NUMERIC AND GEOMETRIC TEMPLATES

A STRUCTURALIST HYPOTHESIS

The specific examples in Table I of mass, length, force and density ratios being numerically equal to powers of α and μ suggest the general hypothesis that classes of physical ratios having like dimensionality are representable by $\alpha^n \mu^m$.

TABLE I

proton mass/electron mass	=	3.263 908 788	=	$\alpha^0 \mu^1$
compton λ/electron radius	=	2.136 834 673	=	$\alpha^{-1} \mu^0$
planck mass/proton mass	=	19.114 198 500	=	$\alpha^{-12} \mu^{-2}$
electron radius/planck length	=	20.241 272 615	=	$\alpha^{-11} \mu^{-1}$
coulomb force/gravity	=	39.355 471115	=	$\alpha^{-23} \mu^{-3}$
planck density/proton density	=	79.838 016 426	=	$\alpha^{-45} \mu^{-5}$

If this hypothesis is true, it would support the structuralist view that essence resides in relation rather than in entity. (In the present case the relations being ratios, and the entities being measurements of physical objects). Further, regularity in relations supports both diversity and multiplicity in physical objects, whereas regularity in physical objects alone is supportive of multiplicity but limiting or suppressive of diversity

The examples given in TABLE I are exact to nine places. However, since astronomical measurements are less accurate than laboratory measurements, in Table II the differences, δ, between the measurement ratios and the $\alpha^n \mu^m$ values are included.

TABLE II

sun mass/earth mass	=	5.522 4	$\alpha^2 \mu^3$	=	5.518 057	$\delta = 0.004$
sun radius/earth radius	=	2.038 1	$\alpha^{-4} \mu^{-2}$	=	2.019 521	$\delta = 0.019$
earth mass/moon mass	=	1.910 1	$\alpha^{-7} \mu^{-4}$	=	1.902 208	$\delta = 0.007$
earth density/sun density	=	0.592 6	$\alpha^{15} \mu^{10}$	=	0.586 565	$\delta = 0.006$
sun mass/planck mass	=	37.961 0	$\alpha^{25} \mu^{29}$	=	37.968 579	$\delta = 0.007$

A COSMOLOGICAL TEMPLATE

A template is not a theory nor a model, but is rather a frame of reference or infrastructure. Metaphorically a template is the table on which the dots [facts, values, observation, experimental results] are to be connected by theories.

A template may be an initial mold from which a structure is released and grows and differentiate

or it may be an ideal toward which a system evolves, converges.

i.e. a source of divergence

or

a destiny of convergence

which?

neither

Actually it becomes

a process, a verb

The template is the source, the origin – not the destination

The template is the launch pad – which spawns diversity and uniqueness

Beginning with a set of limits or constraints

∞ diversity is generated

A template is a set of constraints that enable diversity

Diversity ↑ ⇒ Information ↑

Energy is the fuel which allows Inf to ↑

In the "Inf–Energy" breath cycles

information is poured into the Shunyata

which become a storage place for all needs

however diverse

A TEMPLATE BEGINS
WITH A SET OF MEASUREMENTS
AND EXPLORES THEIR RELATIONSHIPS
N-THEORY
STRUCTURALIST APPROACH

The Template is, like God, a Verb

guiding and checking

the selection → selector process

Fractals and Texture

At each level a fractal is a net having both size and texture

Only that which is "caught" in the net exists

What is too large — needs the next fractal net

What is too small passes through the net, but

may be caught with a smaller net with finer texture

This suggests a top-down rather than a reductionist approach

A random set [say sizes]

hits the largest net — the largest are caught

Others pass to the next, where the next size

is caught ...

What exists is then fractally constructed.

The size-texture relation between nets

may be such that the size of a net on level [A]

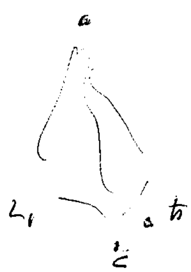
is = the texture of the net on level [A+1] ...

or $\underset{size}{[A]} > \underset{texture}{[A+1]}$ What results in each of

or $\underset{size}{[A]} < \underset{texture}{[A+1]}$ the 3 cases?

The net is a metaphor

There can be energy, mass, frequency, ... nets as well as size nets



PYTH TEMPLATE

S, the Fractal Factor

$\sqrt{S}$ is the "fractal scale factor" $= 19.677940$

It assumes the values:

fractal levels: $(\sqrt{S})^0, (\sqrt{S})^{\pm 1}, (\sqrt{S})^{\pm 3/2}, (\sqrt{S})^{\pm 2}, (\sqrt{S})^{\pm 5/2}, (\sqrt{S})^{\pm 3}$

£ ☆ U

$f(\alpha, \mu)$ provide "fine structure" to each fractal

e.g. standard model, periodic table, stellar types, Hubble types

Matter and Anti-matter, Populations I and II, Spiral + Barred Spiral

[other fine structures $\alpha^{n/2}$ etc] e.g $\sqrt{\alpha}\mu S \cdot \alpha\mu\sqrt{S}$

$\alpha = -2.136835$ $\mu = 3.263909$ $S = 39.355880$

$S \quad \alpha S \quad \mu S \quad \frac{S}{\alpha} \quad \frac{S}{\mu} \quad \alpha\mu S \quad \frac{S}{\alpha\mu} \quad \frac{\alpha S}{\mu} \quad \frac{\mu S}{\alpha}$ 9

$\frac{1}{S} \quad \frac{1}{\alpha S} \quad \frac{1}{\mu S} \quad \frac{\alpha}{S} \quad \frac{\mu}{S} \quad \frac{1}{\alpha\mu S} \quad \frac{\alpha\mu}{S} \quad \frac{\mu}{\alpha S} \quad \frac{\alpha}{\mu S}$ 9

18 at each fractal level

to R, to M etc

∴ 36 at each level

The "Origin", the Planck Particle

Based on $G = -7.175705$, $c = 10.476821$, $\hbar = -26.976924$

$m_0 = \sqrt{\frac{\hbar c}{G}} = -4.662199$ $\quad l_0 = \sqrt{\frac{G\hbar}{c^3}} = -37.791545$

$\left[\frac{MR^3}{T^2}\right]$ $\quad e_0 = \sqrt{\hbar c} = -8.250052$ $\quad t_0 = \sqrt{\frac{G\hbar}{c^5}} = -43.268366$

Measured Reference values: $r_e = -12.550068 = (\alpha\mu S)^{1/2} l_0$

$m_p = -23.776602 = (\alpha\mu/S)^{1/2} m_0$

$m_e = -27.040511 = (\alpha/\mu S)^{1/2} m_0$

$n\,p\,\delta = 0.000598$ $\quad m_n = -23.776004 =$

$e_e = -9.318469 = (\hbar\alpha c)^{1/2} = \alpha^{1/2} e_0$

05-08-22

$$\frac{\sqrt{\mu}\, S}{\alpha} \quad \frac{\mu S}{\sqrt{\alpha}} \quad \sqrt{\frac{\mu}{\alpha}}\, S \quad \frac{\mu}{\alpha} S$$

$$\frac{\mu}{\alpha} S \quad \frac{\mu}{\alpha}\sqrt{S} \quad \frac{\mu}{\alpha} S^{3/2}$$

$$\sqrt{\frac{\mu S}{\alpha}} \quad \sqrt{\frac{\mu}{\alpha}}\, S$$

NO INTERPRETATION OBSERVATIONS, FACTS A SET OF MEASUREMENTS
TEMPLATE
w
GROUND OR INFRASTRUCTURE
|
CULTURAL KNOWLEDGE

A COSMIC TEMPLATE

T < G ff ∃ dot in T not in G either T is ignored or G revised

First, ~~a template is to~~ be distinguished from a theory:

A theory is the organization of a set of objects or measurements with their relationships being derived through operations subject to selected axioms and rules. The validity of a theory is established by logical consistency and conformity with observation and experiment. Since a theory must be coherent with the existing body of knowledge, it possesses explanatory and metaphoric value.

A template is a set of objects or measurements that supply their own relationships and organization. It is a structure in which the measurements self–organize without the necessity of coherence with any pre-existing theories or body of knowledge. Thus a template is neither right nor wrong, true nor false, and lacks any explanatory value.

An example of a template is the "Titius–Bode Law". This was a formula showing relationships between planetary distances in the solar system. It never had a theoretical base, but did prove useful in that it led to the discovery of the planet Uranus and the asteroid belt. A more familiar example of a template is the periodic table. The weights and numbers of different atoms self-organize in a very useful but not theoretically substantiated table. And a contemporary example of a template is a fractal.. While there is at present no theory to explain why patterns self–replicate on different scales, nonetheless they do. Hence, we may say that a template can be viewed as either a pre-theory or just a useful curiosity

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SCALED ~~SPATIAL~~ TEMPLATE

The following template is a self-organizing set of measurements whose inputs come from particle physics and astrophysics. In particular, the inputs are the $\log_{10}$ (cgs) numerical values of

The fine structure constant	$\alpha = -2.136835$	[0]
The proton/electron mass ratio	$\mu = 3.263909$	[0]
The coulomb/gravity force ratio	$S = 39.355471$	[0]
The velocity of light	$c = 10.476820$	[L/T]
The gravitational constant	$G = -7.175296$	$[L^3/MT^2]$
The planck constant	$\hbar = -26.976924$	$[ML^2/T]$

Values derived from the above values:

		=	~~$\alpha\mu S$~~	=	~~40.482545~~	~~[0]~~
The planck length,	L_o	=	$\sqrt{(G\hbar/c^3)}$	=	–32.791341	[L]
The electron radius	r_e	=	$\sqrt{(\alpha\mu S)}\, L_o$	=	–12.550068	[L]
~~The astral radius~~	~~R_A~~	=	~~$\alpha\mu S\, L_o$~~	=	~~7.691204~~	~~[L]~~
~~The cosmic radiuw~~	~~R_K~~	=	~~$(\alpha\mu S)^{3/2} L_o$~~	=	~~27.932477~~	~~[L]~~

TEMPINT.WPD May 13, 2007

WAVE FORM AS TEMPLATE

There are basic and profound relationships between entities and wave forms. Which is to say, every unique entity may be considered as a manifestation of a unique wave form. We conventionally describe physical entities in terms of their size, mass, and shape, but each parameter is a function a set of interrelated frequencies woven together by their various amplitudes and phases. Or, simply put: Individuation is effected by wave form.

ENTITY	WAVE FORM
mass	frequencies
size	amplitudes
shape	phases
duration	duration

Again it is important to listen to the Structuralist School: The unmanifested relationships between entities, as well as the manifested entities themselves, are functions of wave form. Specifically forces and linkages as well as masses and sizes are expressions of wave form.

This would suggest that "dark matter" is related to baryonic matter by a single inversion in a wave form parameter. So the involved parameters must be identified and their possible inversions and symmetries then tested.

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signal/noise : : # of selected arrangements/total # of arrangements : : information/random

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One application of this idea would be to find parameters and values that relate geometric forms.

DIRAC

TEMPLATE VALUES

$S^{1/2}$	= 19.677 735 557		$(\alpha\mu)^{1/2}$	= 0.563 537 057	
S	= 39.355 471 115	= $\alpha^{-23}\mu^{-3}$	$(\alpha\mu)$	= 1.127 074 115	
$S^{3/2}$	= 59.033 206 671		$(\alpha\mu)^{3/2}$	= 1.690 611 171	
S^{2}	= 78.710 942 230	= $\alpha^{-46}\mu^{-6}$	$(\alpha\mu)^{2}$	= 2.254 148 230	
$S^{5/2}$	= 98.388 677 785		$(\alpha\mu)^{5/2}$	= 2.817 685 288	
S^{3}	= 118.066 413 342	= $\alpha^{-69}\mu^{-9}$	$(\alpha\mu)^{3}$	= 3.381 222 342	
$S^{7/2}$	= 137.744 148 899		$(\alpha\mu)^{7/2}$	= 3.944 759 403	
S^{4}	= 157.421 884 456	= $\alpha^{-92}\mu^{-12}$	$(\alpha\mu)^{4}$	= 4.508 296 460	
$S^{9/2}$	= 177.099 620 013		$(\alpha\mu)^{9/2}$	= 5.071 833 518	
S^{5}	= 196.777 355 570	= $\alpha^{-115}\mu^{-15}$	$(\alpha\mu)^{5}$	= 5.635 370 575	
$S^{11/2}$	= 216.455 091 127		$(\alpha\mu)^{11/2}$	= 6.198 907 633	
S^{6}	= 236.132 826 684	= $\alpha^{-138}\mu^{-18}$	$(\alpha\mu)^{6}$	= 6.762 444 690	
$S^{13/2}$	= 255.810 562 241		$(\alpha\mu)^{13/2}$	= 7.325 981 741	
S^{7}	= 275.488 297 798	= $\alpha^{-161}\mu^{-21}$	$(\alpha\mu)^{7}$	= 7.889 518 798	
$S^{15/2}$	= 295.166 033 355		$(\alpha\mu)^{15/2}$	= 8.453 055 855	
S^{8}	= 314.843 768 912	= $\alpha^{-184}\mu^{-24}$	$(\alpha\mu)^{8}$	= 9.016 592 912	

$(S/\alpha\mu)^{1/4}$	= 9.557 099 250	= $\alpha^{-6}\mu^{-1}$	$(\alpha\mu S)^{1/4}$	= 10.120 636 308	= $\alpha^{-11/2}\mu^{-1/2}$
$(S/\alpha\mu)^{1/2}$	= 19.114 198 500	= $\alpha^{-12}\mu^{-2}$	$(\alpha\mu S)^{1/2}$	= 20.241 272 615	= $\alpha^{-11}\mu^{-1}$
$(S/\alpha\mu)$	= 38.228 397 000	= $\alpha^{-24}\mu^{-4}$	$(\alpha\mu S)$	= 40.482 545 230	= $\alpha^{-22}\mu^{-2}$
$(S/\alpha\mu)^{3/2}$	= 57.342 595 500	= $\alpha^{-36}\mu^{-6}$	$(\alpha\mu S)^{3/2}$	= 60.723 817 845	= $\alpha^{-33}\mu^{-3}$
$(S/\alpha\mu)^{2}$	= 76.456 794 000	= $\alpha^{-48}\mu^{-8}$	$(\alpha\mu S)^{2}$	= 80.965 090 460	= $\alpha^{-44}\mu^{-4}$
$(S/\alpha\mu)^{5/2}$	= 95.570 992 500	= $\alpha^{-60}\mu^{-10}$	$(\alpha\mu S)^{5/2}$	= 101.206 363 075	= $\alpha^{-55}\mu^{-5}$
$(S/\alpha\mu)^{3}$	= 114.685 191 000	= $\alpha^{-72}\mu^{-12}$	$(\alpha\mu S)^{3}$	= 121.447 635 690	= $\alpha^{-66}\mu^{-6}$
$(S/\alpha\mu)^{7/2}$	= 133.799 389 500	= $\alpha^{-84}\mu^{-14}$	$(\alpha\mu S)^{7/2}$	= 141.688 908 305	= $\alpha^{-77}\mu^{-7}$
$(S/\alpha\mu)^{4}$	= 152.913 588 000	= $\alpha^{-96}\mu^{-16}$	$(\alpha\mu S)^{4}$	= 161.930 180 920	= $\alpha^{-88}\mu^{-8}$
$(S/\alpha\mu)^{9/2}$	= 172.027 786 500	= $\alpha^{-108}\mu^{-18}$	$(\alpha\mu S)^{9/2}$	= 182.171 453 535	= $\alpha^{-99}\mu^{-9}$
$(S/\alpha\mu)^{5}$	= 191.141 985 000	= $\alpha^{-120}\mu^{-20}$	$(\alpha\mu S)^{5}$	= 202.412 726 15	= $\alpha^{-110}\mu^{-10}$
$(S/\alpha\mu)^{11/2}$	= 210.256 183 500	= $\alpha^{-132}\mu^{-22}$	$(\alpha\mu S)^{11/2}$	= 222.653 998 765	= $\alpha^{-121}\mu^{-11}$
$(S/\alpha\mu)^{6}$	= 229.370 382 000	= $\alpha^{-144}\mu^{-24}$	$(\alpha\mu S)^{6}$	= 242.895 271 38	= $\alpha^{-132}\mu^{-12}$

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GEOMETRIC OBJECTS:

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CUBES e, d, D | $d = e\sqrt{2}$, $D = e\sqrt{3}$

OCTAGONS $\cancel{D} \neq d$ $D = E\sqrt{2}$; $V = \frac{1}{3}E^2D = E^3\frac{\sqrt{2}}{3} = \frac{D^3}{6}$

PYRAMIDS $\frac{1}{3}$'s, $2/3$'s $\left(\frac{16}{3}\right)$ = DOMES 

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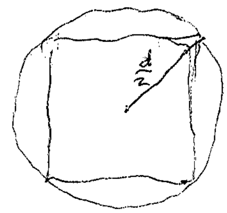
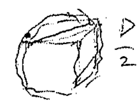
CYLINDERS | r, R radii $\frac{d}{2}, \frac{D}{2}$



SPHERES $2/3$



CONES $1/2$

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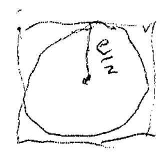


2CYLINDERS

2INTERSECT

3CYLINDERS

3INTERSECT

Cubes, Pyramids, Betweens

$e=2$ $\quad V=8$

$e=2,\ h=2$ $\quad V=\frac{8}{3}=2.\bar{6}$

$e=2,\ h=2$ $\quad V=\frac{16}{3}=5.\bar{3}$

CUBES

$e=2$ $\quad V_e=8$ ⑥

$d=2\sqrt{2}$ $\quad V_d=8^{3/2}=8\,2^{3/2}$ — 22.627417 ③

$D=2\sqrt{3}$ $\quad V_D=8\cdot 3^{3/2}$ $=41.569219$ ①

$V_d/V_e = 2^{3/2}=\sqrt{8} = 2.828427$

$V_D/V_e = 3^{3/2} = \sqrt{27} = 5.196152$

$V_D/V_d = \left(\frac{3}{2}\right)^{3/2} = \sqrt{\frac{27}{8}} = 1.837117$

C

$V_D - V_e = 33.569219$

$V_D - V_d = 18.941802$

$V_d - V_e = 14.627417$

PYRAMIDS

$e=2$ $\quad V_e=\frac{8}{3}=2.\bar{6}$ ⑨

d $\quad V_d=\frac{8^{3/2}}{3}=7.542472$ ⑦

D $\quad V_D=8\cdot 3^{1/2}=13.856406$ ⑤

$V_d/V_e =$ "

P

$V_D - V_e = 11.189739$

$V_D - V_d = 6.713934$

$V_d - V_e = 4.875806$

BETWEENS (DOMES)

$e=2$ $\quad V_e=\frac{16}{3}=5.3$ ⑧

d $\quad V_d=14.904944$ ④

D $\quad V_D=27.772812$ ②

$V_d/V_e =$ "

B

$V_D - V_e = 22.379479$

$V_D - V_d = 12.867868$

$V_d - V_e = 9.577611$

$$\begin{array}{r} 41.569219 \\ 27.712813 \\ \hline 13.856406 \end{array} \qquad \begin{array}{r} 41.569219 \\ 22.627417 \\ \hline 18.941802 \end{array}$$

$$\begin{array}{r} 27.712813 \\ 22.627417 \\ \hline 5.085496 \end{array}$$

$$\begin{array}{r} 15.084945 \\ 13.856406 \\ \hline 1.228539 \end{array} \qquad \begin{array}{r} 22.627 \\ 20.241 \\ 2.386 \end{array}$$

37

1.1

3.57

I_d $R = 1$

$D = 2R$

$D^2 - e^2 = d^2$

$d^2 = 2e^2$

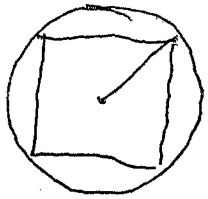
$D^2 = 3e^2$

$D = \sqrt{3}\, e$

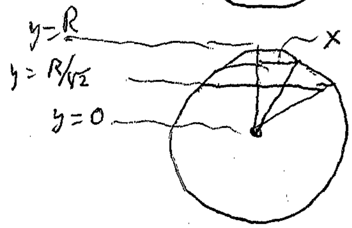
$R = \frac{\sqrt{3}}{2} e$

$R = 1, \quad e = \frac{2}{\sqrt{3}}$

I_3 $\quad Y_1$ has radius R, cube has edge, $e = \sqrt{2}R$, $V = e^3 = \sqrt{8}R^3$



$$V_{cap} = \int_{\frac{R}{\sqrt{2}}}^{R} 4X^2\,dy = 4\int_{\frac{R}{\sqrt{2}}}^{R} (R^2 - y^2)\,dy$$



$X^2 + y^2 = R^2$

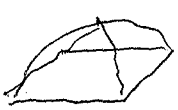
$$= 4R^2\left[R - \frac{R}{\sqrt{2}}\right] - \frac{4}{3}\left[R^3 - \frac{R^3}{\sqrt{8}}\right]$$

$$V_c = 4R^3\left[1 - \frac{1}{\sqrt{2}} - \frac{1}{3} + \frac{1}{3\sqrt{8}}\right]$$

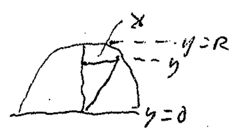
$$I_3 = V = 6V_c + \sqrt{8}R^3 = 8(2 - \sqrt{2})R^3 = 4.686292\ R^3$$

$$Y_3 = 3Y_1 - 3I_2 + I_3 = (8\pi - 16 + 16 - 8\sqrt{2})R^3 = (8\pi - 8\sqrt{2})R^3$$
$$= 7.535848\ R^3$$

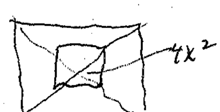
I_2 $\qquad R$ = radius of Y_1



2R



Face Cylinder radius $= R = \frac{e}{\sqrt{2}}$



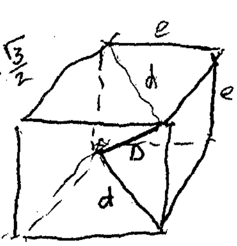
$$I_2 = 2\int_{y=0}^{R} 4x^2\,dy = 8\int_{0}^{R} (R^2 - y^2)\,dy = 8R^2\big[R\big] - \frac{8}{3}\big[R^3\big]$$

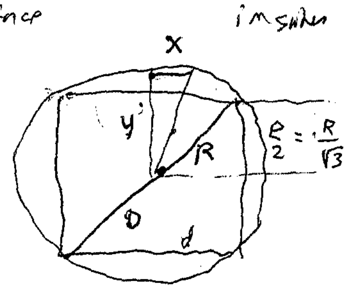
$$I_2 = \frac{16}{3}R^3 = 5.\bar{3}\ R^3$$

$Y_2 = 4\pi - 16/3 = 7.2330373$

I_d $\quad$ Cylinder on diagonal not face $\quad$ or cube inside

diagonal cylinder $R = \frac{D}{2} = e\frac{\sqrt{3}}{2}$



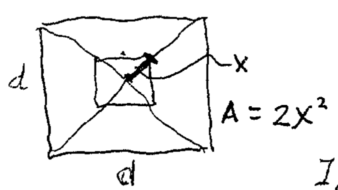


$$V_c = 2\int_{y=\frac{R}{\sqrt{3}}}^{R} x^2\,dy = 2\int_{\frac{R}{\sqrt{3}}}^{R} (R^2 - y^2)\,dy$$

$$V_c = 2R^2\left[R - \frac{R}{\sqrt{3}}\right] - \frac{2}{3}\left[R^3 - \frac{R^3}{3\sqrt{3}}\right]$$

$$V_c = \frac{4}{3}R^3\left[1 - \frac{4}{3\sqrt{3}}\right]$$

$d = e\sqrt{2}$



$$6V_c = 8R^3\left[1 - \frac{4}{3\sqrt{3}}\right]$$

$D^2 = d^2 + e^2 = 3e^2$

$D = e\sqrt{3}$

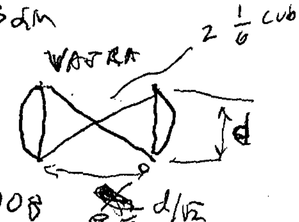
$$I_d = 6V_c + V_k = 8R^3\left[1 - \frac{4}{3\sqrt{3}} + \frac{1}{3\sqrt{3}}\right] = 8R^3\left[1 - \frac{1}{\sqrt{3}}\right]$$

$R = \frac{D}{2} = e\frac{\sqrt{3}}{2}$

$R = 1 \quad I_d = 3.3811978 = 3dM$

$V_k = e^3 = \frac{8R^3}{3\sqrt{3}}$ $\quad d = \sqrt{\frac{8}{3}}R$

$$\frac{1}{3}(6V_c + V_k) = 2V_c + \frac{V_k}{3} = 1.127066$$



$dM \approx 1.127074 \quad \delta = 0.000008$

$$I_3 = 8(2-\sqrt{2}) = 4.868292$$
$$9\alpha\mu = 8(3-\sqrt{3}) = 10.143594 \rightarrow \; = 1.127066$$
$$3I_2 = 8(4-\sqrt{4}) = 16 \qquad \approx \left(\tfrac{4}{3}\right)^{3/2}(\sqrt{3}-1)$$

$$5-\sqrt{15} = 1.127017$$

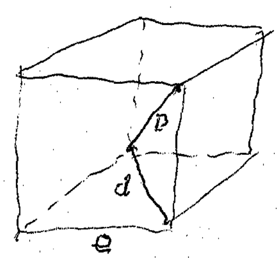
$$Y_1 = 2\pi R^3 = 6.283185$$
$$Y_2 = 4\left(\pi - \tfrac{4}{3}\right)R^3 = 7.233037 \qquad \text{measured } \alpha\mu = 1.127074$$
$$Y_3 = (6\pi - 8\sqrt{2})R^3 = 7.535848$$

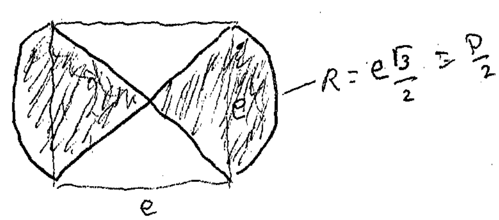
where R is the cylinder radius $= \frac{e}{\sqrt{2}} = \frac{d}{2}$

$$I_2 = \tfrac{16}{3}R^3$$
$$I_3 = 8(2-\sqrt{2})R^3$$

$$3\alpha\mu = 8\left(1-\tfrac{1}{\sqrt{3}}\right)\check{R}^3 = 3.381198 \quad = 3 \text{ VAJRAS}$$

$$\check{R} = \frac{D}{2} = e\frac{\sqrt{3}}{2}$$





VAJRA

Volume $= \alpha\mu$

C = Cube
p = $\frac{1}{3}$ Cube
B = $\frac{2}{3}$ Cube DOMES

D: $e = 2\sqrt{3}$ $V = 8\,3^{3/2}$

d: $e = 2\sqrt{2}$ $V = 8 \cdot 2^{3/2}$

e: $e = 2$ $V = 8$

△ 1/0

	C_D	B_D	C_d	B_d	P_D	C_e	P_d	B_e	P_e
		2/3 C_D		2/3 C_d	1/3 C_D		1/3 C_d	2/3 C_e	1/3 C_e
	41.569219	27.712813	22.627417	15.084945	13.856406	8	7.542472	$5.\bar{3}$	$2.\bar{6}$
C_D 41.569219	0	13.856406	18.941802	26.484274	27.712813	33.569219	34.026747	36.235886	38.902553
B_D 27.712813	3/2	0	5.0855496	12.627868	13.856407	19.712813	20.170341	22.379480	25.046147
C_d 22.627417	$\left(\frac{3}{2}\right)^{3/2}$	$\left(\frac{3}{2}\right)^{1/2}$	0	7.542472	8.771011	14.627417	15.084945	~~17.960751~~ 17.294084	19.960751
B_d 15.084945	$3^{1/2}/4\sqrt{2}$	$3^{3/2}/\sqrt{8}$	3/2	0	1.228538	7.084945	7.542472	9.751612	12.418279
P_D 13.856406	3	2	$2\cdot\sqrt{2}/3^{1/2}$	$2^{5/2}/3^{3/2}$	0	5.856406	6.313934	8.523073	11.189740
C_e 8	$3^{3/2}$	$2\cdot 3^{1/2}$	$\sqrt{8}$	$2^{5/2}/3$	$3^{1/2}$	0	0.457528	$2.\bar{6}$	$5.\bar{3}$
P_d 7.542472	$3^{5/2}/\sqrt{8}$	$3^{3/2}/\sqrt{2}$	3	2	$3^{3/2}/\sqrt{8}$	$3/\sqrt{8}$	0	2.209139	4.875806
B_e $5.\bar{3}$	$3^{5/2}/2$	$3^{3/2}$	$3\sqrt{2}$	$\sqrt{8}$	$3^{3/2}/2$	3/2	$\sqrt{2}$	0	$2.\bar{6}$
P_e $2.\bar{6}$	$3^{5/2}$	$2\cdot 3^{3/2}$	$3\sqrt{8}$	$2^{5/2}$	$3^{3/2}$	3	$\sqrt{8}$	2	0
RATIOS									
	$2^3\,3^{3/2}$	$2^4\,3^{1/2}$	$2^4\sqrt{2}$	$\frac{2^5\sqrt{2}}{3}$	$2^3\,3^{1/2}$	2^3	$\frac{2^4\sqrt{2}}{3}$	$2^4/3$	$2^3/3$

17.294084

$B_d \doteq (B_D - C_d) + 10$

$\Delta = 0.000551$

$\frac{8}{3}\,2^{3/2} = 7.5424723$

$\sqrt{57} = 7.549834$
7.542472
0.007362

41.569219381653055044658712196141

13.856406460551018348219570732047

27.712812921102036696439141464094

22.627416997969520780827019587355

7.5424723326565069269423398624517

15.084944665313013853884679724903

8

2.6666666666666666666666666666667

5.3333333333333333333333333333333

$I_\alpha = 3.381198$

$8(1-\frac{1}{\sqrt{3}})$

BASE = $E = 2$

NORMALIZED
to INT2

correct to R^3

	CONE	PYRAMID	INNERCUBE	SPHERE	INT3	INT2	CYL1	CYL2	CYL3	X CUBE	X SPHERE
Volume $\times E^3$	$2\pi/3$	$8/3$	$\sqrt{8}$	$\frac{4}{3}\pi$	$8(2-\sqrt{2})$ ✓	$16/3$	2π	$4\pi - 16/3$	$6\pi - 8\sqrt{2}$ ✓	8 $E=2$	$R = \frac{\sqrt{3}}{2}E$
	2.094395	2.666666	2.828427	4.188790	4.686292	5.333333	6.283185	7.233037	7.535846	8	
$\times \frac{3}{16}$ NORM $8 \to \frac{3}{2}$	$\pi/8$	$1/2$	$3/2\sqrt{8}$	$\pi/4$	$\frac{3}{2}(2-\sqrt{2})$	1	$\frac{3}{8}\pi$	$\frac{3\pi}{4} - 1$	$\frac{9}{8}\pi - \frac{3}{\sqrt{2}}$	1.5	
	0.392699	0.5	0.530330	0.785398	0.878680	1	1.178097	1.356195	1.412971*	1.5	
$\times$ 40.482552	15.897461	20.241276	21.469112	31.794915	35.571209	40.482552	47.692373	54.902235	57.200672	60.723828	$\alpha\mu S$
$\times$ -32.791345	-16.893884	-12.550069	-11.322233	-0.996430	2.779864	7.691207	14.901028	22.110890	24.409327	27.932483	l_0 cm
$\times$ -43.268166	-27.370705	-23.026890	-21.799054	-11.473251	-7.696957	-2.785614	4.424207	11.634069	13.932506	17.455662	t_0 sec
$\times$ 38.228404	15.012256	19.114202	20.273669	30.024512	33.590534	38.228404	45.036796	51.84517	54.015626	57.342606	$\frac{S}{\alpha M}$
$\times$ -4.662400	10.349856	14.451802	15.611269	25.362112	28.928124	33.566004	40.374396	47.18277	49.353226	52.680206	m_0 g
m_0	19.674656	23.776602	24.936069	34.686912	38.252934	42.890804	49.699196	56.50757	58.678026	62.005006	
					REVISION	I_3	corrected				
	CONE	PYRAMD	INCUBE	INT3	SPHERE	INT2	CYL 3	CYL 1	CYL 2	~~X~~ CUBE	
	2.094395	$2.\bar{6}$	2.828427	3.381198	4.188790	$5.\bar{3}$	6.230754	6.283185	7.233037	8	
	$2\pi/3$	$8/3$	$\sqrt{8}$	$8(1-\frac{1}{\sqrt{3}})$	$4/3\,\pi$	$16/3$	$6\pi - 8(1+\frac{1}{\sqrt{3}})$	2π	$4\pi - \frac{16}{3}$	2^3	
$\times \frac{3}{16}$ NORM Int2	$\pi/8$	$1/2$	$3/2\sqrt{8}$	$\frac{3}{2}(1-\frac{1}{\sqrt{3}})$	$\pi/4$	1	$\frac{9}{8}\pi - \frac{1}{2}(3+\sqrt{3})$	$3/8\,\pi$	$\frac{3}{4}\pi - 1$	1.5	
	0.392699	0.5	0.530330	3.381198+	0.785398	1	1.168266	1.178097	1.356195	1.5	

~0

$(\alpha\mu)^3 = 3.381222^+$

$\delta = 0.000024$

$1 + \frac{(\alpha\mu)^{3/2}}{10} = 1.169061$

1.168266

$\delta = 0.000795$

* cf $\sqrt{2}$
1.414214

~~54.902235~~

51.84517

47.18277 9

13.90

R = 1

Edge = 2

CONE	PYRAMID	NCUBE	$I_{\alpha\mu}$	SPHERE	I_3 $\sqrt{2}$	I_2	Y_1	Y_2	Y_3	XCUBE	
$\frac{2\pi}{3}$	$8/3$	$\sqrt{8}$	$8(1-\frac{1}{\sqrt{3}})$	$\frac{4}{3}\pi$	$8(2-\sqrt{2})$	$16/3$	2π	$4\pi-16/3$	$6\pi-8\sqrt{2}$	8	$\leftarrow X R^3 = V$
2.094395	$2.\bar{6}$	2.828427	3.381198	4.188790	4.686292	$5.\bar{3}$	6.283185	7.233037	7.535846	8	values

FUNDAMENTAL CONSTANTS WORK SHEET

$c := 10.476821$ $G := -7.175706$ $h := -26.976924$

$mo := 0.5\cdot(c + h - G)$ $lo := 0.5\ (G + h - 3\cdot c)$ $to := 0.5\ (G + h - 5\cdot c)$

$mo = -4.6621985$ $lo = -32.7915465$ $to = -43.2683675$

$Er := mo + 2\cdot c$ $Eg := G + 2\cdot mo - lo$ $Et := h - to$ $Ek := 0.5\cdot(h + 5\cdot c - G)$

$Er = 16.2914435$ $Eg = 16.2914435$ $Et = 16.2914435$ $Ek = 16.2914435$

$do := 5\cdot c - h - 2\cdot G$ $mp := -23.776602$ $re := -12.550068$

$A := mp - mo$ $B := re - lo$ $tp := re - c$

$do = 93.712441$

$A = -19.1144035$ $B = 20.2414785$ $tp = -23.026889$

$dp := mp - 3\cdot re$

$J := mo - lo$ $K := mp - re$

$dp = 13.873602$

$J = 28.129348$ $K = -11.226534$

$S := J - K$ $am := A + B$

$B - A = 39.355882$ $S = 39.355882$ $am = 1.127075$

$To := 0.5\cdot(G + do)$ $Tp := 0.5\cdot(G + dp)$ $h - c = -37.453745$

$To = 43.2683675$ $Tp = 3.348948$ $Tp + tp = -19.677941$

$Tp + tp - A = -0.5635375$ $mp + re - am = -37.453745$ ✓

$mo + lo = -37.453745$ $mp + re = -36.32667$ $mp + re - (h - c) = 1.127075$

$J + re = 15.57928$ $h - c - re = -24.903677$ $mp - am = -24.903677$

$3\cdot B + to = 17.456068$ $2\cdot B + to = -2.7854105$ $B + to = -23.026889$

$3\cdot B + mo = 56.062237$ $2\cdot B + mo = 35.8207585$ $B + mo = 15.57928$

$3\cdot B + lo = 27.932889$ $2\cdot B + lo = 7.6914105$ $B + lo = -12.550068$

$B + mo - mp = 39.355882$ $Tp + B + to = -19.677941$ $B + to - Tp = -26.375837$

$2\cdot B + to + Tp = 0.5635375$ $Tp + to = -39.9194195$ $Tp + to + S = -0.5635375$

$q5 := 3 \cdot G + 2 \cdot h - 8 \cdot c$ $\qquad$ $q3 := G + 2 \cdot h - 4 \cdot c$

$q5 = -159.295534$ $\qquad$ $q3 = -103.036838$

$5 \cdot lo - q5 = -4.6621985$ g $\qquad$ $q3 - 3 \cdot lo = -4.6621985$ g

$5 \cdot re - q5 = 96.545194$ g $\qquad$ $q3 - 3 \cdot re = -65.386634$ g

$0.2\ (q5 + mo) = -32.7915465$ cm $\qquad$ $\frac{1}{3} \cdot (q3 - mo) = -32.7915465$ cm

$0.2 \cdot (q5 + mp) = -36.6144272$ cm $\qquad$ $\frac{1}{3} \cdot (q3 - mp) = -26.42007867$ cm

$r := 1.5$

$SS := r \cdot (am + S)$

$SS = 60.7244355$ $\qquad$ $SS + mo = 56.062237$ g $\qquad$ $SS + lo = 27.932889$ cm

$0.2 \cdot (q5 + SS + mo) = -20.6466594$ cm $\qquad$ $\frac{1}{3} \cdot (q3 - (SS + mo)) = -53.033025$ cm

$5 \cdot (SS + lo) - q5 = 298.959979$ g $\qquad$ $q3 - 3 \cdot (SS + lo) = -186.835505$ g

WORK SHEET NUMBER 2

$n := 0, .25 .. 3$

$c := 10.476821$ $\quad G := -7.175706$ $\quad h := -26.976924$

$mo := 0.5 \cdot (c + h - G)$ $\quad lo := 0.5\ (G + h - 3 \cdot c)$ $\quad to := 0.5\ (G + h - 5 \cdot c)$

$mo = -4.6621985$ $\quad lo = -32.7915465$ $\quad to = -43.2683675$

$S := 39.355882$ $\quad am := 1.127074$

$SS := S + am$ $\quad ss := am - S$

$SS = 40.482956$ $\quad ss = -38.228808$

$M(n) := n \cdot SS + mo$ $\quad R(n) := n \cdot SS + lo$ $\quad T(n) := n \cdot SS + to$

	n =	M(n) =	R(n) =	T(n) =
L	0	-4.6621985	-32.7915465	-43.2683675
	0.25	5.4585405	-22.6708075	-33.1476285
D	0.5	15.5792795	-12.5500685	-23.0268895
	0.75	25.7000185	-2.4293295	-12.9061505
R	1	35.8207575	7.6914095	-2.7854115
	1.25	45.9414965	17.8121485	7.3353275
U	1.5	56.0622355	27.9328875	17.4560665
	1.75	66.1829745	38.0536265	27.5768055
	2	76.3037135	48.1743655	37.6975445
	2.25	86.4244525	58.2951045	47.8182835
	2.5	96.5451915	68.4158435	57.9390225
	2.75	106.6659305	78.5365825	68.0597615
	3	116.7866695	88.6573215	78.1805005

WORK SHEET NUMBER 2

$n := -1, -0.75 .. 3$

$c := 10.476821$ $\qquad G := -7.175706$ $\qquad h := -26.976924$

$mo := 0.5 \cdot (c + h - G)$ $\qquad lo := 0.5\,(G + h - 3 \cdot c)$ $\qquad to := 0.5\,(G + h - 5 \cdot c)$

$mo = -4.6621985$ $\qquad lo = -32.7915465$ $\qquad to = -43.2683675$

$S := 39.355882$ $\qquad am := 1.127074$

$SS := S + am$ $\qquad ss := am - S$

$SS = 40.482956$ $\qquad ss = -38.228808$

$M(n) := n \cdot SS + mo$ $\qquad R(n) := n \cdot SS + lo$ $\qquad T(n) := n \cdot SS + to$

	n =	M(n) =	R(n) =		T(n) =	
	-1	-45.1451545	-73.2745025		-83.7513235	
	-0.75	-35.0244155	-63.1537635		-73.6305845	
B [0,2]	-0.5	-24.9036765	-53.0330245		-63.5098455	[0,-1]
	-0.25	-14.7829375	-42.9122855		-53.3891065	
p	0	-4.6621985	-32.7915465		-43.2683675	
	0.25	5.4585405	-22.6708075		-33.1476285	
[0,1] D	0.5	15.5792795	-12.5500685		-23.0268895	[1,0]
	0.75	25.7000185	-2.4293295		-12.9061505	
[0,1] ☆	1	35.8207575	7.6914095		-2.7854115	[1,0]
	1.25	45.9414965	17.8121485	←	7.3353275	
[0,1] U	1.5	56.0622355	27.9328875		17.4560665	[1,0]
	1.75	66.1829745	38.0536265		27.5768055	
	2	76.3037135	48.1743655		37.6975445	
	2.25	86.4244525	58.2951045		47.8182835	
	2.5	96.5451915	68.4158435		57.9390225	
	2.75	106.6659305	78.5365825		68.0597615	
	3	116.7866695	88.6573215		78.1805005	

Note
$$\left.\begin{array}{l} n = \tfrac{3}{2} p \text{ for } U \\ n = p \text{ for } ☆ \\ n = \tfrac{1}{2} p \text{ for } D \end{array}\right\} q = 0$$
$$n = \tfrac{1}{2} q \text{ for } B \;\} \; p = 0$$

$D \longleftrightarrow B$

interchange p and q

SDMA ?

CHANNELS

TIMES or Frequencies

s := 20.241477 q := -43.268366

u := -8, -7.. 8 v := 0.5

$Y(u) := (v \cdot (1 + u)) \cdot s + q$

$\times \frac{c^3}{G} \rightarrow$ Mass

UNIVERSE $g = 0$

TIMES Y(u) =

	Y(u)	
	-114.1135355	$-7/6$
U^{-1}	-103.992797	-1 — $\boxed{-3}$
	-93.8720585	$-5/6$
$\star^{-1}$	-83.75132	$-\frac{2}{3}$
	-73.6305815	$-\frac{1}{2}$ — $\boxed{-\frac{3}{2}}$
D^{-1}	-63.509843	$-\frac{1}{3}$
	-53.3891045	$-\frac{1}{6}$
P	-43.268366	$p = 0$ P
	-33.1476275	$+1/6$
D	-23.026889	$+1/3$ — $\boxed{1}$ D
	-12.9061505	$+\frac{1}{2}$ — $\boxed{\frac{3}{2}}$
$\star$	-2.785412	$+2/3$ — $\boxed{2}$ $\star$
	7.3353265	$+5/6$
U	17.456065	$+$ $p = 1$ $\boxed{3}$ — UNIV
	27.5768035	$+7/6$
	37.697542	$+4/3$
	47.8182805	$+\frac{3}{2}$ — $\boxed{\frac{9}{2}}$

$\frac{U}{U^{-1}} = (\alpha, us)^3$

$\frac{\star}{\star^{-1}} = (\alpha, us)^2$

$\frac{D}{D^{-1}} = (\alpha, us)^1$

$P = (\alpha, us)^0$

WORK SHEET NUMBER 3

$n := -1, -0.75 .. 3$

$c := 10.476821$ $G := -7.175706$ $h := -26.976924$

$mo := 0.5\cdot(c + h - G)$ $lo := 0.5\,(G + h - 3\cdot c)$ $to := 0.5\,(G + h - 5\cdot c)$

$mo = -4.6621985$ $lo = -32.7915465$ $to = -43.2683675$

$S := 39.355882$ $am := 1.127074$

$SS := S + am$ $ss := am - S$

$SS = 40.482956$ $ss = -38.228808$ $m := 1 .. 12$

$T(n) := n\cdot SS$

n =	T(n) =
-1	-40.482956
-0.75	-30.362217
-0.5	-20.241478
-0.25	-10.120739
0	0
0.25	10.120739
0.5	20.241478
0.75	30.362217
1	40.482956
1.25	50.603695
1.5	60.724434
1.75	70.845173
2	80.965912
2.25	91.086651
2.5	101.20739
2.75	111.328129
3	121.448868

m =
1
2
3
4
5
6
7
8
9
10
11
12

Harmonic

STAR FRAMES PART IV
FRAME DENSITIES

All values are $\log_{10}$ values. Densities are given as M/R^3;
To convert to Mass/spherical Volume, subtract 0.622089; $[M/R^3 - 0.622089 = M/V]$
Density of the Planck particle: $m_o/l_o^3 = c^5/\hbar G^2 = 93.712439$ g/cm^3
Density of a proton: $m_p/r_e^3 = 13.873602$ g/cm^3

NEUTRON STARS	M^*	$M\sim$	M_*
R^*	12.746528 SL	11.619454 1Q	10.492380 1Q
$R\sim$	16.127747 2Q	15.000673 SL	13.873599 1Q
R_*	19.508972 2Q	18.381898 2Q	17.254824 SL

SL = on the Schwarzschild bound; 1Q = in first quadrant; 2Q = in second quadrant
Note: The $M_*/R\sim^3$ density is identical with that of the proton. This suggests that the proper equations for mass and radius of a neutron star are $(S/\alpha\mu)m_o$ and $S\,l_o$ respectively.
[However, the proton uses $(\alpha\mu/S)^{1/2}\,m_o$ and $(\alpha\mu S)^{1/2}\,l_o$ respectively.]

" α^2 " STARS	M^*	$M\sim$	M_*
R^*	−0.074482 ON	−1.201556 B	−2.328630 B
$R\sim$	3.306740 A	2.179666 ON	1.052592 B
R_*	6.689762 A	5.562688 A	4.535077 ON

ON = on the α^2 bound; A = above the α^2 bound; B = below the α^2 bound
Note: For the sun $M/R^3 = 0.771751$, which differs from $M_*/R\sim^3$ by a factor of about 2.
The solar $M/V = 0.149662$ or antilog 1.411 g/cm^3

UNIVERSE	M^*	$M\sim$	M_*
R^*	- 27.736426	- 29.427037 X	- 31.117648 X
$R\sim$	- 22.664593 C	- 24.355204 C	- 26.045815 C
R_*	- 17.592760 C	- 19.283371 C	- 20.973982 C

In an homogeneous isotropic model, the critical density is $\rho_c = 3H_o^2/8\pi G$. If the present density is ρ_o and $\Omega_o = \rho_o/\rho_c$, then the universe will expand forever if $\Omega_o < 1$ or will collapse if $\Omega_o > 1$. Taking H_o as 71.977 km/s/mpc, $[T_U = 17.456065]$, $\rho_o = -27.736426$ g/cm^3 $\equiv \rho_c$ if the mass of the universe is given by M^* and the radius by R^*. In the above table X means if this is ρ_o, the universe will expand forever, and C means with this value of ρ_o the universe will collapse. If the present density = the critical density $[\Omega_o=1]$, then the universe is stable.