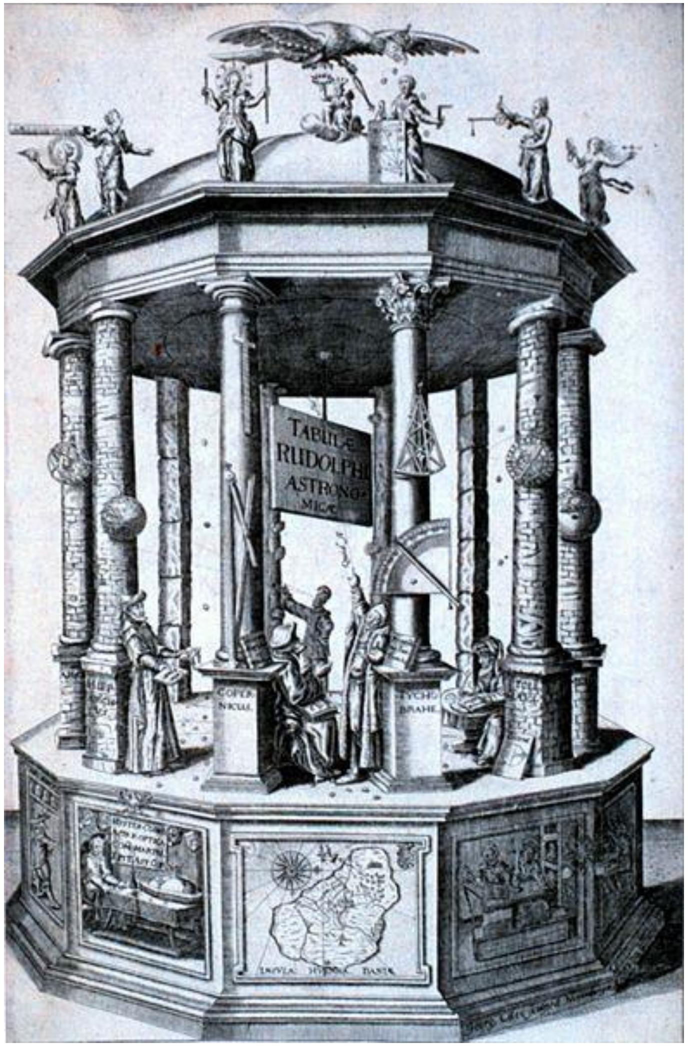
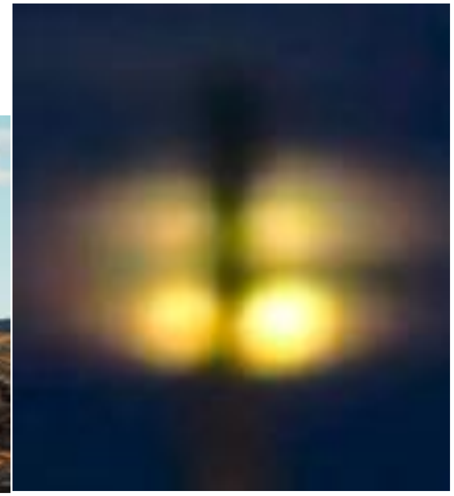


What’s the Matter?

Do you wonder if the Universe is really like they say it is? How can it be? Why halves and thirds? Believe it for a second. Then rethink Time. Where is all the antimatter? What’s the Matter? What are free quarks? What are light and gravity? Why is dark matter dark? How do neutrinos and top quarks decay? What insidious unwarranted assumption is rampant throughout S&T? It’s about Time! How can the expansion of the Universe accelerate? Why are black holes good?

Quartered Moon

Big Stack in Anaconda



Quarters representing:

- Living
- Zoom Perspective
- Test Lecture: What's the Matter?
- Zoom Retrospective

Many are cold,
but few are frozen!

My home town Anaconda MT is noted for its cold weather: blizzards in June, snow falling from a clear sky (blown off a glacier), a chinook changing temperature 100° F in 24 hours, ….

Unusual image of the Moon quartered by occultation behind the Big Stack in Anaconda. Why is it quartered, not halved by a long cylinder?

I am bogged down with computer problems, such as old documents not working in newer systems. I am trying to correct such problems in this presentation.

God’s Integers

- “God made the integers; all else is the work of man.” — Leopold Kronecker
- The familiar quote is often incorrectly attributed to Kronecker directly. Actually a colleague of his named Weber claimed after Kronecker's death that Kronecker said this. I have doubts about this because Kronecker would not have used the term "integer". He was almost as suspicious of the negative numbers as he was of transcendental numbers. Furthermore he specifically wrote that the numbers are a creation of the human mind, implying a measure of contingency not conveyed by Weber's quote at all. https://hsm.stackexchange.com/questions/3770/did-kronecker-attribute-immutable-origin-to-the-integers
- God is real, unless declared integer. — Alan J. Perlis 😇

God's Math

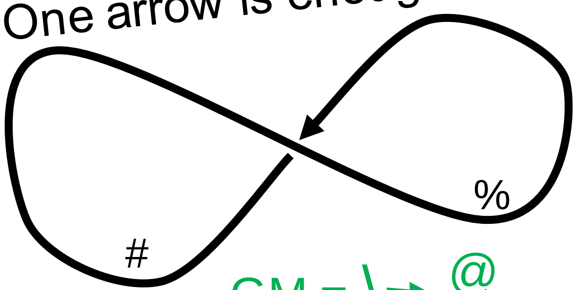
God's Math is here defined as all computable functions that are independent of representation, for example:

- Superscripts: $x^{f} \ldots = f\,(x) \ldots$
- Recursion: $f^{@} = (f^{@})^{\,f}$
- Diagonal: $f^{\,\backslash} A = \backslash f\, A = A^{f} A$
- Nameable maps: $f^{\,A \to B} = A^{f}\, B$
- Gods Math (GM): $GM = GM^{\to} GM$
- Forks: $x^{\,f^{\,\%}\, g} = x^{\,f}\; x^{\,g}$
- Constants: $c^{\,\#}\, x = c$
- Catenation: $f^{\,n^{+}k}\, z = f^{\,n}\, (f^{\,k}\, z)$
- Countably infinite: $\infty = \infty^{+} 1 = {}^{+}1$ @
- Countable: $|GM| = \infty$

Universe modelling rule: the Universe obeys simple rules that do not depend upon representation!

Everything computably maps anything to something. One arrow is enough.

Variables (such as f, @, \, #, %) may be defined by propositions.



GM = \→ @

Any arrow represents a domain of computable functions that map one domain to another. A symbol next to it represents a mapping variable.

% and # name Moses Schönfinkel's S and K rules.

God's Math (GM) may be represented by an arrow from itself to itself, which defines it recursively.

This generic definition of + serves for adding counts, disjunction of conditions, catenating sequences such as strings, and many others.

The computable functions are countable!

Fantasies

Domains that depend on representation are fantasies:

Negative Integers: $Z^{<}0$

We want f^{-n} to be the inverse of f^{n}; which is not generally a function. Do we want $(f^{undo}\ x^{f} = x)$? Or $(f^{retract}\ x)^{f} = x)$?

The Real numbers: R

The 'Real Line' is said to have 2^{∞} real numbers; but almost all of them are unreal (not namable or computable). We cannot count them.

Transfinite numbers: X_1

Transfinite numbers are a fantasy! The proof that the real line has 2^{∞} points is wrong because most of them are not computable.

Time: <u>now</u>

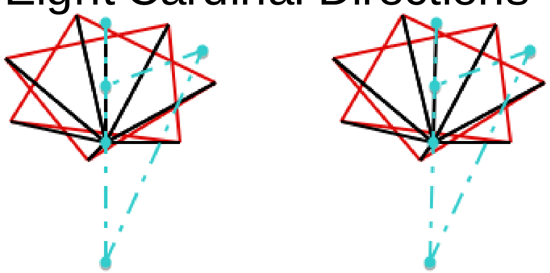
I get different answers when I repeatedly ask "What time is it?"; so <u>now</u> ≠ <u>now</u>.

Unikorn Reps

Unikorn Icons

Unikoins of any eight different denominations represent indivisible chunks of positive matter.

Eight Cardinal Directions



Any arrangement of eight points on a sphere provides a 3D model of positive matter with every 3D point having similar neighbors.

Bag of Unikoins

A bag of Unikoins represents a clump of positive matter.

Krutarnions

O	%35336848261	fam
vl	32899824243Ⓚ	%29
vo	8595449577Ⓚ	%37
vk	7439336476Ⓚ	%19
vi	6235914399Ⓚ	%17
vok	8154657291Ⓚ	%13
vj	18436616484Ⓚ	%23
voj	11398983310Ⓚ	%31
voi	12849763004Ⓚ	%11

Chinese Remainders provide a means of representing a bag of Unikoins by a single number (mod O). SUMs catenate bags; LCMs, families; MODs, counts.

Unikorn names

voi vo vk

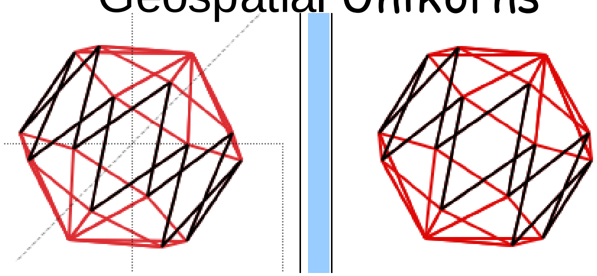
voj vl vi

vj vok

We name eight fundamental unikorns arbitrarily so we can talk about them algebraically.

Starflower

Geospatial Unikorns



Stereoscopic view of locations of eight unikorns and their antipodes as vertices of a nearly regular icosioctahedron.

⊾=90°   is the Right Angle

Ancient Egyptian Square

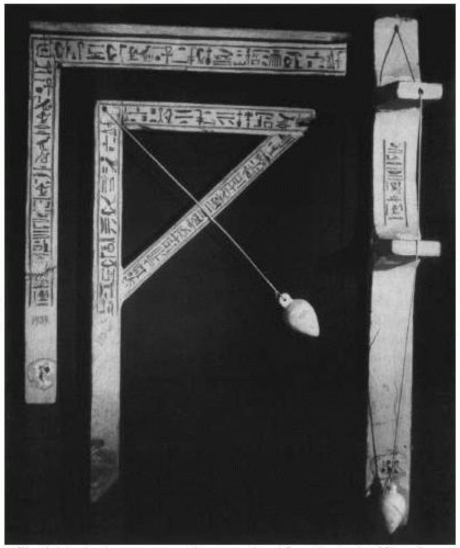


Fig. 6.4 A plumb, a square, and a square level from the tomb of Senedjem at Deir el-Medineh. (Cairo 27280, 27259, 27258)

Ancient Carpenters knew that 90° is more useful than 180°. Eddie Baker in 1913 [cite a reference] suggested that π/2 = 90° was a better angle constant than π = 180°. I name it ⊾.

I agree because, by defining expL(Z* ***kt***) = ***kt***^{Z} for rational Z = ⁻/_ , we have expL(z) = . in general defines an imaginary unit ***kt*** as any fixpoint of expL. For any rational Z = cosL(z) complex ***kt*** sinL(z), avoiding transcendental arguments entirely. Every point w is a complex number in a complex plane as containing 0, I, and w.

B$^{\text{complex } kt}$A = C*expL(***kt***)A = B + A

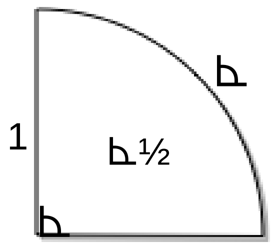
Anaconda MT

where many are cold but few are frozen.

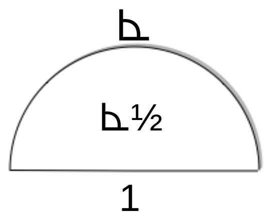
My hometown commons area is a square city block with a circular sidewalk enclosing an arena used as an ice skating rink. The distance halfway around is ⊾* the distance across. The same ⊾ appears repeatedly in geometry.

⊾ Is Ubiquitous

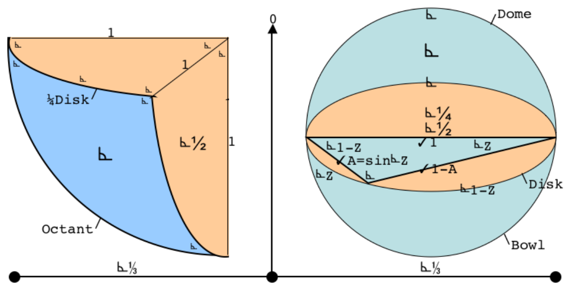
- Master Copies



Quadrant



Semicircle



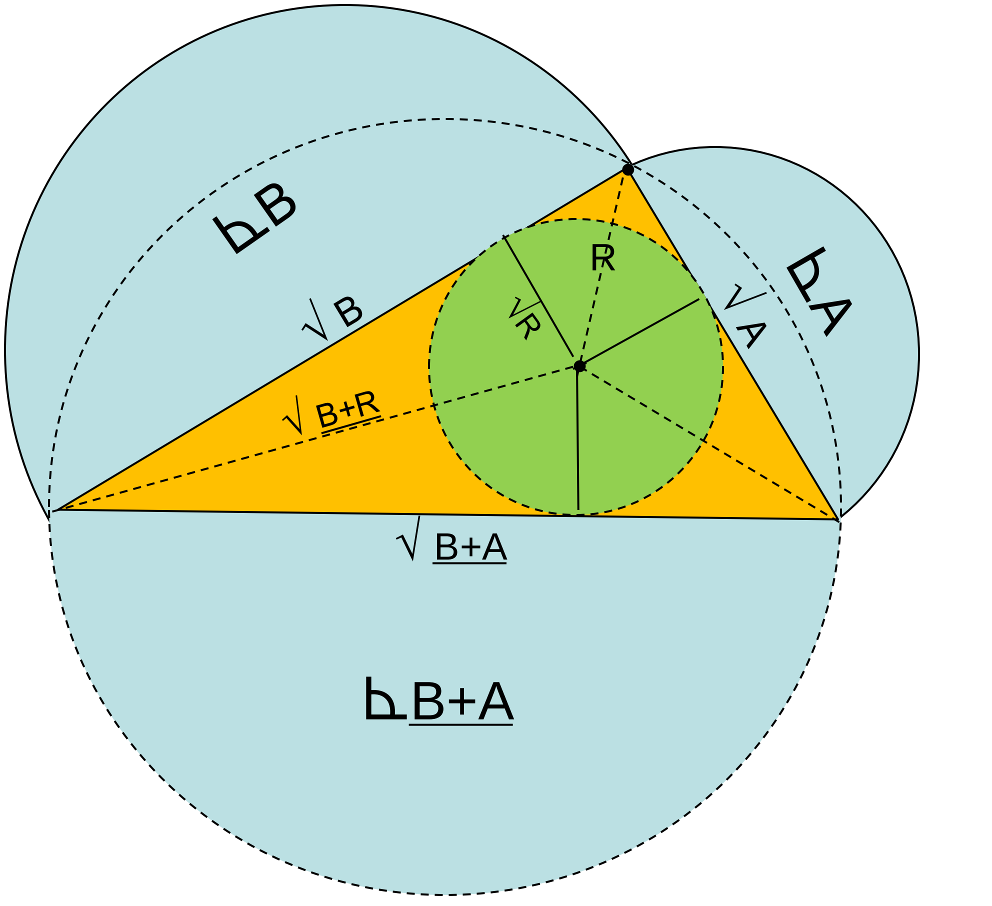
Octant Dome/Bowl

The unit box

It is a design error to meaure an N-dimensional object by its radius because the center is ambiguous and hard to find. Its various diameters can be measured with calipers, so a circumscribed hypercube (with all edges of length D) is an easy and fitting measure of the size of the object. Shrinking the object to fit into a unit hypercube provides a unit masterplan independent of N. The hypervolume of the object will be $M(D)=M(1)*D^N$ where M(1) may be precalculated.

The Right Triangle

- A circle circumscribed around a right triangle is split into two semicircles by the hypotenuse.
- The inscribed circle is revealing.
- If B, A and B+A are all squares of integers, then so is R.
- This accounts for all Pythagorean triples.



All of Trigonometry

Given one, solve one:

$$\sqrt{\underline{1-A}} + \boldsymbol{j}\sqrt{A} = \boldsymbol{j}^{Z}$$

$$\text{if } \boldsymbol{I} \bullet \boldsymbol{j} = 0,\ \boldsymbol{j} \bullet \boldsymbol{j} = 1$$

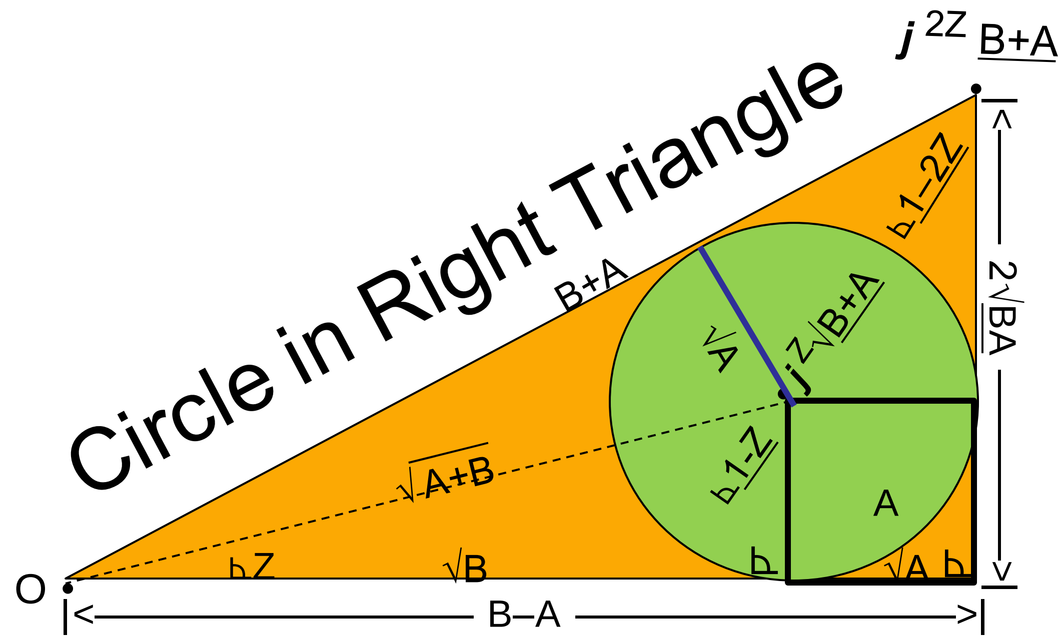
Supersedes Euler:

$$e^{x\boldsymbol{j}} = \cos(x) + \boldsymbol{j}\sin(x)$$

$$e^{\text{⊾}\boldsymbol{j}} = \boldsymbol{j}$$

$$e^{x\boldsymbol{j}} = \boldsymbol{j}^{x/\text{⊾}}$$

$$\sin(x) = \boldsymbol{j} \bullet \boldsymbol{j}^{x/\text{⊾}},\ \ldots\ (13\ \text{others})$$



Brilliant ideas are sometimes red herrings. Trigonometry in terms of Naperian logarithms is one of them. Rational powers of imaginary units (***i*** , ***j*** , ***k***, V / |V|) are much more convenient because they do not require us to understand transcendental numbers.

Note that , $\boldsymbol{j}^{Z}\sqrt{\underline{B+A}}$ and $\boldsymbol{j}\ \boldsymbol{2}^{Z}\ \underline{B+A}$ mark a third vertex of two right triangles. If √B and √A are counts, then B-A, 2√BA and B+A are also counts and sides of a larger right triangle, accounting for all Pythagorean triangles. Note $(b \ {}^{+\boldsymbol{j}}\ a)^2 = (b^2 - a^2)^{+\boldsymbol{j}}\ 2ab$

Inverses are Domains

- Some function: let $f: A \to B$,
- An instance: $x: A$, $y = x^f$, $y: B$
- Its inverse: $f^{-1}y = \{x{:}A \mid x^f = y\}$
- Inverse domain: $f^{-1}: B \to \text{Domains}$
- Square root: $\sqrt{\ } = ½ = 2^{-1}$, …
- Imaginary units: ***o***, ***k***, ***-k***, ***i***, ***ok***, ***ko, j***: $\sqrt{-1}$

All of Hyper Trig

Given Q in any pure vector space (**$I \cdot Q = 0$**)

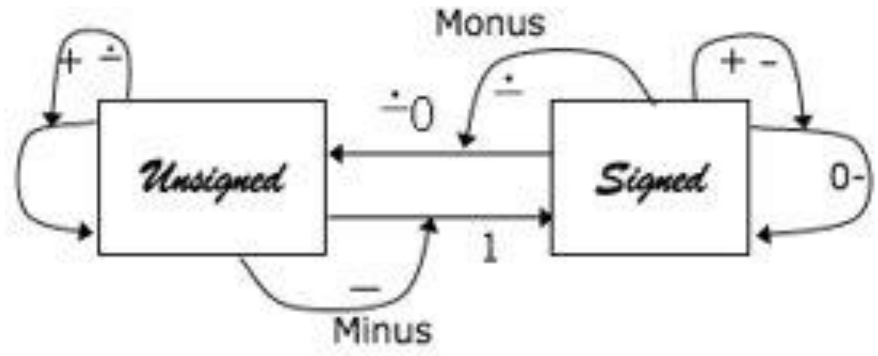
- Its imaginary unit: $\boldsymbol{q} = Q / |Q|$ has $|\boldsymbol{q}|=1$, so $\boldsymbol{q}$: $\sqrt{\underline{-1}}$
- Q is imaginary: $\boldsymbol{q} * Q^{mag} = Q$
- Given: $\boldsymbol{q} \cdot B = 0 = \boldsymbol{q} \cdot A$
- Solve for two of: ${}_B\boldsymbol{q}^{\,\mathbf{plex}}A = C\boldsymbol{*}\boldsymbol{q}^Z$ is complex in **q** for rational Z
- Bimagnitude: ${}_B\boldsymbol{k}^{\,\mathbf{plex}}A$ is Complex in $\boldsymbol{k}$ for B,A: Magnitude
- Biquaternion: ${}_B\boldsymbol{i}^{\,\mathbf{plex}}A$ is Quaternion for B,A: Complex
- Biquaternion: ${}_B\boldsymbol{o}^{\,\mathbf{plex}}A$ is Octonion for B,A: Quaternion
- Differences last: $B^{-1\,\mathbf{plex}}A = A \overline{\ } B$ is Signed for B,A: Unsigned anything
- Leaves 8-bit signs for an overall simplification of 256 octonion sectors.

Kruton Basis for All

The idea here is to use a single Chinese Remainder representation to mock many different domains within limits:

- Eight mutual primes: OvL8 = [Ovl,Ovo,Ovk,Ovi,Ovok,Ovj,Ovoj,Ovoi]
- Big Zero: O = $*^{OvL8}$ 1 = TT OvL8
- Kruton basis: vL8 = {v***l***, ***vo***, ***vk***, ***vi***, ***vok***, ***vj***, ***voj***, ***voi***}
- Chinese Remainders: Krutons = Counts (mod O)
- Kruton map: Krutons = vL8 → Count
- Octonion basis: oL8 = {***l***, ***o***, ***k***, ***i***, ***ok***, ***j***, ***oj***, ***oi***}
- Unit sequence: oL7 = [***o***, ***k***, ***i***, ***ok***, ***j***, ***oj***, ***oi***]
- Wrapped seq: oL9 = [***o***, ***k***, ***i***, ***ok***, ***j***, ***oj***, ***oi***, ***o***, ***k***]

Unsigned to Signed



Sign errors are a major glitch in Physics:

- Kronecker was leary of negative numbers
- Count n is easy: $n\ f \ldots = f^{n} \ldots$
- General catenation + op: $f^{m+n}\, x = f^{m}\, (f^{n} x)$
- Undoing anything is vague: $f^{-1} \ldots = \text{vague}$
  - What we want: $f^{\text{undo}}\, x^{f} = x$
  - Formal inverse: $f\ x^{f^{-1}} = x$
- We define difference formally: $f^{A \overline{\quad} B} = A^{f}\, B$

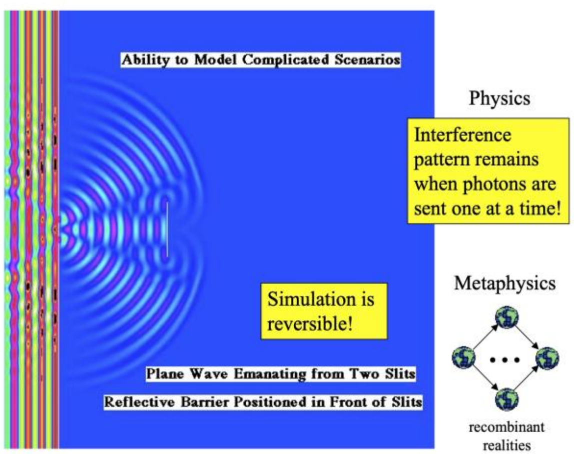
Time and Clocks

Insidious Unwarranted Assumption

We all assume that the past is unique, but cannot prove it, so it is an unwarranted assumption. It is insidious owing to our narrow viewpoint. The two-slit experiment shows a diffraction pattern only when we cannot determine which slit a photon went through, even when photons go through one at a time.. My Recombinant Realities model says that we see the diffraction pattern when alternate realities recombine losing the difference between them; otherwise, we could not see. Time is foam-like, not simple.

Seeing Dimly

Any lens system behaves as though each photon takes all possible paths through it. Long-exposure telescopes exploit this. The image changes if we block some paths, say by placing instruments in what should be dark areas.



Two-Slit Experiment

Heidelberg Sundial

Oldest Clock

Orbital Shells

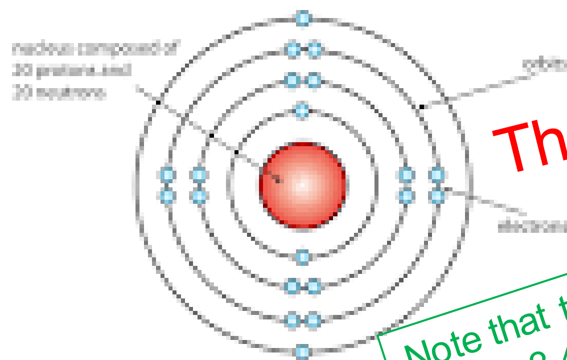
Virtual Electons

What happens when a positron and an electron collide? Their charges cancel, but what happens to their masses?

positronium boson

e————————•————————e

I suggest that a proton carries with it a halo consisting of a full shell of diameter 30 with 900 e—e positronia bosons (virtual positrons and electrons) all located at the center of the proton. The 1800e mass of that shell accounts for most of the mass of the proton.



The radii here are faulty.

Note that the diameters of the shells should be 1,2,3,4,5, … so that their surface areas are 2,8,18,32,50 ь. Each electron sits on a ь surface area.

900e—900e halo

The mass of the halos for each particle should be the measured mass of the particle minus the masses of its constiuents.

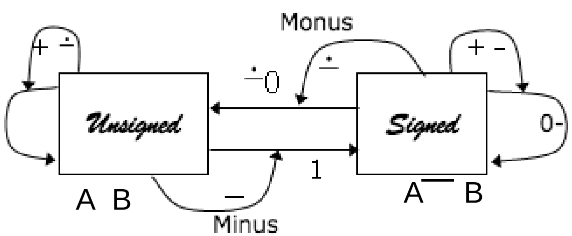
Many bosons can share the same state, but their constiuent fermions cannot. So the number of bosons that can dance in one place is limited by the spaces for their fermions (1 ь each).

Weighing a Balance

A balance scale measures the difference between two masses.

A fixed spring scale measures the total weight placed upon it.

Signed is Unsigned ¯ Unsigned



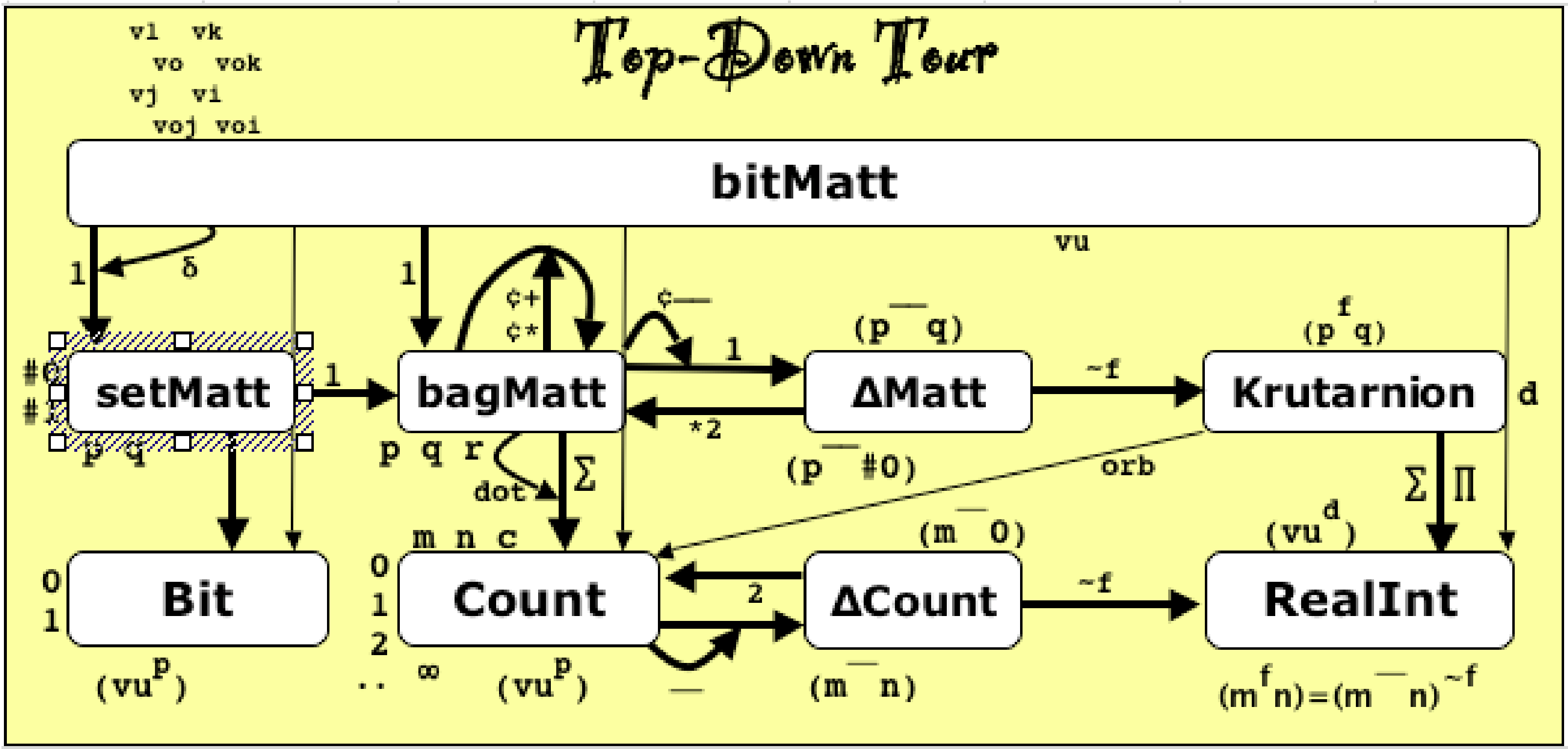
We take A¯ B as a formal difference: $f_{A - B} = A^f B$

Exponential forms in Eulerian terms: $x^f \ldots = f\,x \ldots = f(x,\ldots)$

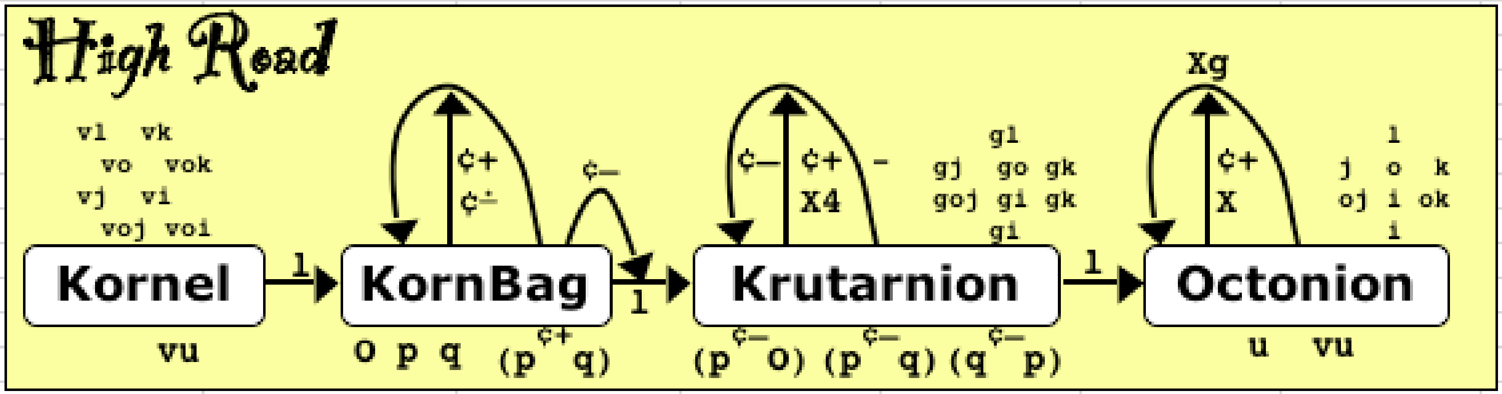
Not weight vs. +Mass,

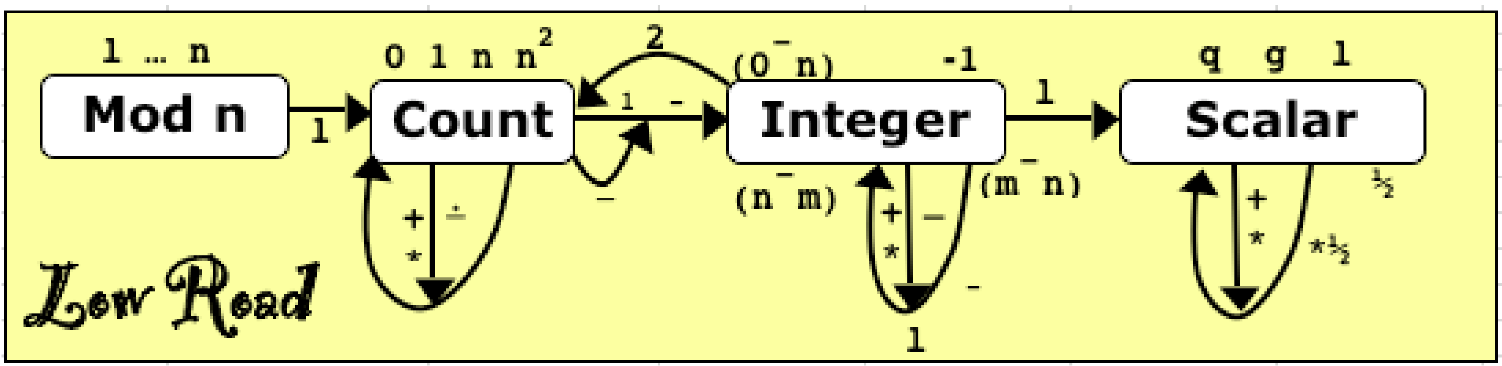
but Mass vs. ±Charge.

Top-Down Tour



High & Low Roads





Krutarnion Products

X8

Eight times the product of two Kornels is always a Lipschitz unit. This X8 table is calculated from the KX4 product rule. Notice the extreme regularity of the table suggests fast complex multiplication.

KX4

−oj	vl	vk	vi	vj	vo	vok	voj	voi
vl	k	l	j	−i	−ok	o	oi	−oj
vk	l	−k	i	j	o	ok	oj	oi
vi	i	j	−l	k	−oj	−oi	o	ok
vj	j	−i	−k	−l	oi	−oj	ok	−o
vo	o	−ok	oj	−oi	−l	−k	−i	j
vok	ok	o	oi	oj	k	−l	−j	−i
voj	oj	oi	−o	−ok	i	j	−l	k
voi	oi	−oj	−ok	o	−j	i	−k	−l

The Lipschitz Octonions are differences over L8={l,o,k,l,ok,j,oj,oi}.
The Krutarnions are a subdomain of They are not closed under Octonion Product; however, they are closed under quadruple Octonion Product (x4). Fortunately, we need a product rule only to show symmetries, not to denote actions on Matter.

However, the false QCD colors of the standard model do not interact with photons! So a nuclear reaction may change the flavors of two subatomic particles, but not their colors. My Kolor rules follow product rules.