On Quantizing General Relativity

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Part I
A Necessary Prelude:
State Machine Special Relativity

Minkowski's Original Coordinates Transformation Figure

$$c^2t^2 - x^2 - y^2 - z^2 = 1.$$

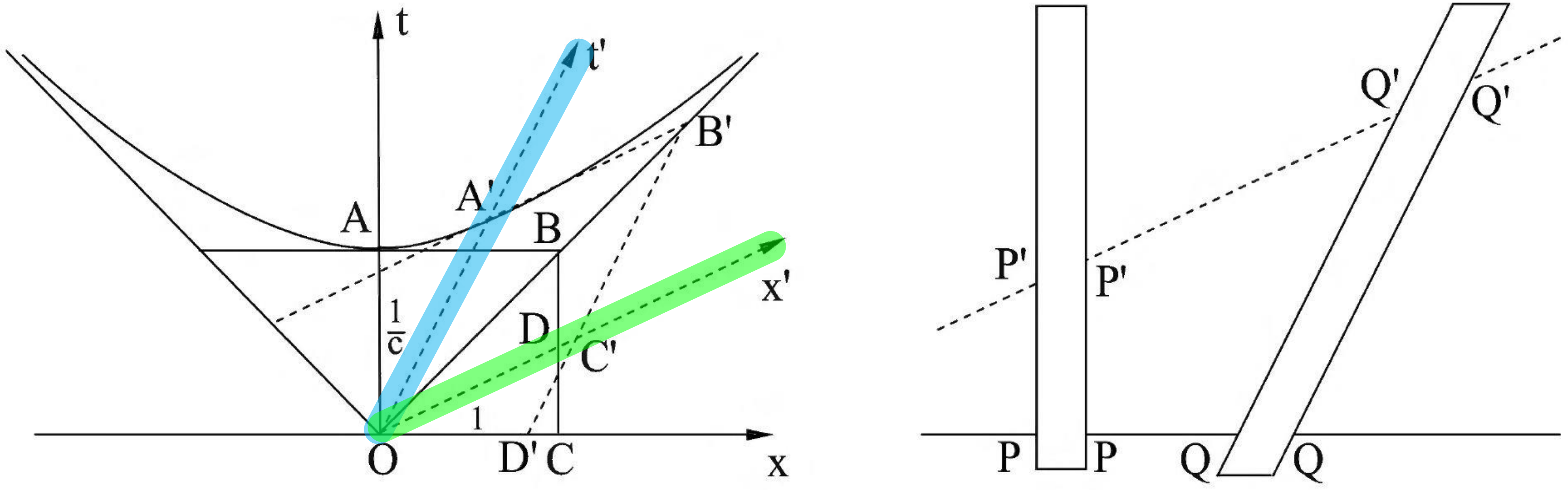


Fig. 1 in H. Minkowski, *Space and Time,* 80th Assembly of German Natural Scientists and Physicians, Sep. 1908. (color added)

Feynman's Version of Minkowski's Figure

feynmanlectures.caltech.edu/I_17.html#Ch17-S1

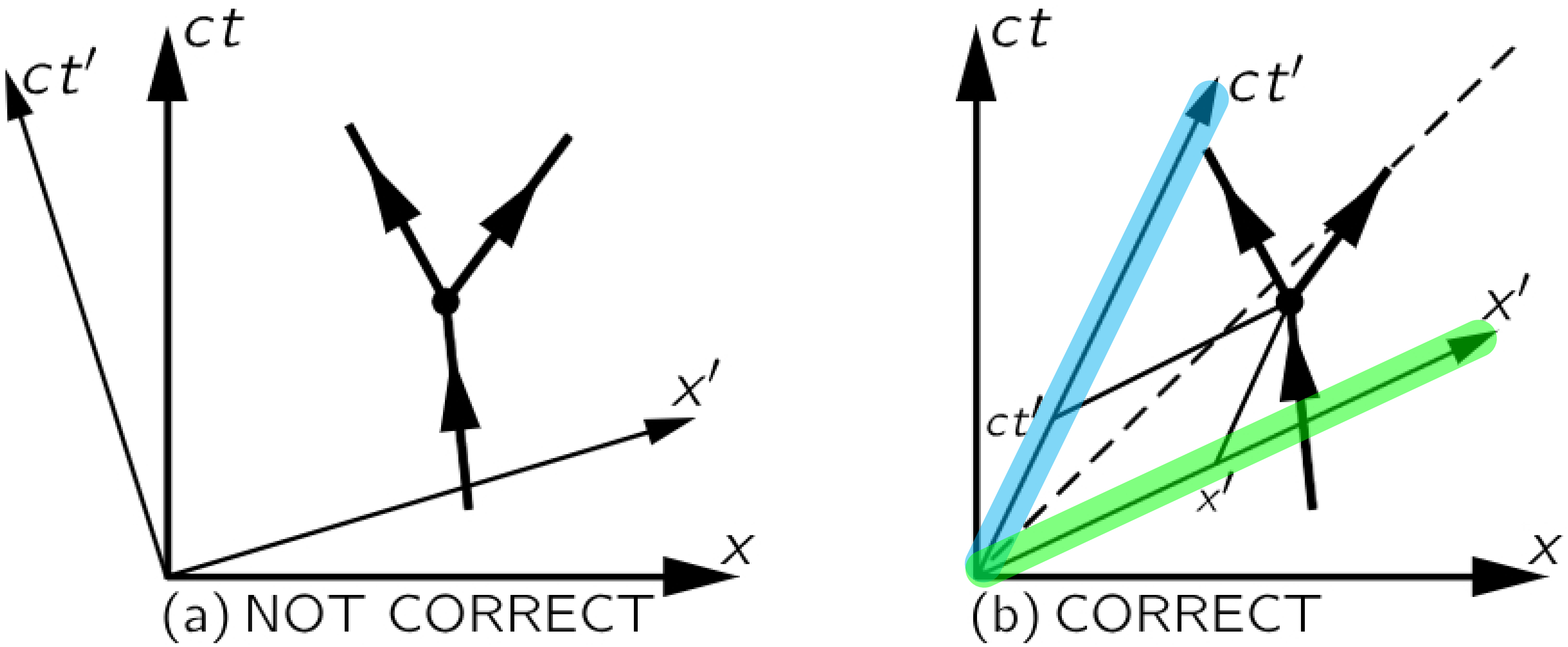
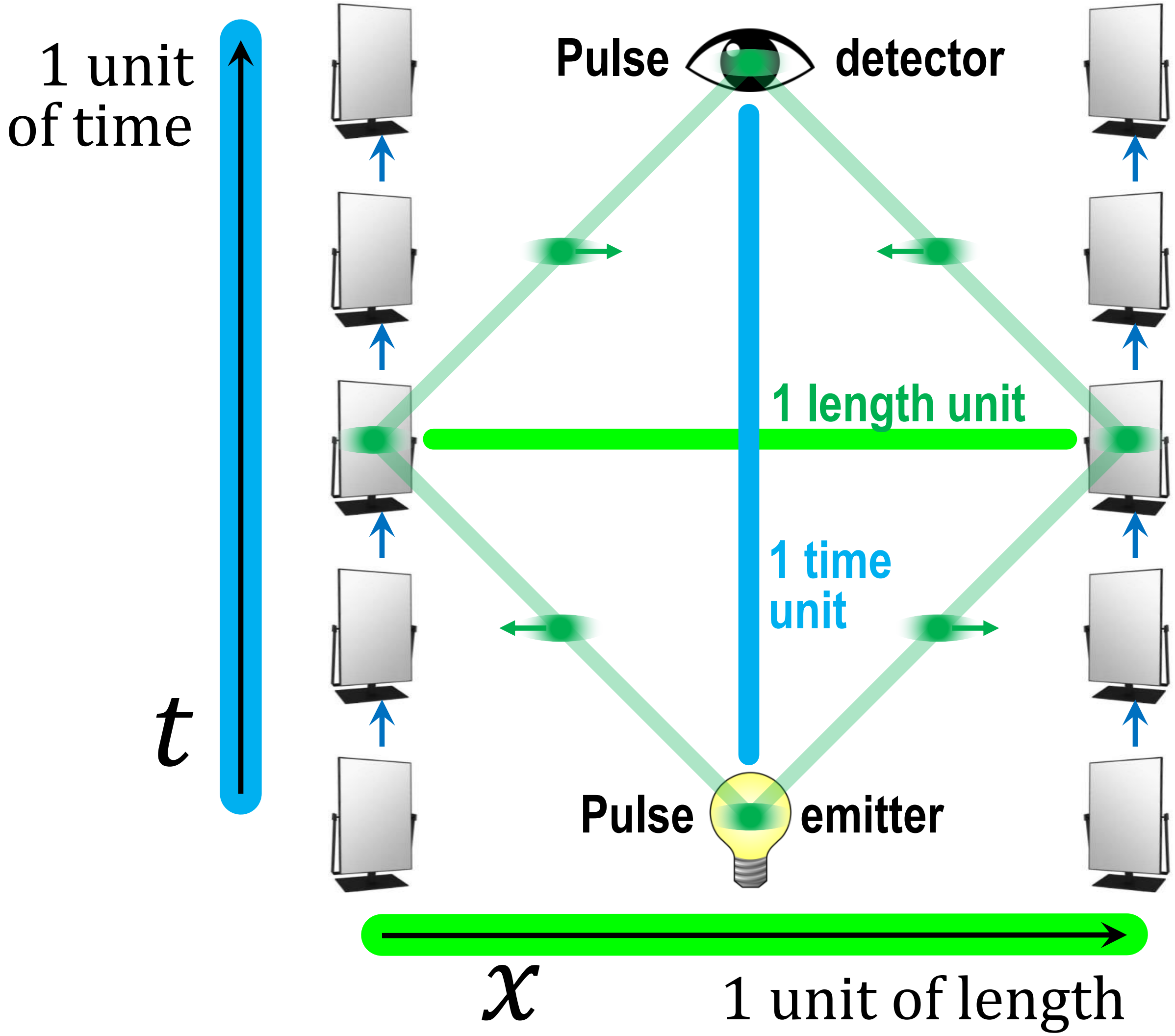
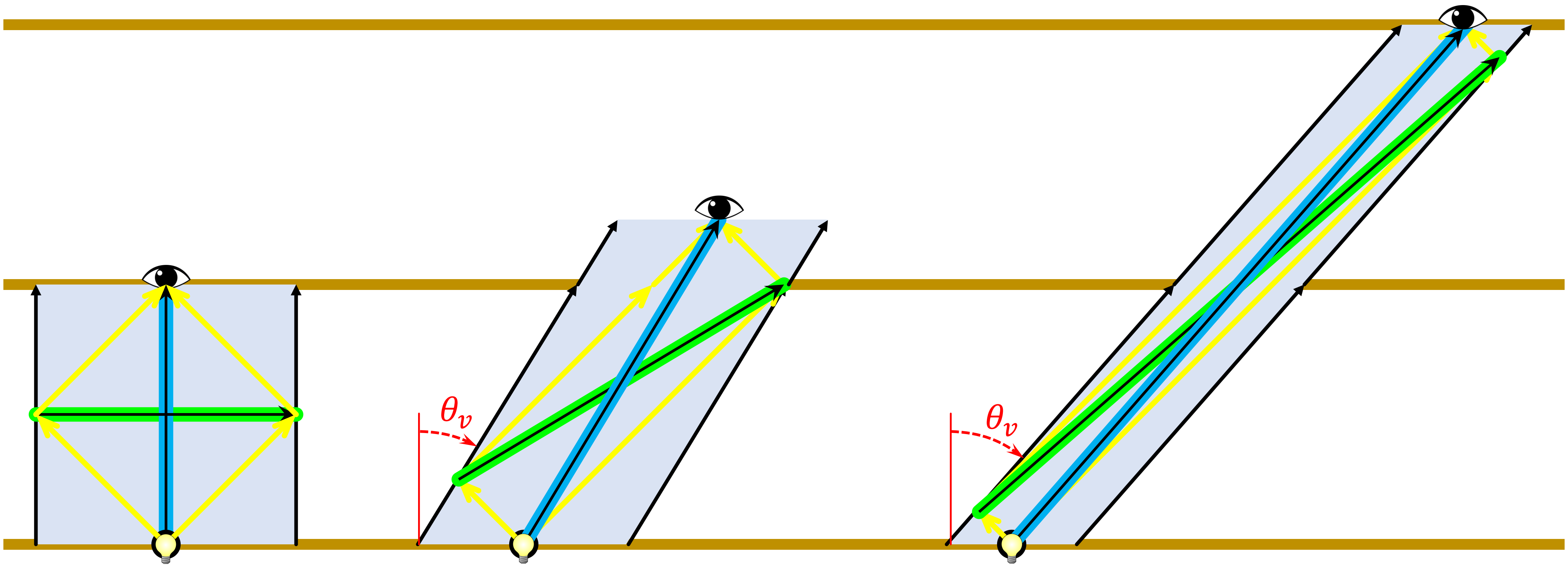


Fig. 17–2. Two views of a disintegrating particle.

Light Clocks Reveal How the Transformations Work



Three x', t' Frame Examples Using Light Clocks

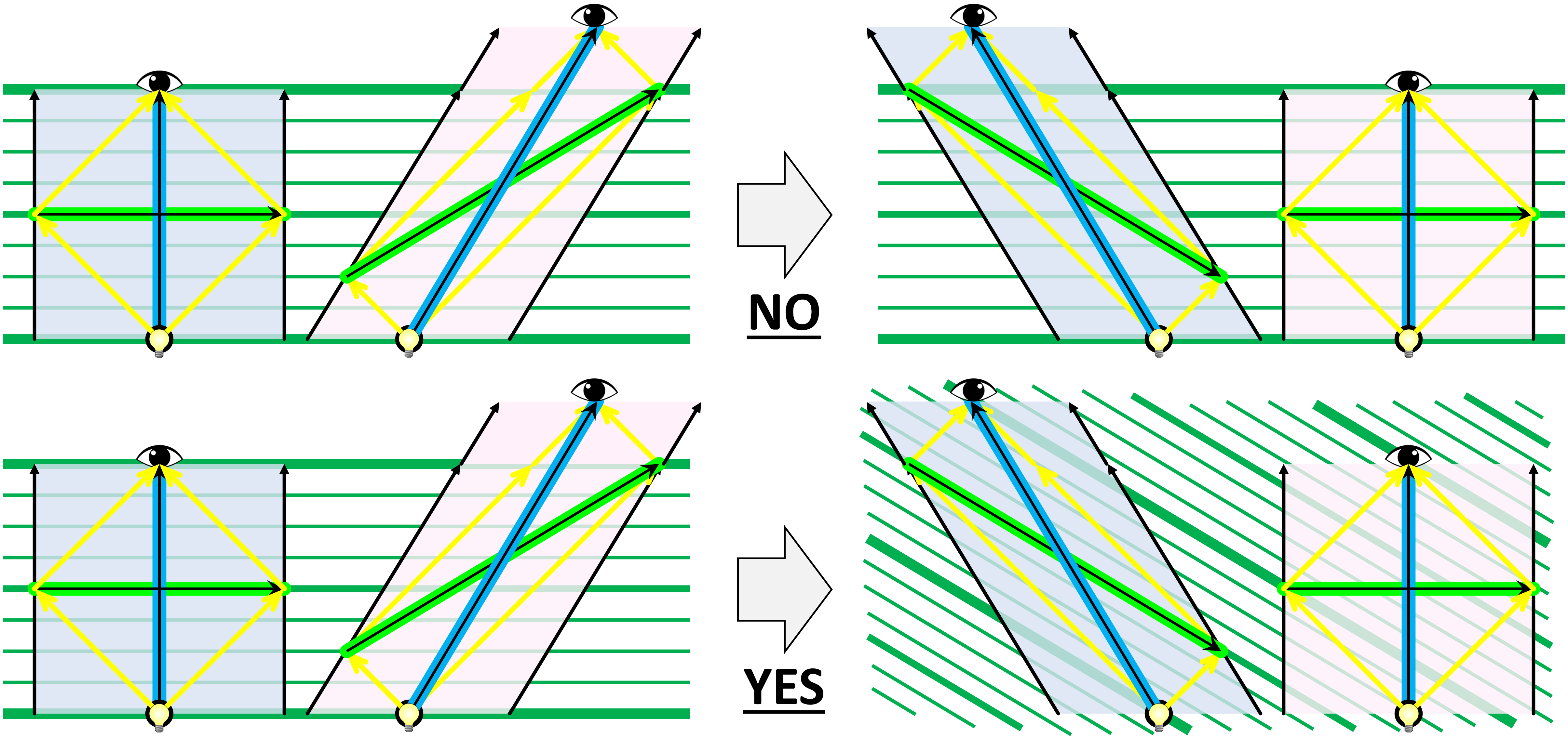


$v = 0\ c$
$\beta = 0$
$\gamma = 1$
$\theta_v = 0°$

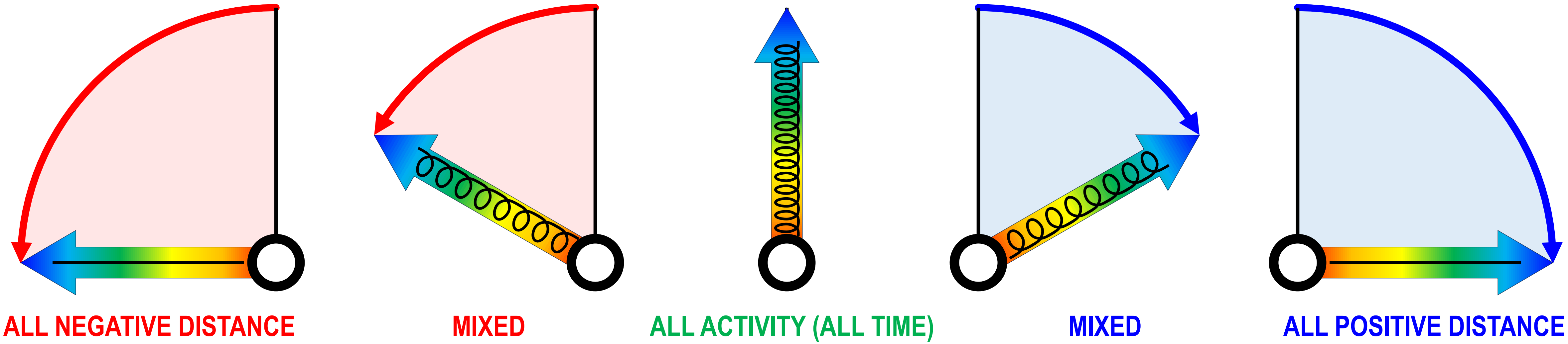
$v = 0.6\ c$
$\beta = 0.6$
$\gamma = 1.25$
$\theta_v = 30.96°$

$v = 0.866\ c$
$\beta = 0.866$
$\gamma = 2$
$\theta_v = 40.9°$

Why Poincaré Transformations Are Local

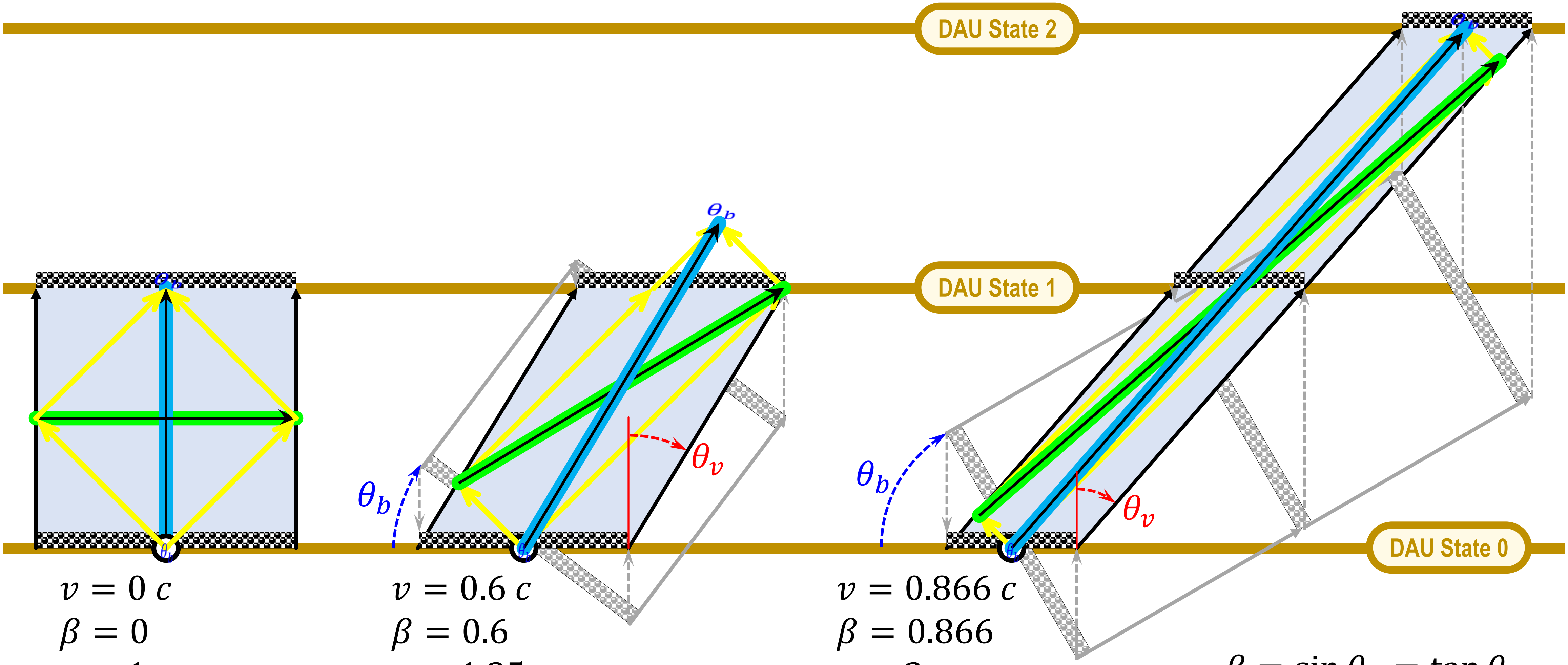


Dynamics: 1 DAU (Distance-Activity Unit) per Cycle



- One DAU per cycle transforms its attached matter unit to a new state
  - Vertical DAU = 100% Activity transformation (passage of time)
  - Horizontal DAU = 100% Distance transformation (relocation in space)
- Matter units are vastly multiscale, from particles to cosmic “walls”
- “Speed” movie analogy: Activity = loops, Distance = straight driving
  - Motion cannot stop, so the only options are loops (time) or travel (distance)

Using Tilted Blocks to Calculate Time-Structure Details



$v = 0\ c$
$\beta = 0$
$\gamma = 1$
$\theta_v = 0°$
$\theta_b = 0°$

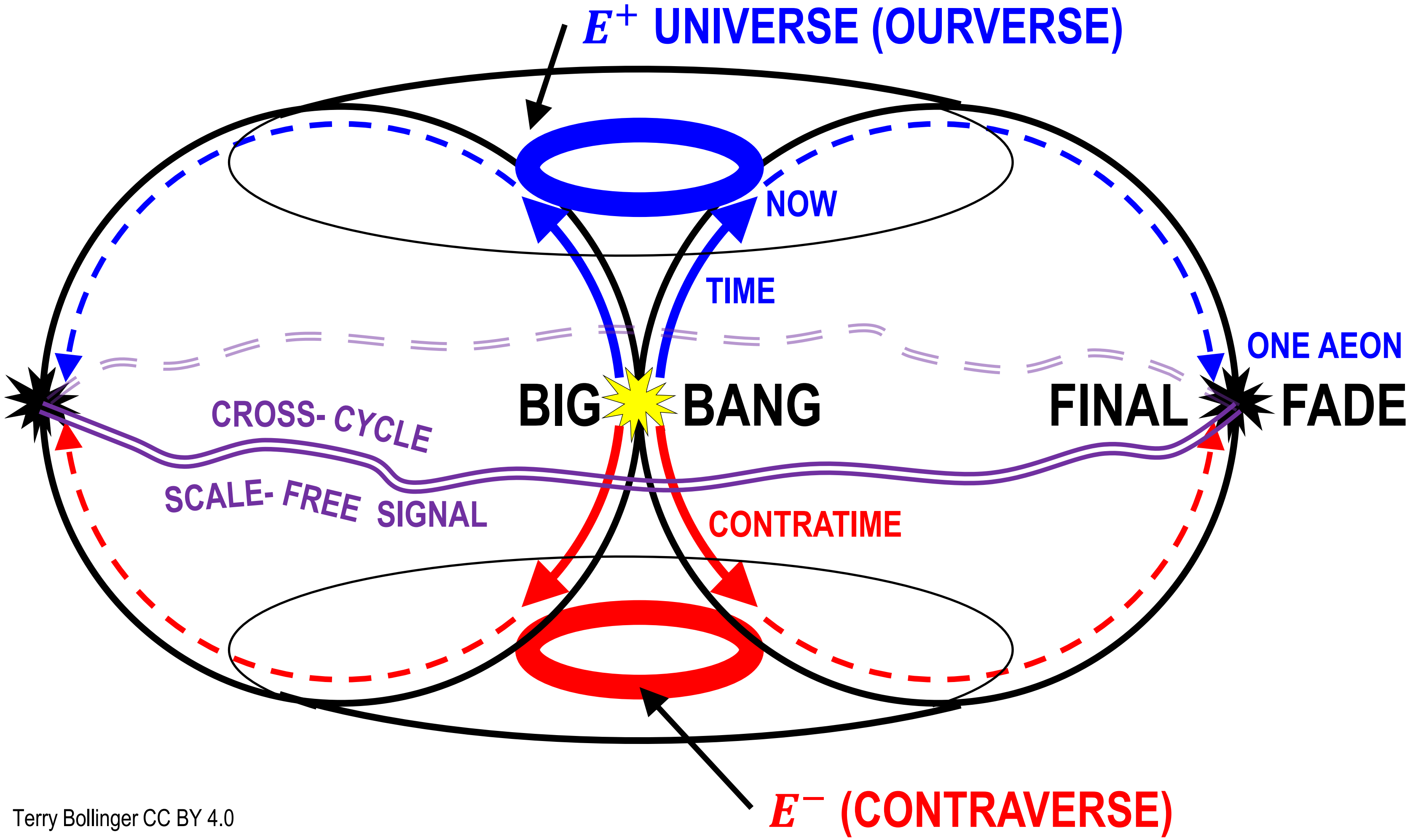
$v = 0.6\ c$
$\beta = 0.6$
$\gamma = 1.25$
$\theta_v = 30.96°$
$\theta_b = 36.9°$

$v = 0.866\ c$
$\beta = 0.866$
$\gamma = 2$
$\theta_v = 40.9°$
$\theta_b = 60°$

$\beta = \sin\theta_b = \tan\theta_v$
$\theta_v = \tan^{-1}\sin\theta_b$
$\theta_b = \sin^{-1}\tan\theta_v$

Part II
A Dual Universe Version of Penrose's Conformal Cyclic Cosmology (CCC)

The Dual Universe Interpretation of Conformal Cyclic Cosmology



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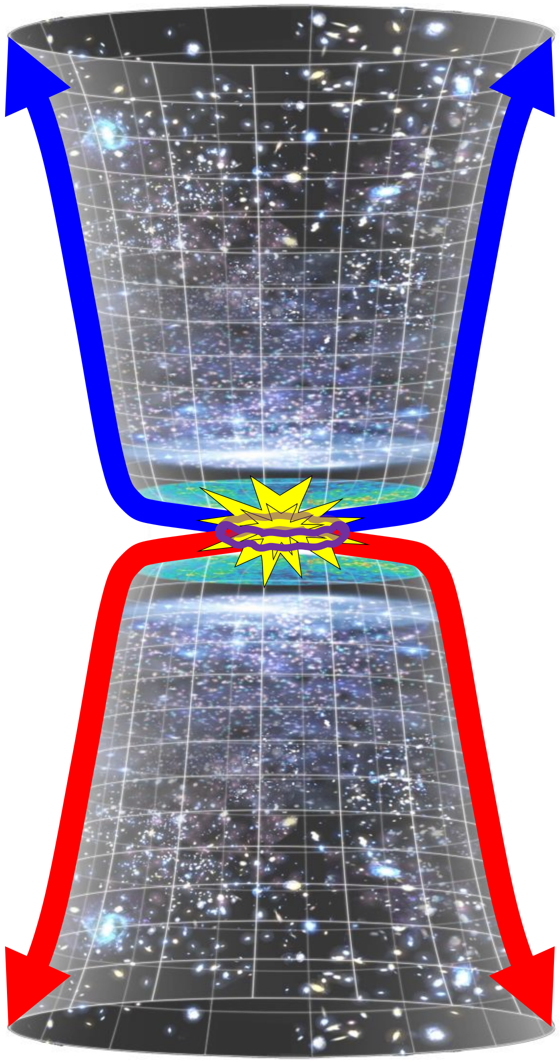
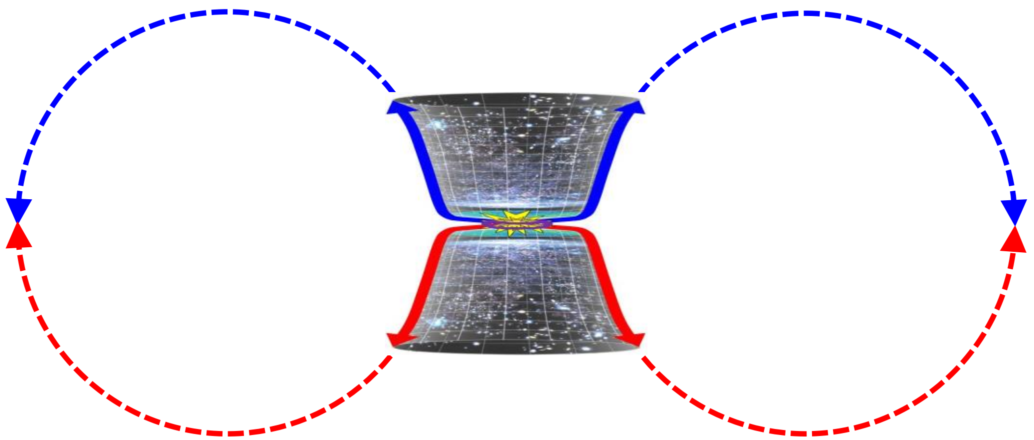
Universe and Contraverse

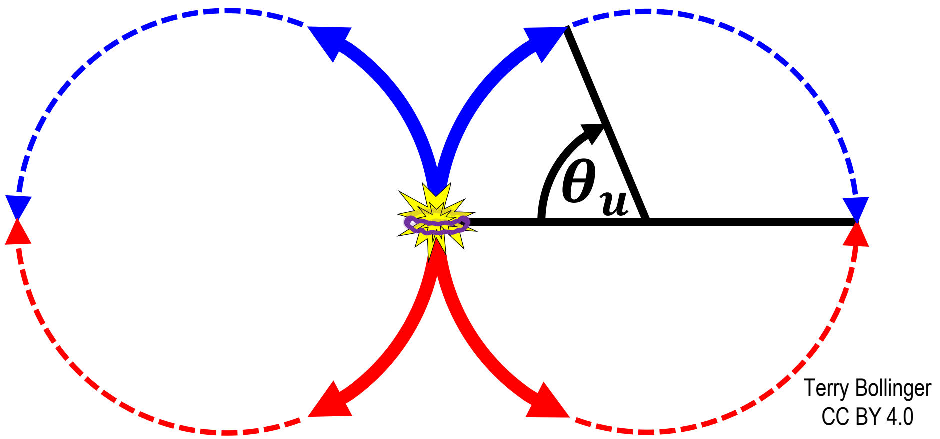


Normalizing Expansion to Angular Time

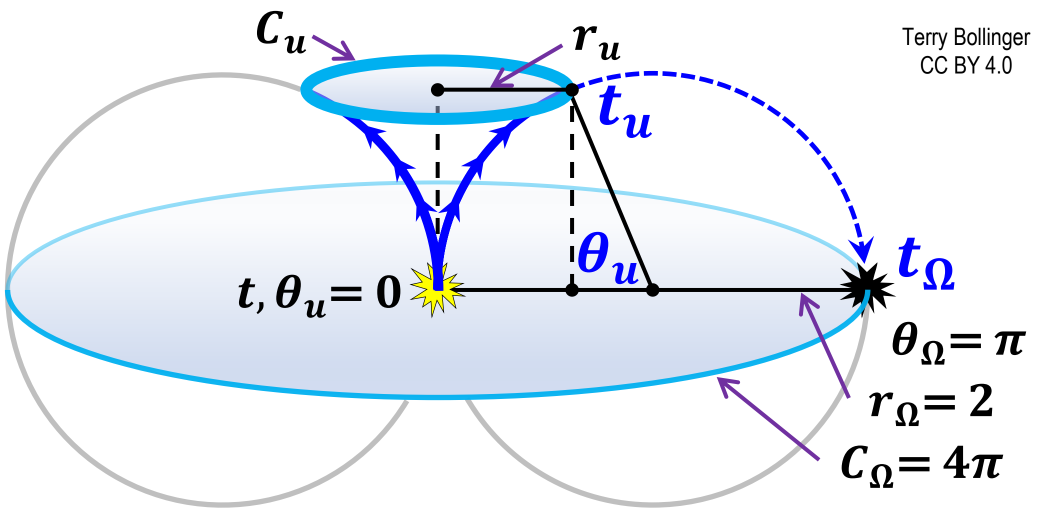
Scale-Expansion Coordinates



Normalized Angular-Time Coordinates



Metrics for One Cycle



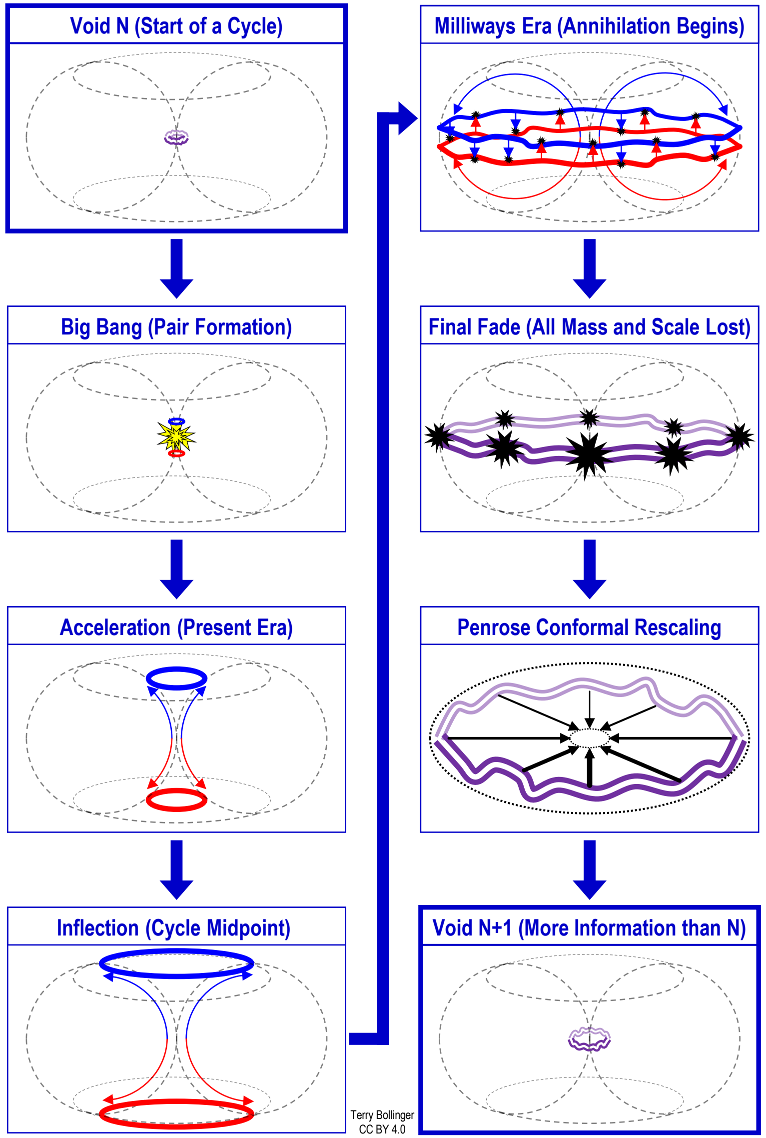
$$t_u = \frac{t}{t_\Omega} \qquad \theta_u = \pi t_u = \frac{\pi t}{t_\Omega}$$

$$C_u = 2\pi r_u = 2\pi(1 - \cos\theta_u) = 2\pi\left(1 - \cos\frac{\pi t}{t_\Omega}\right)$$

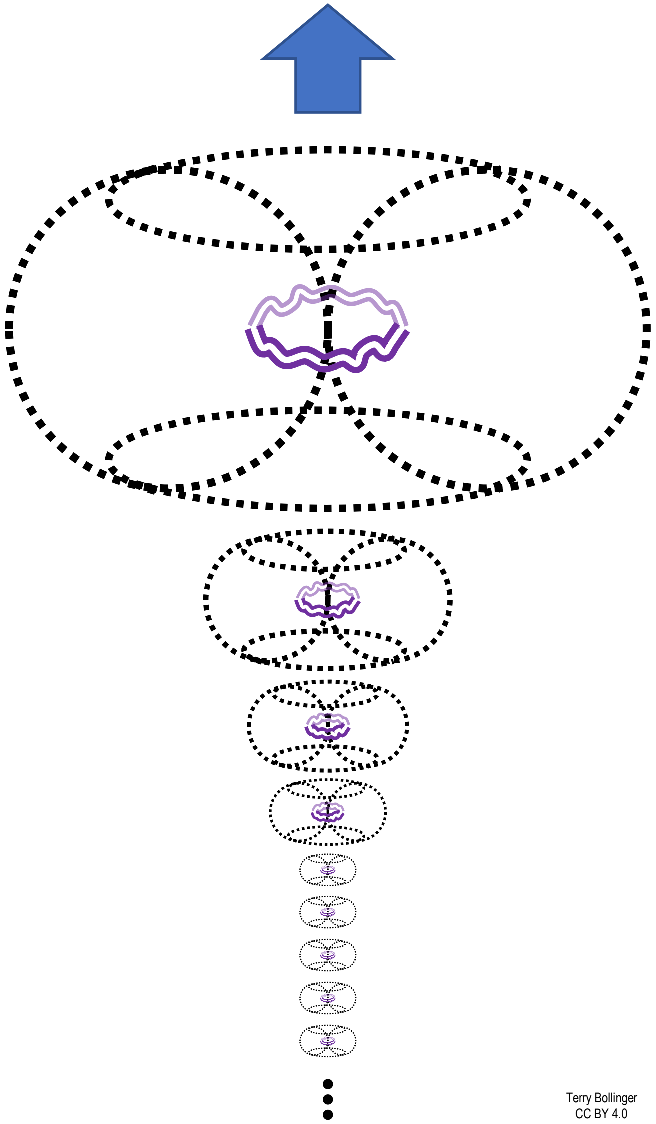
$$= 2\pi(1 - \cos\pi t_u)$$

$$H_t = \frac{dC_u}{dt_u} = \frac{d\big(2\pi(1 - \cos\pi t_u)\big)}{dt_u} = 2\pi^2 \sin\frac{\pi t}{t_\Omega}$$

One Full Cycle of a Dual CCC Universe



Expansion of Cycle Size, Duration, and Complexity



Part III
Time as Dipole Field

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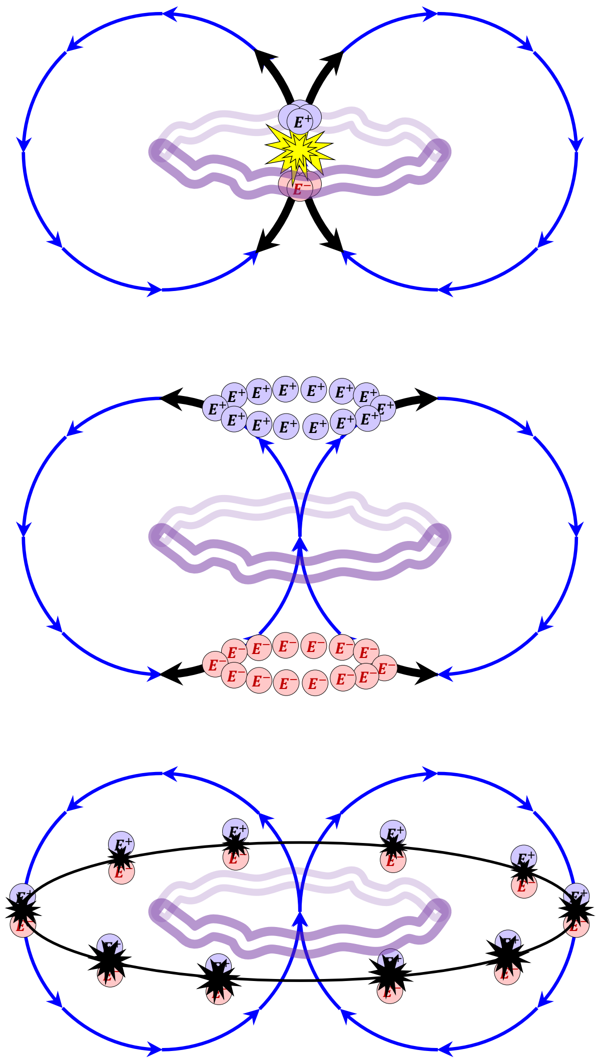
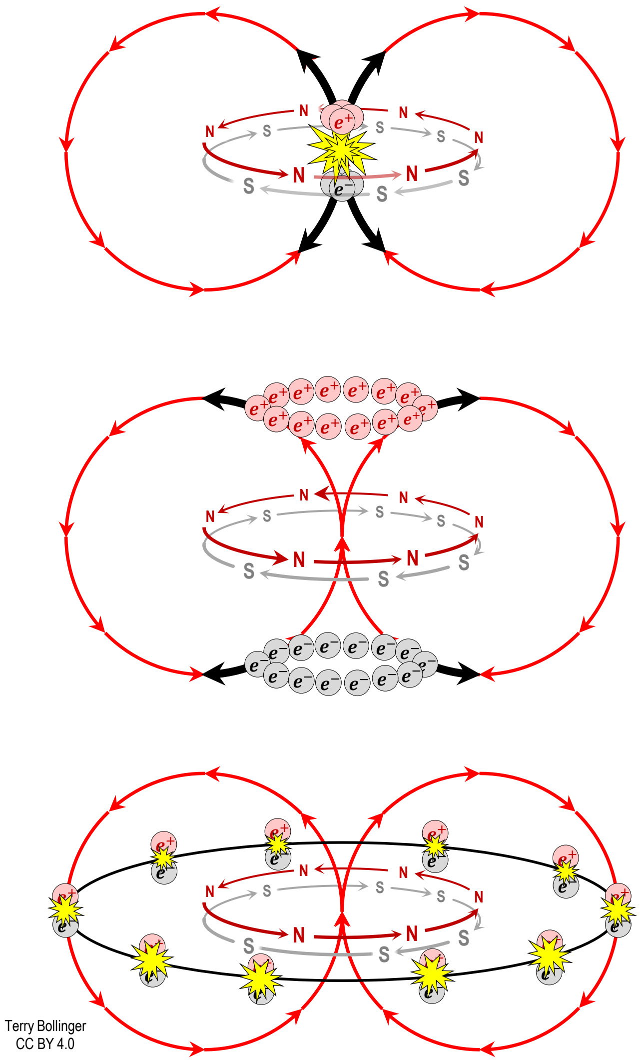
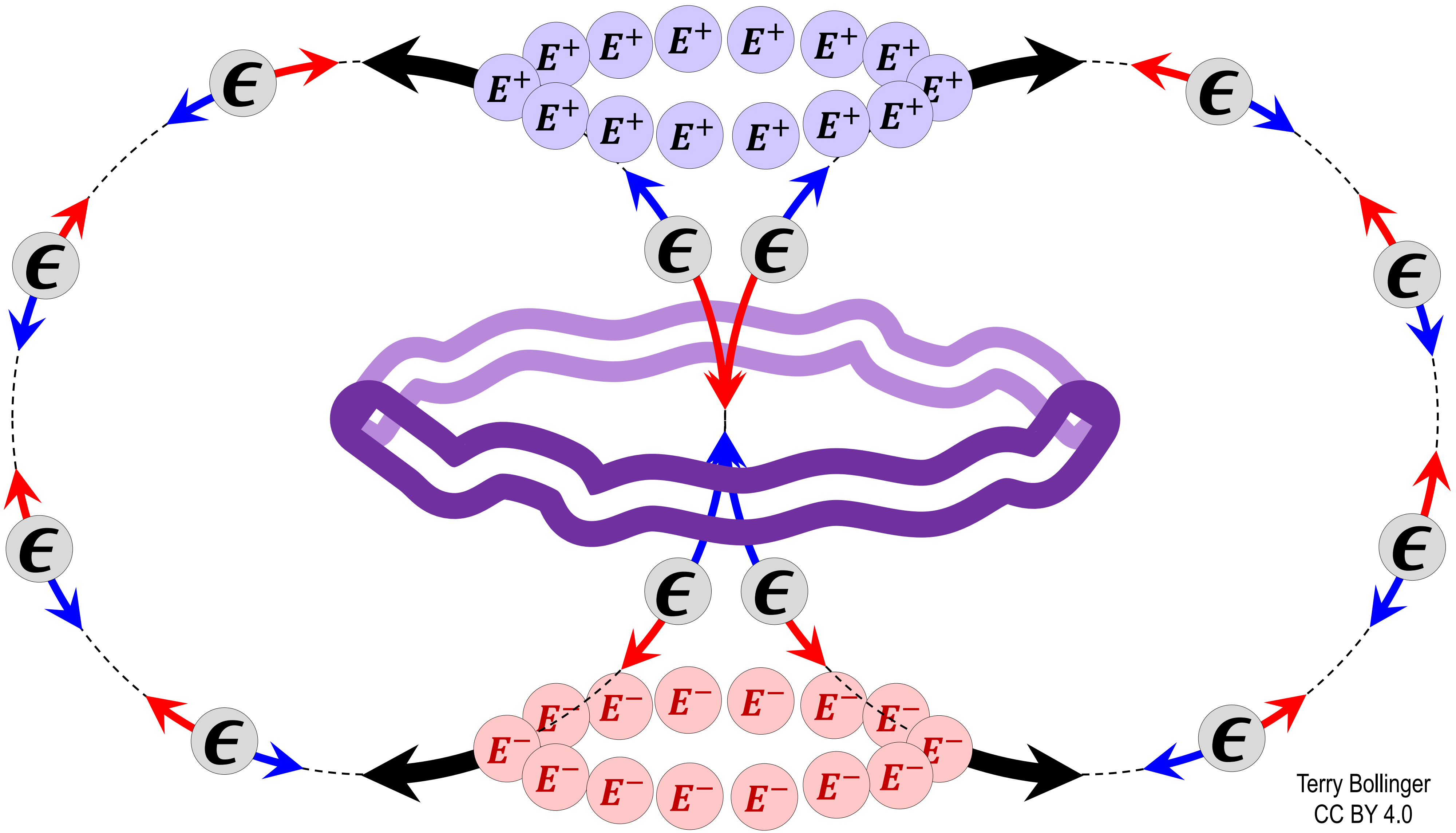


An Electric Model of Dual CCC



The Ereboic Field in the 7+1 Upverse



Part IV
Force Unification as Context

Tohu Charge Displacement Coordinates

Harari-Shupe-Seiberg Chromoelectric (Tohu) Charge Displacement Coordinates

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$$TTT = T_1 + T_2 + T_3$$
$$\overline{T}\overline{T}\overline{T} = -T_1 - T_2 - T_3$$

$$T_1 = \bar{r} + ⅓e = \text{charge}(\bar{d}_{\bar{r}})$$
$$T_2 = \bar{g} + ⅓e = \text{charge}(\bar{d}_{\bar{g}})$$
$$T_3 = \bar{b} + ⅓e = \text{charge}(\bar{d}_{\bar{b}})$$

$$-T_1 = \overline{T_1} = r - ⅓e = \text{charge}(d_r)$$
$$-T_2 = \overline{T_2} = g - ⅓e = \text{charge}(d_g)$$
$$-T_3 = \overline{T_3} = b - ⅓e = \text{charge}(d_b)$$

Placeholder: $\boldsymbol{V}$ (=0, *no* anti). Example: $TVT = T_1 + T_3 = \text{charge}(u_g)$

Tohu units are mutually orthogonal for *all* fermions: $(T_i \perp T_j)_{i \neq j}$

The 9, 3, and 1 Views of Internal Pion Forces

The Nine Standard Model Force Particles in Pions

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q

$$[\downarrow\uparrow\bullet] + [\uparrow\downarrow\bullet]$$
$$[\downarrow\bullet\uparrow] + [\uparrow\bullet\downarrow]$$
$$[\bullet\downarrow\uparrow] + [\bullet\uparrow\downarrow]$$
$$i[\downarrow\uparrow\bullet] - i[\uparrow\downarrow\bullet]$$
$$i[\downarrow\bullet\uparrow] - i[\uparrow\bullet\downarrow]$$
$$i[\bullet\downarrow\uparrow] - i[\bullet\uparrow\downarrow]$$
$$[\updownarrow\bullet\bullet] - [\bullet\bullet\updownarrow]$$
$$\sqrt{1/3}\,[\updownarrow\bullet\bullet] - \sqrt{4/3}[\bullet\updownarrow\bullet] + \sqrt{1/3}[\bullet\bullet\updownarrow]$$
$$\gamma = [\bar{e}e]$$

$\bar{q}$

The Three Tohu Force Particles in Pions

q

$$[T_1\bar{T}_1]$$
$$[T_2\bar{T}_2]$$
$$[T_3\bar{T}_3]$$

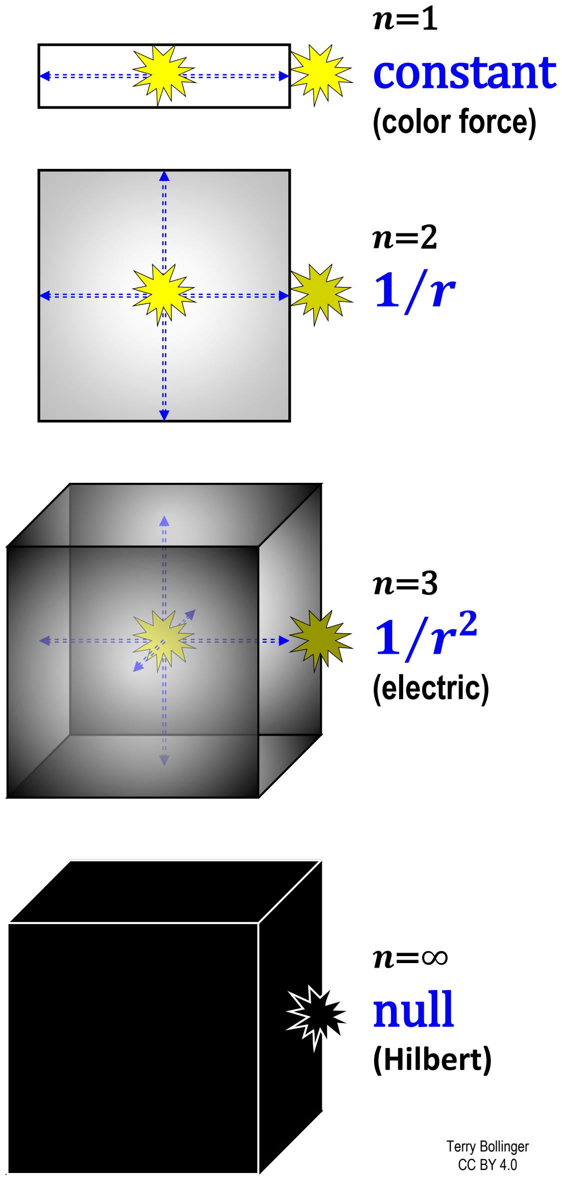
$\bar{q}$

The Single Imposition Force Particle in Pions

$$T \quad [T\bar{T}] \quad \bar{T}$$

Part V
Sidenote: Beware The Infinite Darkness of Hilbert Spaces

The Infinite Darkness of Hilbert Space



Part VI
A Dual-Universe Interpretation of Particle Chirality

E+ and E- Fermion Groups

E^+ Fermion Group (Weak-Aware)

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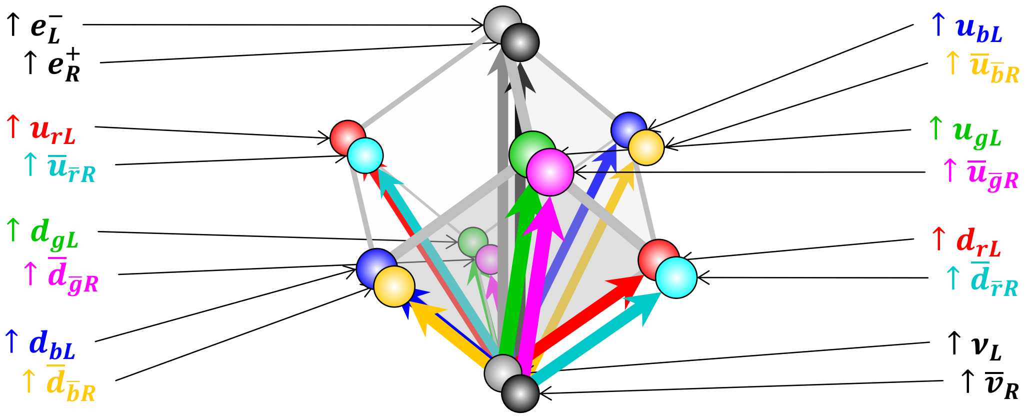
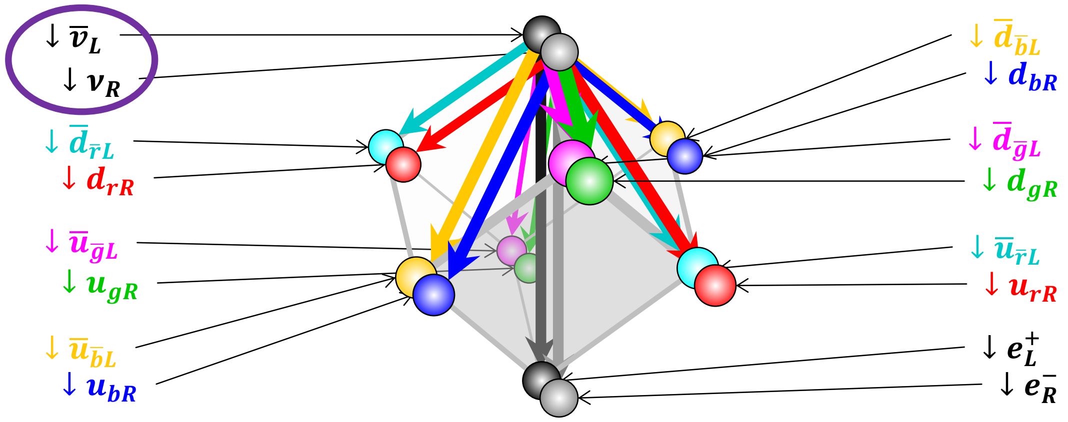
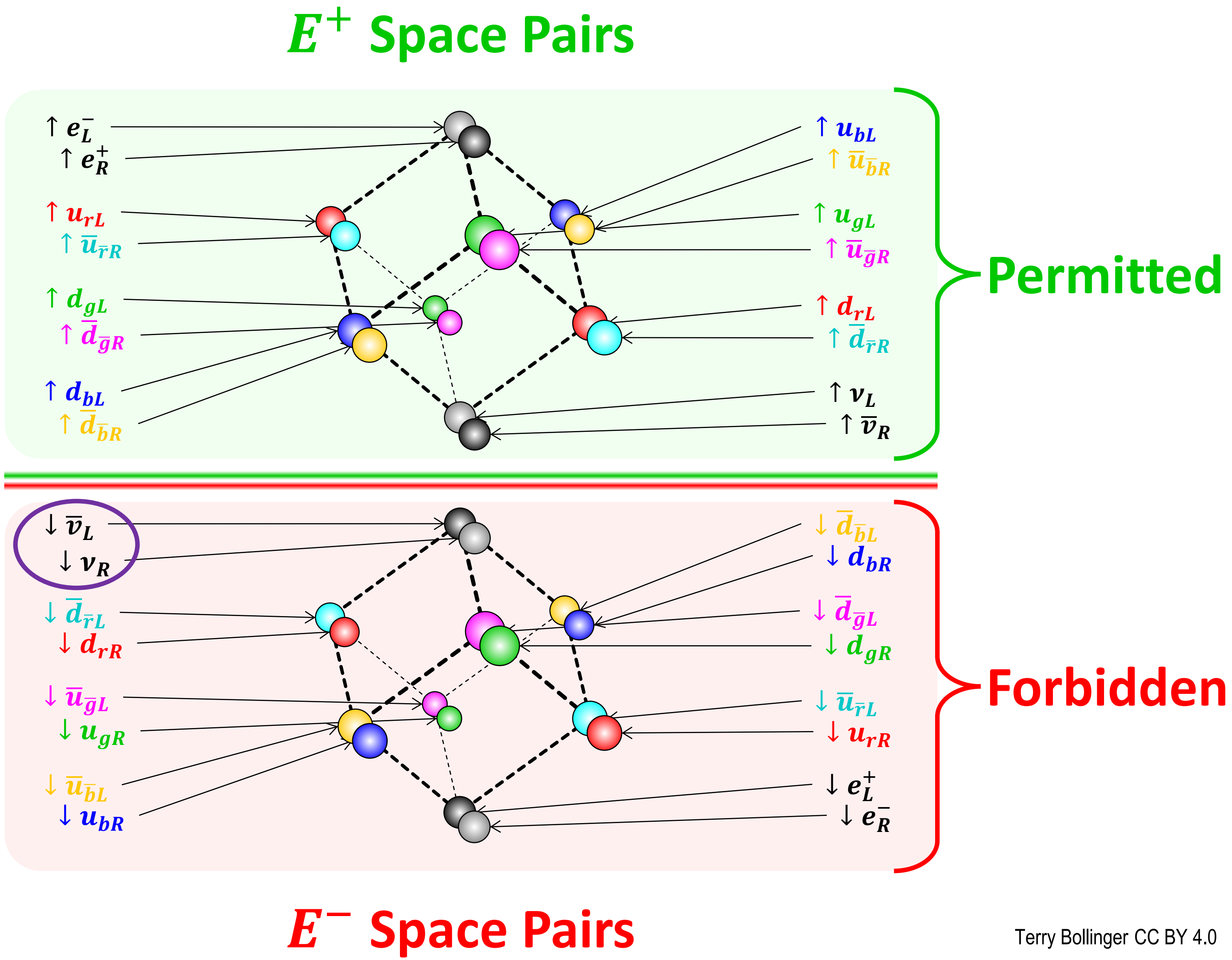




E^- Fermion Group (Weak-Blind)

Permitted (E+) and Forbidden (E-) Space Pairs



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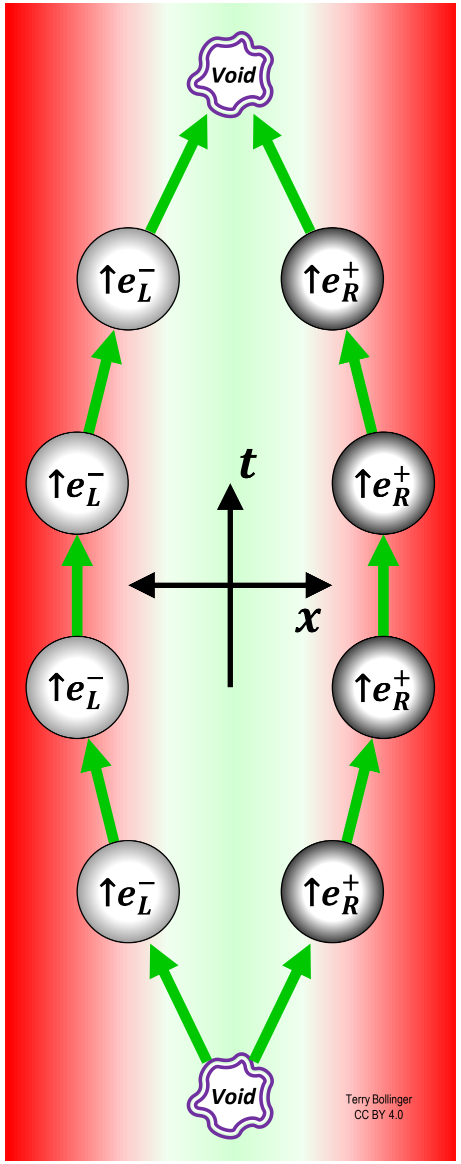
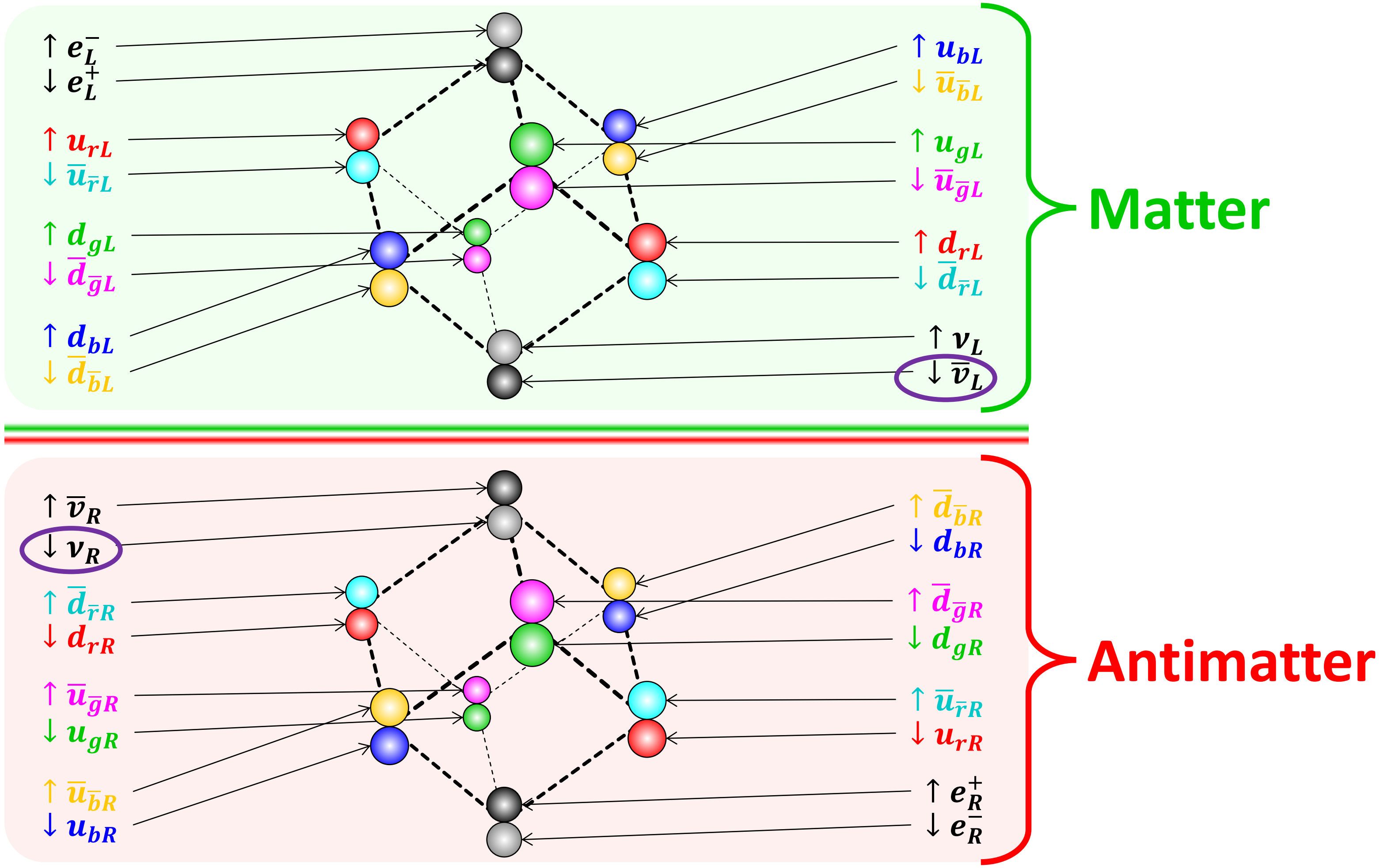
Part VII
Time and Space as Emergent Properties

Space-Pair Creation and Annihilation



Time Pairs for Matter and Antimatter

Left-Handed Time Pairs



Right-Handed Time Pairs

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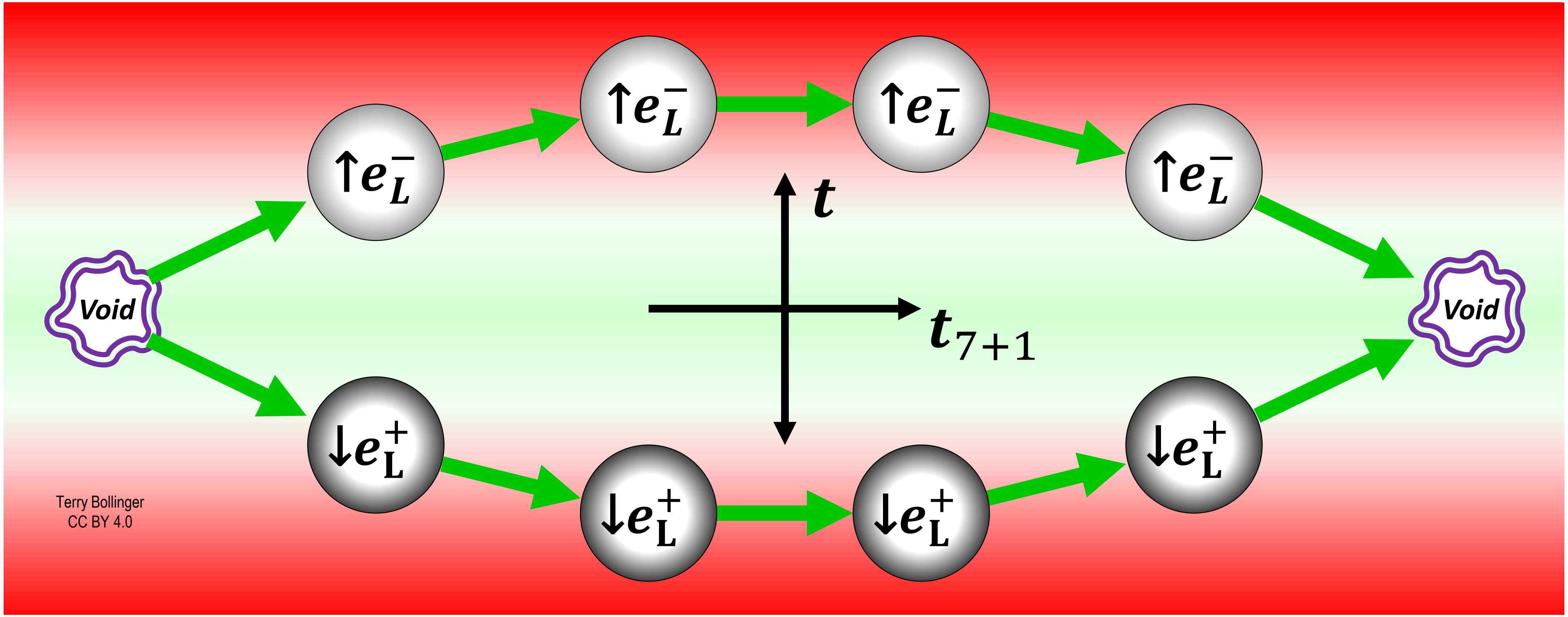
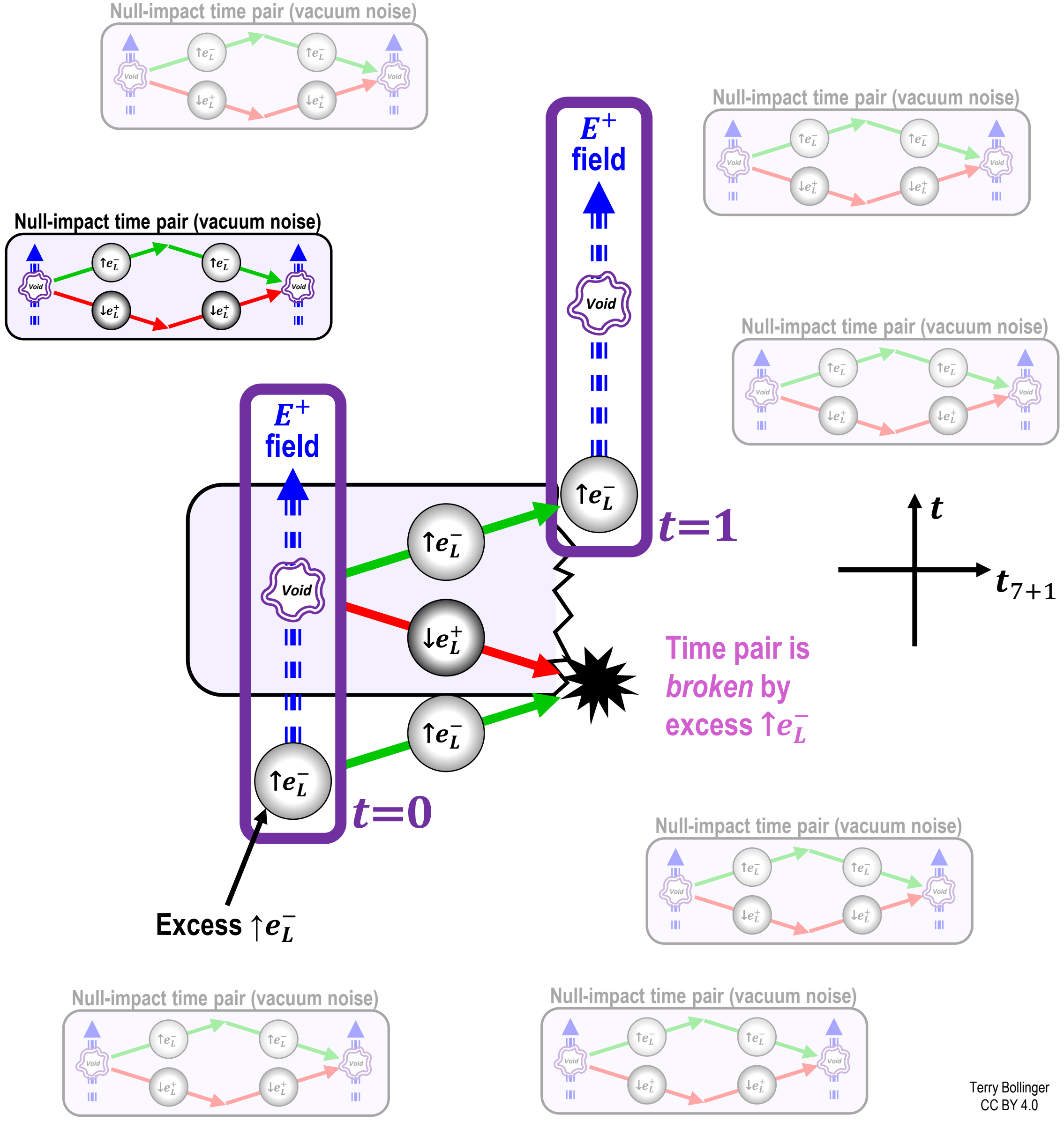
Time-Pair Creation and Annihilation



Part VIII
Higgs Field as an Image of the Ereboic Field

Time as Destabilized Time Pairs



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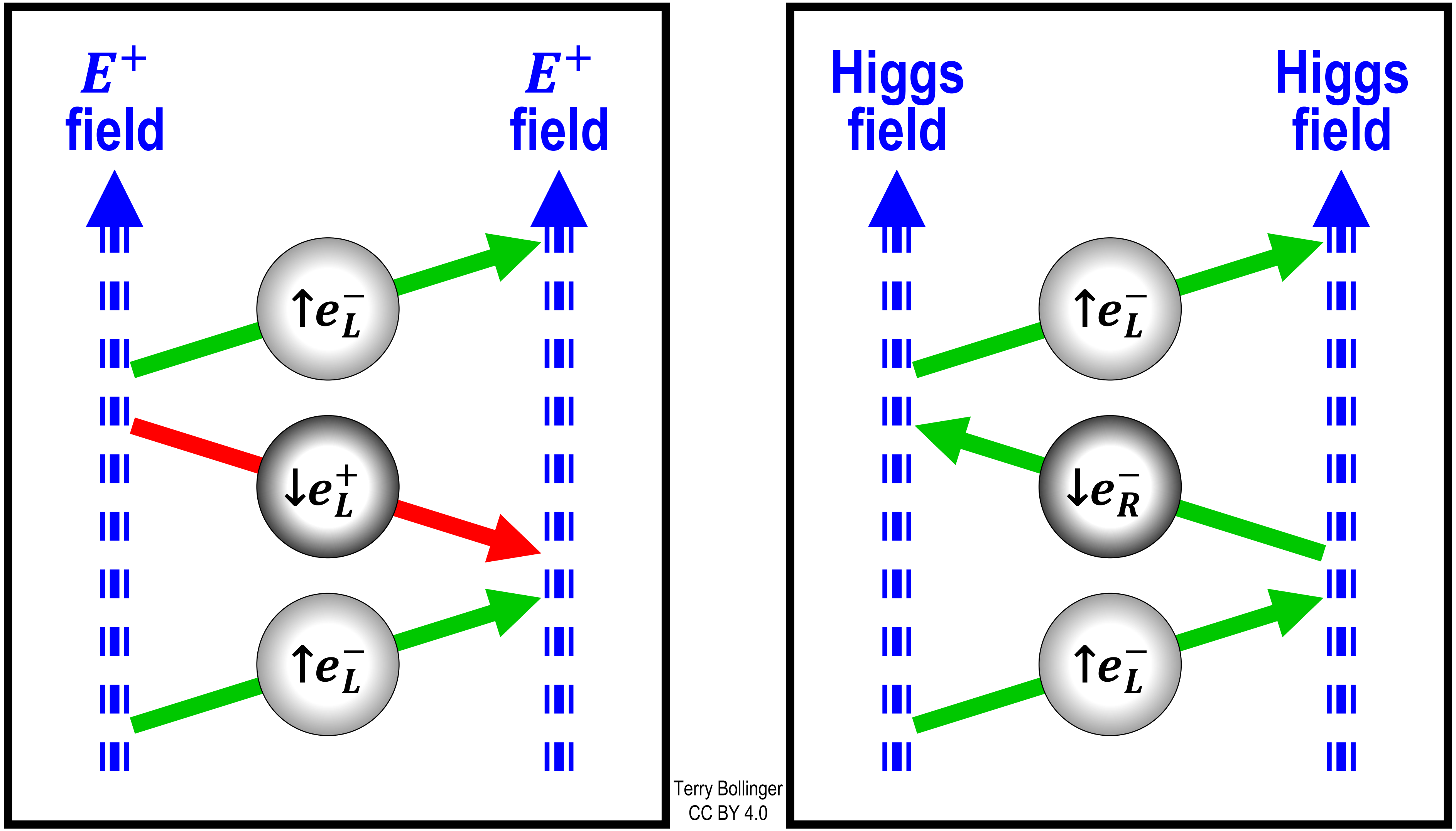
E+ Field and the Higgs Field



Part IX
Quantum Mechanics as a Frame-Bound Phenomenon

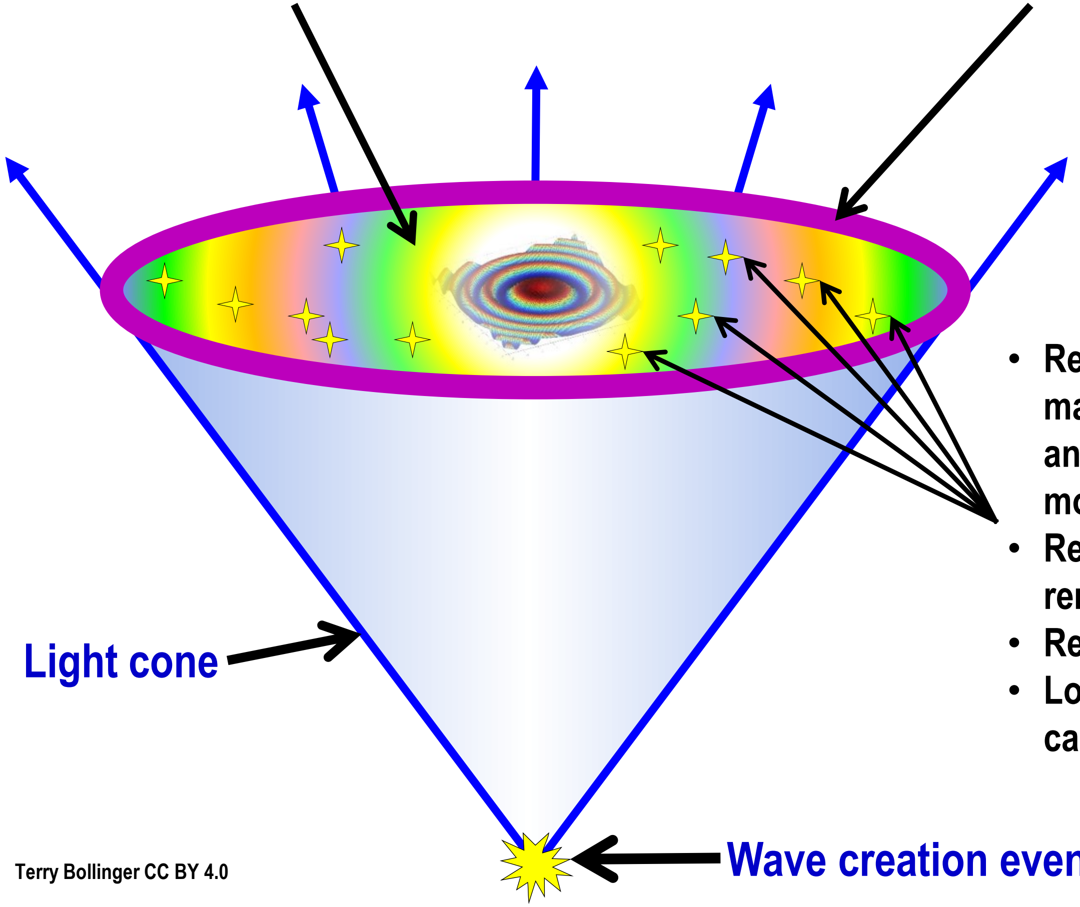
Holographic Information Waves

Schrödinger Image

- A dynamic *information hologram*
- Existence is defined by *external* data
- Hologram confines quantum numbers
- Image projected via momentum space

Holographic Information Wave

- Classical data expands at up to speed of light
- Composed mainly of phonons and photons
- This data encodes *all* knowledge on the wave
- Fourier transform provides holographic image



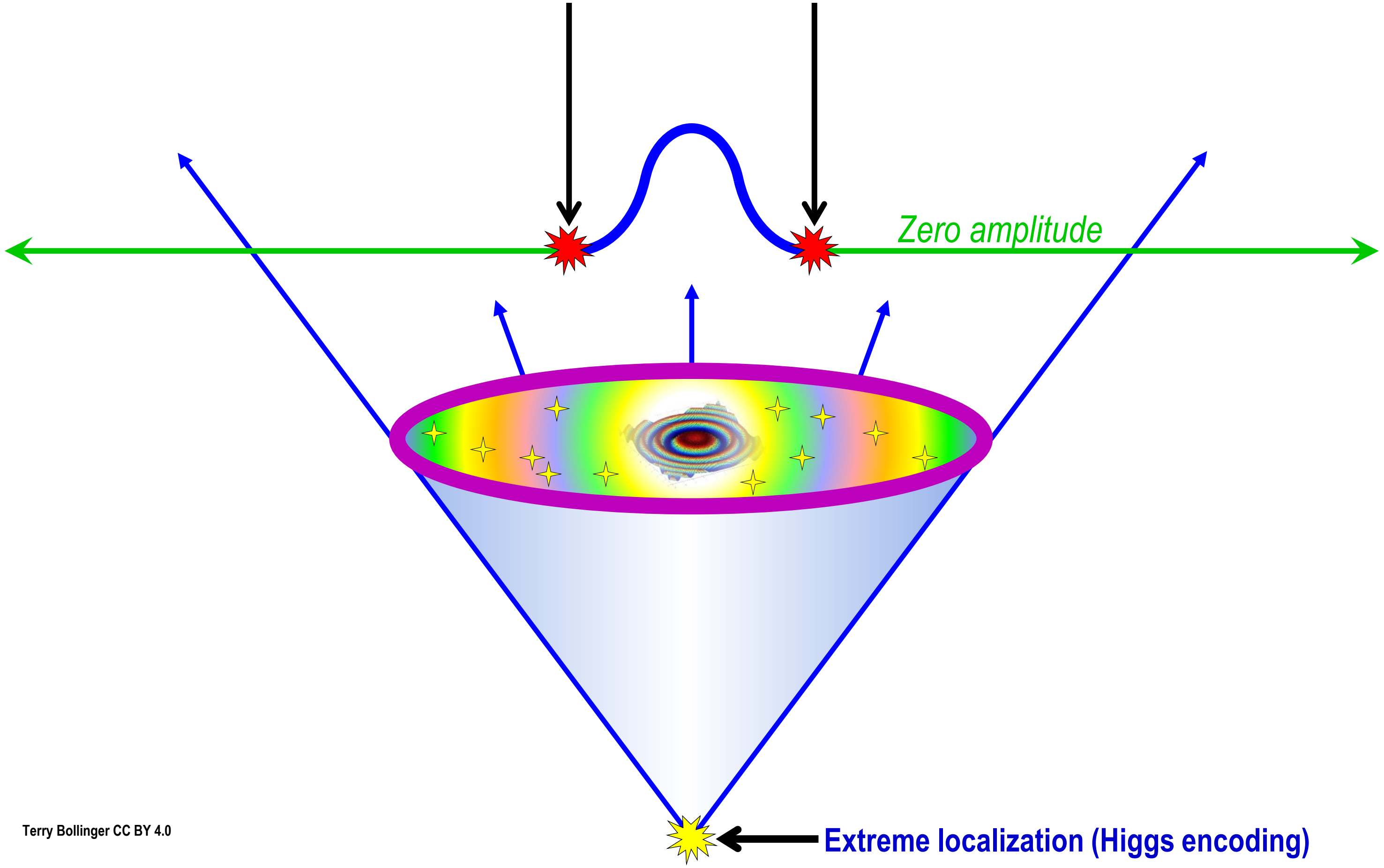
Higgs Bits

- Rest-capable (Higgs) matter can capture and spatially localize momentum wave bits
- Resulting Higgs bits remain in hologram
- Result: Decoherence
- Low-noise Higgs bits can confine the image

Wave creation event (classical)

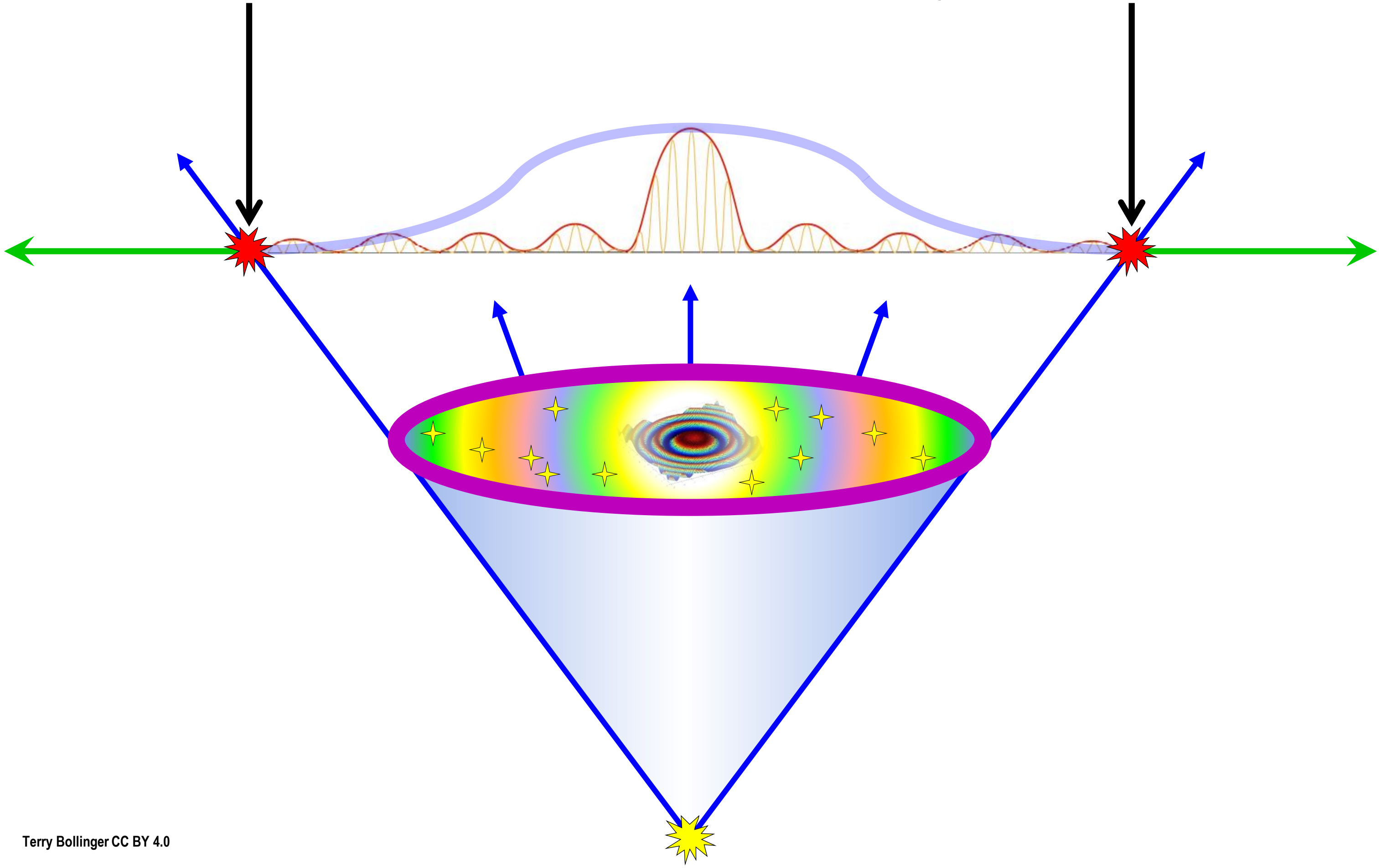
Holography and Bump Functions Don't Mix Well

- Bump functions (distributions) capture the idea of wave function *localization*
- Notably, Dirac delta functions are the mathematical limits of bump functions
- Bump functions splice functions to guarantee C^∞ smoothness, but at a cost
- Bump-splice boundaries require *infinite* (f/∞) Fourier spectrum (momentum)
- Not possible for energy-limited holography based on real particles in real space



Light Cones Are Natural Quantum-Wave Boundaries

- **An alternative: Shift the infinite-momentum bump boundaries out to the light cone**
- **The resulting boundary spectrum then matches with the SR momentum spectrum**
- **An interesting implication: Light cones are fundamentally *quantum* phenomena**
- **A second implication: Dirac delta functions are the *least* physical of distributions**



Part X
Dispensing with Infinitely Malleable Spacetime

Ereboic Field Constraints on Exotic GR Solutions

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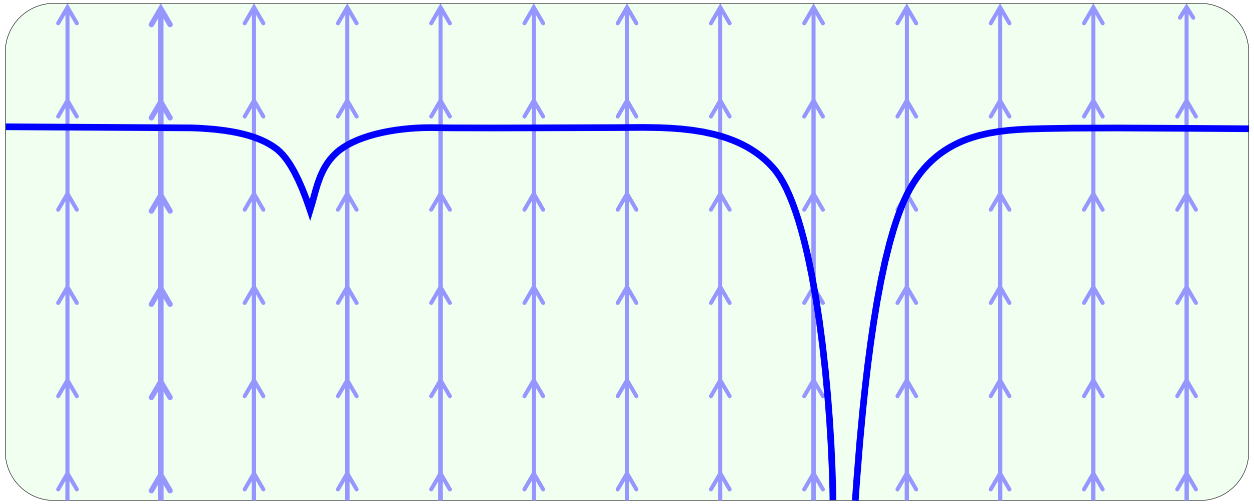
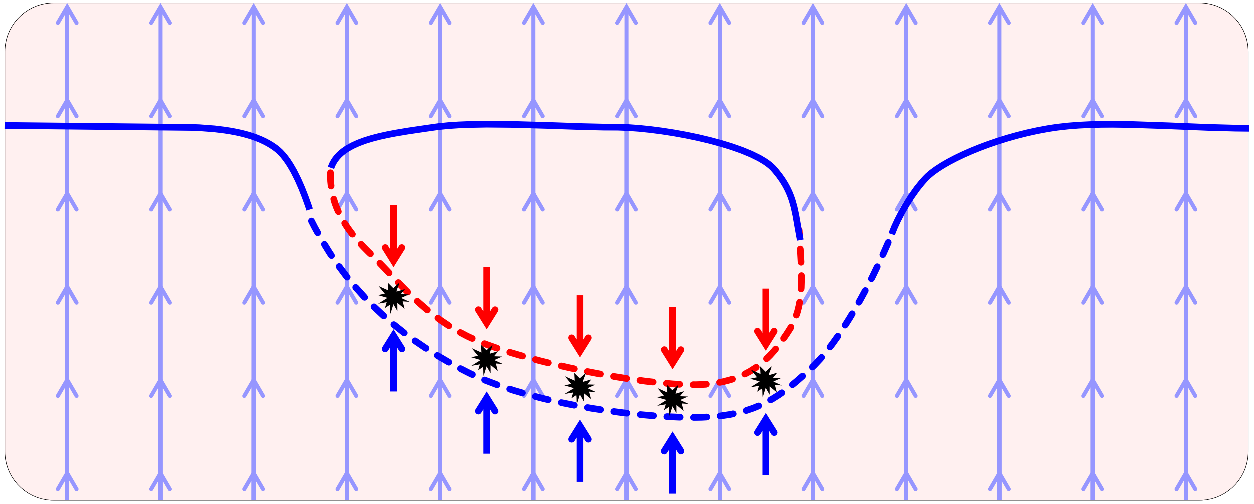
***Permitted*: Black Hole Cosmologies**



***Forbidden*: Wormhole Cosmologies**



Reinterpreting Riemannian Manifolds

Isotropically Parallel Manifolds

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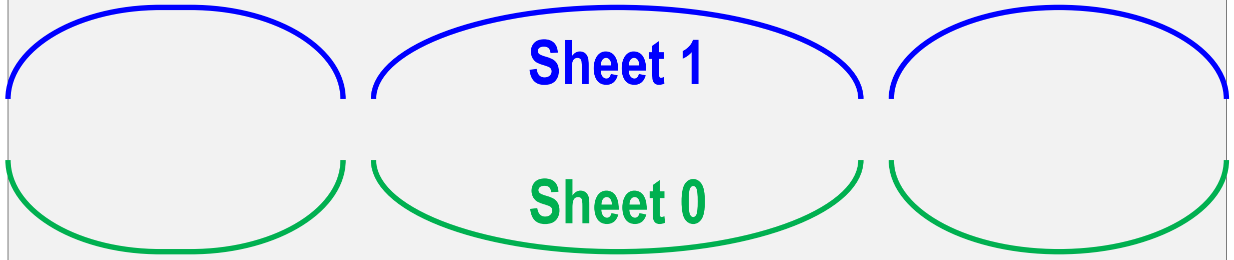
Issue (1): Infinite (C^{∞}) smoothness implies infinite precision, even at quantum scales

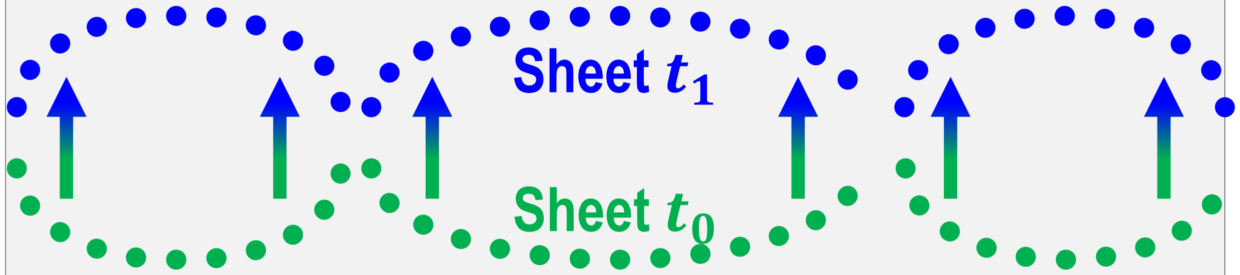
Issue (2): Simultaneous co-existing worlds sheets (here with ER bridges) are conceivable



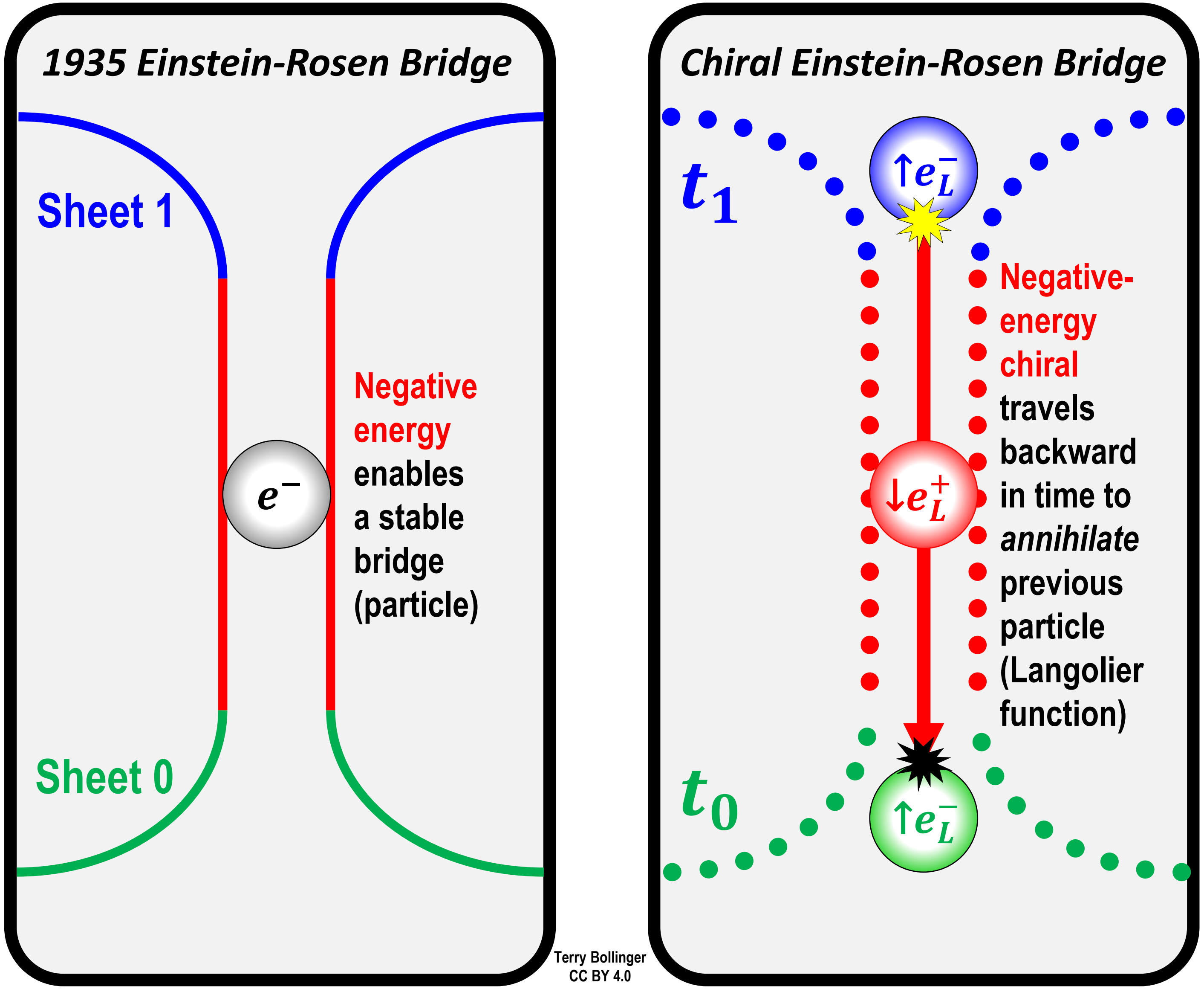
Time-Front Manifolds

(1) Resolution depends on available energy, and so becomes *blurred* at particle scales

(2) In time-front manifolds, adjacent parallel sheets imply *movement*, versus co-existence



Einstein-Rosen Bridges



Looking Deeper

- We cannot understand gravity until we abandon smooth manifolds
- We cannot understand gravity until we drop quantum infinities
- Tensors are important because *matter is all about tensions*
  - The tensor structure of spacetime is an illusion created by matter
  - The tensor structure of space-time frame instances is very, very real
- We cannot understand gravity until we recognize that negative energy matter is an integral part of how time operates
- The very weak fields we call “space” stem from a dramatic symmetry break between location and momentum symmetries

Summary

- Special relativity needs fixing (and it's not even hard)
  - The information content of the universe is hard-bound to matter & energy
  - That information content is the state of the universe
  - "Now" is completely real and bottom up
- Gravity is an "almost-cancelled" remnant of the largest and most ancient instances of spacetime organization
- Since space is a very weak field via Casimir separation binding, quantization should be possible once negative energy matter states (weak blind fermions) are fully taken into account