spacetime into
[4-dimensional physical Minkowski spacetime](#)
[plus](#)
[4-dimensional CP2 internal symmetry space](#).

The heaviest mass state nu_3 corresponds to a neutrino whose propagation begins and ends in CP2 internal symmetry space, lying entirely therein. According to the D4-D5-E6-E7-E8 VoDou Physics Model the mass of nu_3 is zero at tree-level but it picks up a first-order correction propagating entirely through internal symmetry space by merging with an electron through the weak and electromagnetic forces, effectively acting not merely as a point but as a point plus an electron loop at both beginning and ending points so

the first-order corrected mass of nu_3 is given by
 $M_{\nu_3} \times (1/\sqrt{2}) = M_e \times GW(m_{\text{proton}}^2) \times \alpha_E$
 where the factor $(1/\sqrt{2})$ comes from the Ut3 component of the neutrino mixing matrix so that

$$\begin{aligned} M_{\nu_3} &= \sqrt{2} \times M_e \times GW(m_{\text{proton}}^2) \times \alpha_E = \\ &= 1.4 \times 5 \times 10^5 \times 1.05 \times 10^{(-5)} \times (1/137) \text{ eV} = \\ &= 7.35 / 137 = \mathbf{5.4 \times 10^{(-2)} \text{ eV}}. \end{aligned}$$

Note that the neutrino-plus-electron loop can be anchored by weak force action through any of the 6 first-generation quarks at each of the beginning and ending points, and that the anchor quark at the beginning point can be different from the anchor quark at the ending point, so that there are $6 \times 6 = 36$ different possible anchorings.

The intermediate mass state nu_2 corresponds to a neutrino whose propagation begins or ends in CP2 internal symmetry space and ends or begins in physical Minkowski spacetime, thus having only one point (either beginning or ending) lying in CP2 internal symmetry space where it can act not merely as a point but as a point plus an electron loop. According to the D4-D5-E6-E7-E8 VoDou Physics Model the mass of nu_2 is zero at tree-level

but it picks up a first-order correction at only one (but not both) of the beginning or ending points so that so that there are 6 different possible anchorings for ν_2 first-order corrections, as opposed to the 36 different possible anchorings for ν_3 first-order corrections, so that

the first-order corrected mass of ν_2 is less than the first-order corrected mass of ν_3 by a factor of 6,

so

the first-order corrected mass of ν_2 is

$$\begin{aligned} M_{\nu_2} &= M_{\nu_3} / \text{Vol}(\text{CP}2) = 5.4 \times 10^{(-2)} / 6 \\ &= 9 \times 10^{(-3)} \text{eV}. \end{aligned}$$

The low mass state ν_1 corresponds to a neutrino whose propagation begins and ends in physical Minkowski spacetime. thus having only one anchoring to CP2 interna symmetry space.

According to E8 Physics the mass of ν_1 is zero at tree-level

but it has only 1 possible anchoring to CP2

as opposed to the 36 different possible anchorings for ν_3 first-order corrections or the 6 different possible anchorings for ν_2 first-order corrections so that

the first-order corrected mass of ν_1 is less than the first-order corrected mass of ν_2 by a factor of 6,

so

the first-order corrected mass of ν_1 is

$$\begin{aligned} M_{\nu_1} &= M_{\nu_2} / \text{Vol}(\text{CP}2) = 9 \times 10^{(-3)} / 6 \\ &= 1.5 \times 10^{(-3)} \text{eV}. \end{aligned}$$

Therefore:

$$\begin{aligned} \text{the mass-squared difference } D(M_{23}^2) &= M_{\nu_3}^2 - M_{\nu_2}^2 = \\ &= (2916 - 81) \times 10^{(-6)} \text{ eV}^2 = \\ &= \mathbf{2.8 \times 10^{(-3)} \text{ eV}^2} \end{aligned}$$

and

$$\begin{aligned} \text{the mass-squared difference } D(M_{12}^2) &= M_{\nu_2}^2 - M_{\nu_1}^2 = \\ &= (81 - 2) \times 10^{(-6)} \text{ eV}^2 = \\ &= \mathbf{7.9 \times 10^{(-5)} \text{ eV}^2} \end{aligned}$$

The 3×3 unitary neutrino mixing matrix neutrino mixing matrix U

	ν_1	ν_2	ν_3
ν_e	Ue1	Ue2	Ue3
ν_m	Um1	Um2	Um3
ν_t	Ut1	Ut2	Ut3

can be parameterized (based on the 2010 Particle Data Book) by 3 angles and 1 Dirac CP violation phase

$$U = \begin{pmatrix} c_{12} & c_{13} & s_{12} & c_{13} & s_{13} & e^{-i\delta} \\ -s_{12} & c_{23} & -c_{12} & s_{23} & s_{13} & e^{i\delta} \\ s_{12} & s_{23} & -c_{12} & c_{23} & s_{13} & e^{i\delta} \end{pmatrix}$$

where $c_{ij} = \cos(\theta_{ij})$, $s_{ij} = \sin(\theta_{ij})$

The angles are

$\theta_{23} = \pi/4 = 45$ degrees

because

ν_3 has equal components of ν_μ and ν_τ so
that $U_{\mu 3} = U_{\tau 3} = 1/\sqrt{2}$ or, in conventional
notation, mixing angle $\theta_{23} = \pi/4$
so that $\cos(\theta_{23}) = 0.707 = \sqrt{2}/2 = \sin(\theta_{23})$

$\theta_{13} = 9.594$ degrees = $\arcsin(1/6)$

and $\cos(\theta_{13}) = 0.986$

because $\sin(\theta_{13}) = 1/6 = 0.167 = |U_{e3}| = \text{fraction of } \nu_3 \text{ that is } \nu_e$

$\theta_{12} = \pi/6 = 30$ degrees

because

$\sin(\theta_{12}) = 0.5 = 1/2 = U_{e2} = \text{fraction of } \nu_2 \text{ begin/end points}$
that are in the physical spacetime where massless ν_e lives
so that $\cos(\theta_{12}) = 0.866 = \sqrt{3}/2$

$\delta = 70.529$ degrees is the Dirac CP violation phase

$e^{i\delta} = \cos(70.529) + i \sin(70.529) = 0.333 + 0.943 i$

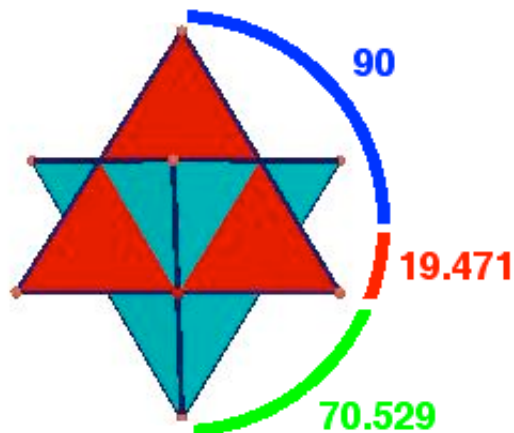
This is because the neutrino mixing matrix has 3-generation structure
and so has the same phase structure as the KM quark mixing matrix
in which the Unitarity Triangle angles are:

$\beta = \nu_3 \cdot \nu_1 \cdot \nu_4 = \arccos(2/\sqrt{3}) \cong 19.471 \text{ } 220 \text{ } 634$ degrees so $\sin 2\beta = 0.6285$

$\alpha = \nu_1 \cdot \nu_3 \cdot \nu_4 = 90$ degrees

$\gamma = \nu_1 \cdot \nu_4 \cdot \nu_3 = \arcsin(2/\sqrt{3}) \cong 70.528 \text{ } 779 \text{ } 366$ degrees

The constructed Unitarity Triangle angles can be seen on the Stella Octangula
configuration of two dual tetrahedra (image from gauss.math.nthu.edu.tw):



Then we have for the neutrino mixing matrix:

	nu_1	nu_2	nu_3
nu_e	0.866 x 0.986	0.50 x 0.986	0.167 x e-id
nu_m	-0.5 x 0.707 -0.866 x 0.707 x 0.167 x eid	0.866 x 0.707 -0.5 x 0.707 x 0.167 x eid	0.707 x 0.986
nu_t	0.5 x 0.707 -0.866 x 0.707 x 0.167 x eid	-0.866 x 0.707 -0.5 x 0.707 x 0.167 x eid	0.707 x 0.986

	nu_1	nu_2	nu_3
nu_e	0.853	0.493	0.167 e-id
nu_m	-0.354 -0.102 eid	0.612 -0.059 eid	0.697
nu_t	0.354 -0.102 eid	-0.612 -0.059 eid	0.697

Since $e^{i(70.529)} = \cos(70.529) + i \sin(70.529) = 0.333 + 0.943 i$
 and $.333e^{-i(70.529)} = \cos(70.529) - i \sin(70.529) = 0.333 - 0.943 i$

	nu_1	nu_2	nu_3
nu_e	0.853	0.493	0.056 - 0.157 i
nu_m	-0.354 -0.034 - 0.096 i	0.612 -0.020 - 0.056 i	0.697
nu_t	0.354 -0.034 - 0.096 i	-0.612 -0.020 - 0.056 i	0.697

for a result of

	nu_1	nu_2	nu_3
nu_e	0.853	0.493	0.056 - 0.157 i
nu_m	-0.388 - 0.096 i	0.592 - 0.056 i	0.697
nu_t	0.320 - 0.096 i	0.632 - 0.056 i	0.697

which is consistent with the approximate experimental values of mixing angles shown in the Michaelmas Term 2010 Particle Physics handout of Prof Mark Thomson

	nu_1	nu_2	nu_3
nu_e	0.853	0.493	0.056 - 0.157 i
nu_m	-0.388 - 0.096 i	0.592 - 0.056 i	0.697

nu_t	0.320 - 0.096 i	0.632 - 0.056 i	0.697
	nu_1	nu_2	nu_3
nu_e	0.85	0.53	0
nu_m	-0.37	0.60	0.71
nu_t	0.37	-0.60	0.71

if the matrix is modified by taking into account
the March 2012 results from Daya Bay observing non-zero $\theta_{13} = 9.54$ degrees.

Here is a pdf version of this page.

Ken Shoulders's EVOs and Ball Lightning

For reference, here are values of some useful physical quantities:

The effective G^* induced by the zero point energy core needed to stabilize a single spatially extended electron is $\sim 10^{40}$ G.

$$G^* m / r = e / r \quad G^* m = e \quad G^* = e/m = 10^{42}$$

e	Electron charge	[Q]	1.381 E-34 cm
m_e	Electron mass	[M]	9.1095 E-28 gm 6.764 E-56 cm
r_e	Electron radius classical (= $\alpha(\hbar/(m_e c))$)	[L]	2.81794 E-13 cm
r_es	Electron Schwarzschild radius (= $2G_0 m_e/c^2$) 22 orders of magnitude *smaller* than the Planck length	[L]	1.35264 E-55 cm
a_0	Bohr radius (= $\hbar^2/(m_e e^2)$)	[L]	0.529177 E-08 cm

[Ken Shoulders and Steve Shoulders said in 1996](#): "... Highly organized, **micron-sized clusters of electrons** having soliton behavior ... have been investigated by K. Shoulders since 1980 ... a short Latin acronym has been adopted and the structure is called an EV, for strong electron. Their organizational properties have been theoretically studied and reported by P. Beckmann [... Petr Beckmann, "Electron Clusters," Galilean Electrodynamics, Sept./Oct., Vol. 1, No. 5, pp. 55-58, 1990 ...] and R. Ziolkowski [... Richard W. Ziolkowski and Michael K. Tippett, "Collective effect in an electron plasma system catalyzed by a localized electromagnetic wave," Physical Review A, vol. 43, no.6, pp. 3066-3072, 15 mar., 1991 ...] ... What is seen in the laboratory is an extremely energetic entity ... Measurements ... measuring the charge-to-mass ratio of the structure ...[by]... time-of-flight ... have been made showing there are no included ions to a limit of at least one ion per million electrons. **The total number of electrons in a one micrometer diameter EV is 10^{11} .** ...". [In 1999 they said](#): "... Throughout much of this work on EV energetics it has been obvious that we get more energy out of certain experiments than we put in. ...".

In August 2004 e-mail messages about Shoulders's EVOs, [Jack Sarfatti](#) said:

"... picture is of a self-assembled spherical shell or maybe a kind of Buckyball of N close-packed electrons each of effective surface area $\sim (\hbar/mc)^2$. This forms a closed cavity - with some leakage perhaps, but the leakage rate decreases as N increases. Obviously there

will be a cavity boundary condition Casimir effect but I am pretty sure it is usually negligible in comparison with my strong gravity effect from Einstein's general relativity. ...

... The KEY IDEA is as follows:

1. The repulsive electro-static self energy per unit electron mass for the N poly-electron cluster is $V(\text{Coulomb Self-Energy}) \sim N^2 e^2 / mr > 0$ where the N electrons are arranged in a mono-layer thin spherical shell of thickness $h/mc \sim 10^{-11}$ cm

i.e. Euclidean area of the shell is $A = 4\pi r^2 = N(h/mc)^2 r \sim N^{1/2}(h/mc) = \text{Schwarzschild radial coordinate}$ if large space warp ... from $G^* \sim 10^{40}G$ at short-range.

That is, N on-mass-shell bare electrons each of radius $e^2/mc^2 \sim 10^{-13}$ cm in a soup of virtual plasma of virtual photons and virtual electron-positron pairs - the latter partially condensed as a vacuum condensate!

... a Casimir force ... plays a minor secondary role. The Casimir potential energy per unit electron mass will be of the form $V(\text{Casimir}) \sim C(hc/mr)N(h/mc)^2$ Where C is a dimensionless coefficient that can be positive or negative ... Note that $V(\text{Casimir})$ scales only as N because it depends on the surface area of the N poly-electron thin shell. This is a boundary effect!

Ignoring rotational and vibrational modes - to be added later. All we have next is the GR correction term ... $V(\text{Dark Energy}) = c^2/\lambda_{\text{zpf}}^2$ a 3D Harmonic Oscillator Potential like a ball in a tunnel through center of Earth

Note that $\lambda_{\text{zpf}} > 0$ i.e. an anti-gravity repulsive "dark energy" exotic vacuum core that COUNTER-INTUITIVELY BINDS the N electrons into a metastable BOUNDARY WALL THIN POLY-ELECTRON SHELL making the QED Casimir force in the first place ... Adding all three potential energies Coulomb, Casimir & General Relativity with PW Anderson's "More is Different"

$$V(\text{total}) = BN^2(e^2/mr) + CN(hc/mr)(h/mc)^2 + c^2/\lambda_{\text{zpf}}^2$$

B is also a dimensionless coefficient The critical point for dynamical equilibrium is $dV(\text{total})/dr = 0$ i.e. the total acceleration must vanish in metastable equilibrium where $r \rightarrow r^* - BN^2(e^2/mr^{*2}) - 3CN(hc/mr^{*2})(h/mc)^2 + 2c^2/\lambda_{\text{zpf}}^* = 0$

So I do not care about Casimir force, which when $N \gg 1$ is obviously a small perturbation!

We now have a more accurate formula for r^* , or rather, if you want to keep $r^* = N^{1/2}(h/mc)$ then you can compute λ_{zpf} .

We also have the stability constraint: $d^2V(\text{total})/dr^2 > 0$

When this constraint is violated WE HAVE WHAT IS BEGINNING TO SUGGEST A BOMB! ...

... you must explain why the boundary forms! You cannot impose it by fiat. The boundary is the thin shell of charge itself of radius $a \sim N^{1/2}(\hbar/mc)$. If $N \sim 10^{12}$ that gives $a \sim 10^{-5}$ cm. ... I don't think it works well for 2 electrons. You need, in simplest model, $N \gg 1$ electrons close-packed to form a sphere ...".

My model for EVOs also makes a spherical shell, but it is a two-layer shell, motivated by the formation of a blastocyst two-layer shell in embryology, and it also explains how the door to the high-energy vacuum is opened.

Here is an 8-step description of my model:

1 - A bunch of electrons are zapped in Ken Shoulders's apparatus with a complicated electromagnetic field.

2 - One of the electrons finds another with opposite spin and they form a Cooper pair of two electrons in a dumbbell configuration.

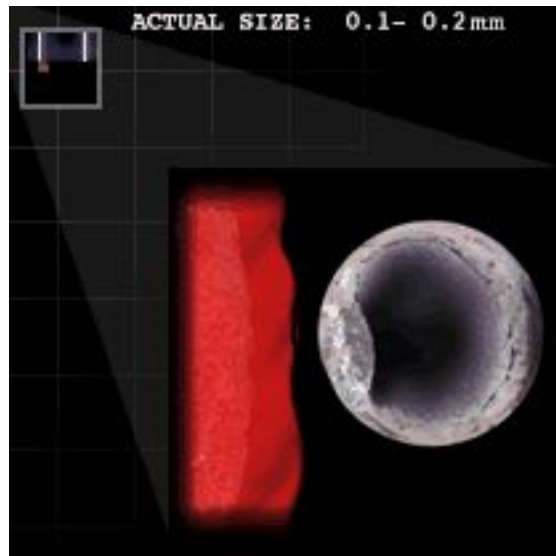
3 - They find another Cooper pair, and the 4 of them form a double-dumbbell tetrahedral configuration.

4 - The tetrahedron finds (or catalyzes the formation of) another opposite-oriented tetrahedron, and the 8 of them form a cube.

5 - Each of the 8 vertices of the cube finds from the cloud an opposite-spin electron, and the 16 of them look like Cooper pairs at each of the 8 cube vertices with the long axis of each pair on a diagonal of the cube.

FORMATION OF THE 16 CONFIGURATION IS LIKE THE MORULA / BLASTOCYST TRANSITION

(At age 4 days, a human embryo consists of a solid ball of 16 cells, called the morula. At the next stage of cell division, the blasocyst forms. Here is a blastocyst image



from <http://www.visembryo.com/baby/stage3.html> which states: "... Cell division continues, and a cavity known as a blastocoel forms in the center of the morula. Cells flatten and compact on the inside of the cavity ... the appearance of the cavity in the center the entire structure is now called a blastocyst. ... two cell types are forming: the embryoblast (inner cell mass on the inside of the blastocoel), and the trophoblast (the cells on the outside of the blastocoel). ...".)

THE CENTER OF THE CUBE IS A HOLLOW INTERIOR,
with a 2-layer boundary of 8 inner electrons of each Cooper pair
and 8 outer electrons of each Cooper pair.
The 8 inner electrons can be thought of as being bounded by
the 8 outer electrons.

6 - Any energy (kinetic or repulsive electromagnetic) of
the 8 inner electrons confined by the boundary of the 8 outer electrons
is transferred to the Bohm Quantum Potential by the process
described in Bohm's Hidden Variable Paper II, section 5,
(reprinted at page 387 of Quantum Theory and Measurement,
edited by Wheeler and Zurek (Princeton 1983))
in which Bohm says:

"... the PSI-field is able to bring the particle to rest
and to transform the entire kinetic energy into potential energy
of interaction with the PSI-field. ...".

Bohm discusses specifically the situation of

"... a "free" particle contained between two impenetrable and
perfectly reflecting walls, separated by a distance L",

but

perhaps a similar analysis might apply to a spherical cluster.

Bohm goes on to say:

"... at first sight, it may seem puzzling
that a particle having a high energy should be at rest
in the empty space between two walls.

Let us recall, however, that the space is not really empty, but contains an objectively real PSI-field that can act on the particle. ...".

7 - The increased energy of the Bohm Quantum Potential is now enough to open the door to the high-energy vacuum, which effectively gives the electron configuration access to conformal degrees of freedom of vacuum dark energy etc.

8 - The electron double-layer with central vacuum energy configuration, which is the EVO, then begins to collect the other electrons in the cloud, making them into Cooper pairs and sticking them into the sort-of-spherical double-layer.

The outer layer of electrons acts as a protective boundary for the EVO, because if a hostile electron/positive ion system attacks the EVO, an outer boundary EVO electron neutralizes the positive ion and the EVO captures the remaining electron to replace the boundary electron.

The entire EVO system continues to grow until the electrons of the cloud are all assimilated into it (about 10^{12} electrons in the case of EVOs manufactured by Ken Shoulders).

Ball lightning can be a lot larger than the size of the Ken Shoulders manufactured EVO because lightning can be more energetic than his machines.

A typical Ball Lightning has $r \sim 10$ cm, $N = 10^{21}$.

Use the hydrogen atom as the basis of comparison

where $r \sim 10^{-8}$ cm and $N = 1$

with self-electrical force $\sim 10^{+16}$

compared to

the Ball Lightning self-electrical force $10^{42} \times 10^{-2} = 10^{40}$ in these relative dimensionless units.

That is,

the self-electrical force at the

surface of the Ball Lightning assumed to be in a spherical thin shell

is $\sim 10^{24}$ stronger than the electrical force on

the atomic electron in the ground state of the hydrogen atom.

Next consider a single electron as a shell of charge e

at the classical electron radius 10^{-13} cm.

The relative self-electric force is then 10^{+26} .

Therefore,
the electrical force of the Ball Lightning is
about 10^{14} larger than that on a single electron.

The effective G^* induced by the zero point energy core needed
to stabilize a single spatially extended electron is $\sim 10^{40}$ G.

That is
the effective Planck length L_p^* in
the interior of a single electron is $\sim 10^{-13}$ cm.

The effective Planck length in the interior of the Ball Lightning
is therefore $\sim 10^{-6}$ cm since $G^* \sim L_p^{*2}$.

[Tony Smith's Home Page](#)

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