Physics from Axioms.

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Abstract:

We introduce a definition of Time and Photons from four Axioms. Basically, you take a 4-dimensional manifold, transform them into two superimposed Riemann Spheres and isolate a circle (call this Pp) in one of the spheres. Then one specifies the circle to turn by a unit amount (the turn is a quantum rotation: turn from state A to state B without visiting the in-between states) as measured along the circle if the Pp encounters a space point. The circle's infinity point stays at the north pole of the Riemann Sphere for any finite rotation since infinity - constant = infinity. Using this , Time can be defined if we require special particles to be in the particles of a clock. We go on to define photons and antiphotons. If we define antiphotons we are at a more efficient level of using resources (conservation of space implied by conservation of Energy). The model explains why photons have momentum. The reason why a photon can have variable frequency is also stated. The model assumes there are positive and negative events of spacetime and this is the reason why one can choose a zero point (for coordinates) anywhere. The model explains why light travels at a finite speed.

Keywords: time, photon.

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1. Defining Time.

Here are the four axioms we are going to use:

A1: Complex numbers exist. Call this C.

A2: x = x

A3: x + y = y + x

A4: A is a subset of B if B contains A and B - A not = the empty set.

The following definitions are stated and will be used:

Definitions: "C x C" means "Complex plane Cartesian product Complex plane".

"RS <-> RS" means "Riemann sphere superimposed on Riemann sphere".

"quantum rotation" means "a rotation from state A to state B without visiting the states in-between".

By "event" I will mean: "point in spacetime".

By "negative event" I will mean "a left out point in spacetime".

The format of the statements will be:

Index	Statement	Reason

First, we construct a Space. This space will be required to be able to define a particle.

1	Construct S = C x C.	A1, A2
1.1	S is 4 dimensional.	1

1.2 Set the components of S = $S_{1,2,3,4}$ in the following order: Real, Imaginary, Real, Imaginary. 1, A2

The reason that we could define this space is because of A1.

We define a particle called Pp next.

2	S can transform into two superimposed Riemann Spheres.	A1, 1

See ref. [6] why this is possible, from a reputable source.

3	Construct two Riemann Spheres of S, call it RS <-> RS = Pp.	A1, 1

We define a circle along the Imaginary axis of the second RS: S_4.

4 Isolate a circle in the second RS namely S_4 and call it P_T. A1, 3

4.1 I'm going to use physical terminology below. Declaration

4.2 Construct "physical space" = $S_P = C \times C/S_4$. A1, A2

This gives physical space with S_{p2} multiplied by i.

5 Let P_T advance by one (rotate relative to $S_{1,2,3}$ by one as measured along the circle) if encountering a space point and let the rotation be a quantum rotation. Call this "freq" = T_S
A1, 4, 4.2, A2

This rotation does not move infinity at the north pole of RS since infinity - constant = infinity. This circle cannot have a charge of the particle Pp on it. Note that the act of "encountering" need not depend on time or it may depend on a particle at infinity encountering space points, but this does not require time.

8 Let $S_{1,2}$ be perpendicular to $S_{3,4}$ 1

Now we can define a basic time interval:

For particles 1 to N and encounter m (defined using a particle like P_T, at infinity), compute:

12 Define "basic time step" = Delta t_{Bm} = 1/Ave $(\#T_S)_m$ 1-11, A3, A2

where Ave $(\#T_s)_m$ = (1/N)(sum_n=1^N $(\#T_s)_{nm}$).

See Appendix A for sample computations.

From these define "Basic time":

14 Define "Basic time" = t_{Bm} = Delta t_{B1} + Delta t_{B2} + ... + Delta t_{Bm} `12, 5, A3

22 Basic Time advances like a clock, it depends on the Pp in the clock and on the route (fast clocks run slow) in space. 18, 21

23 Basic Time = Time. A2, 22, 14

In practice, we only require that some particle of the crystal/ atom/pendulum/spring of the clock has a circle with no charges on it that can serve as the particle clock.

2. Defining Photons and Anti-photons.

We go further to define photons. For this, we need antiphotons as well. For this, we need to define negative events of B_{ST} (the origin may then be constructed anywhere.)

23.1 Construct negative points of physical space as: $S_{P-} = (-r)x(-r)x(-r)$, $r > 0$, r element of Real numbers A1

23.2 Couple (Delta t_{Bm}) to points of $(S_{P-})_m$. Call the result B_{ST-}. 14, 23.1

23.3 Shift the origin of B_{ST-} in B_{ST} by an amount: min{ distance of two adjacent events of B_{ST} along any axis of B_{ST}}/2 and do the same for all four directions. Call the result CB_{ST}. 23.2

23.4 Define the events and negative events of CB_{ST} to have closest neighbors in a helix for any direction in CB_{ST}. This is not picture able. 23.3

24 Define a constant $c = \Delta S_{Pm}/\Delta t_{Bm}$ 4.2, A2

24.1 Let c be the maximum speed trough CB_{ST} i.e. the speed at which the particle sees minimum distance between succeeding events of CB_{ST}. 4.2, 23.3

24.2 Construct S = C A1

25 From S, define a new sothern hemisphere RS. 24.2

25.1 From S define a new northern hemispere of left out events of B_{ST} as Riemann sphere left out (RSL) 24.2

25.2 Call the construct of 25, 25.1 as F_1. 25, 25.1

29 Construct S_{AP} = (-C) A1

This way the particle and antiparticle may look identical except for phase difference of 180 degrees (as if turned through 180 degrees).

30 Construct from S_{AP} a RSL and RS as inverse of above. Call it $\underline{F_1}$. 29, 25, 25.1

31 Let CB_{ST} construct any vector in F_1, call it p. This is done by identifying four numbers in F_1. Call such particle qFp_1. 3, 18, 4.1

32 p is 4 dimensional 31

33 Construct the same vector as in 31 x (-1) in $\underline{F_1}$. Call such particle $\underline{qFp_1}$. 31, 28

34 Identify a marker in F_1's origin and at the origin in $\underline{F_1}$. 31, 33

35 Set $Fp_1 = qFp_1$ and leave out 2 distinguished events just below the unit circle crossing a

curled up axis. Call the two points A, B. 24.2

36 Set <u>Fp_1</u> = <u>qFp_1</u> and add 2 distinguished events just below the unit circle crossing a curled up axis. Call the two points <u>A</u>, <u>B</u>. 29

37 Let S_1, S_2 of Fp_1 look like in Figure 1.1 24.2, 35

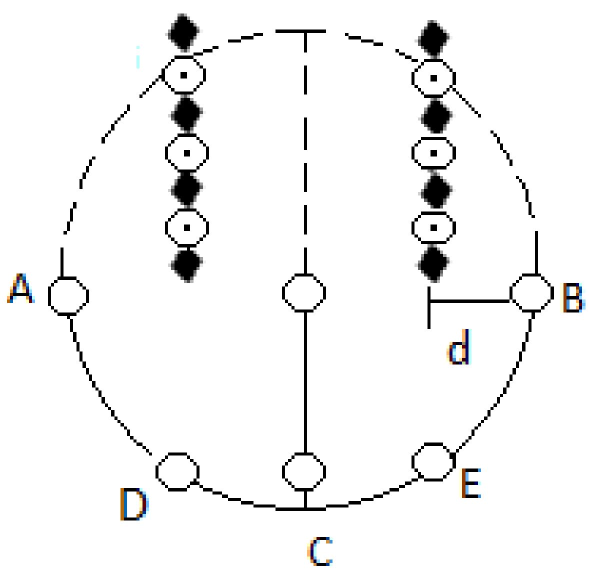


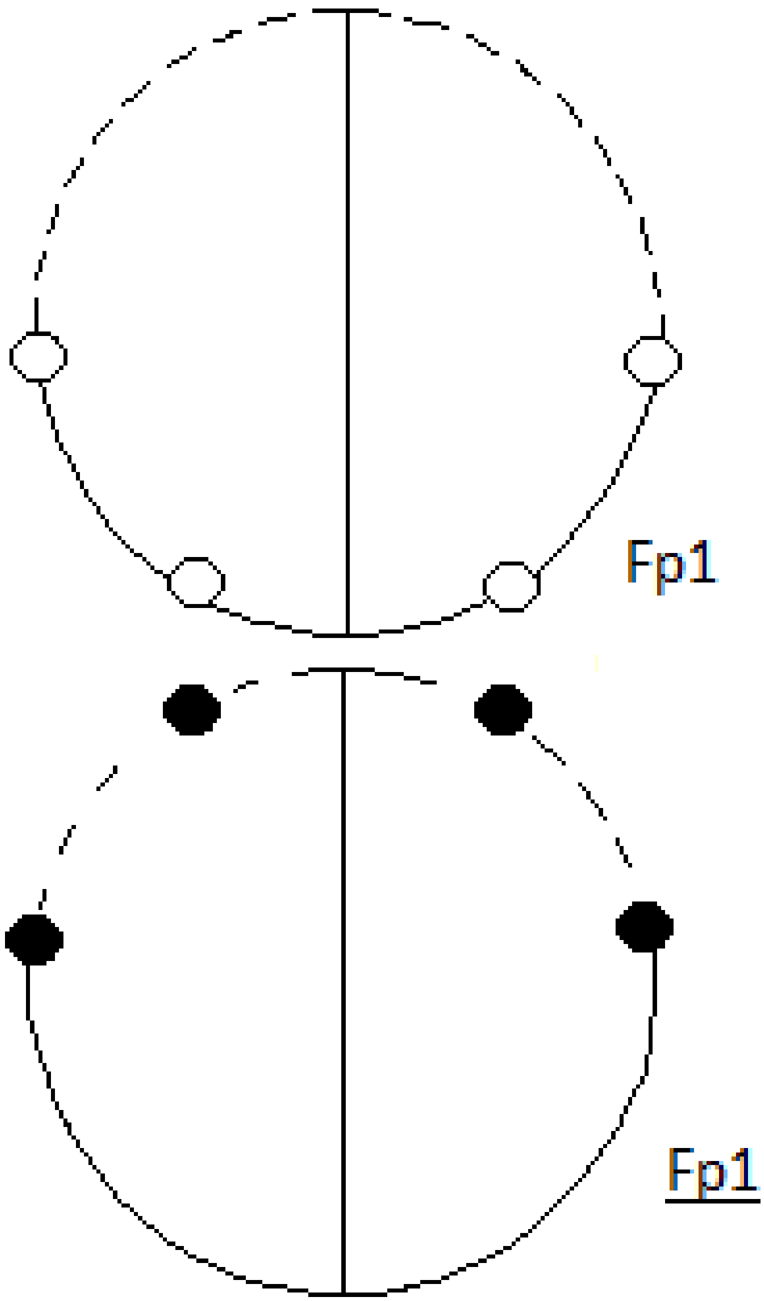
Figure 1.1

The little circles represent events of the circle that was left out. The figure shows an Fp_1. The diamonds are positive events of CB_{ST} and the circles with dots in the center are negative events of CB_{ST}, as the particle sees them. The little circles denote left out events, this is accomplished by letting the <u>Fp_1</u> take four events of Fp_1, now <u>Fp_1</u> would have four additions of events (see figure 1.2). The distance "d" is defined as a constant multiple of the interaction strength. The charges so generated (event exchanging) may be called: "relativistic mass" since it causes the photon to follow geodesics in spacetime. This is why photons have momentum.

In figure 1.1 CB_{ST} chose a momentum vector in the up direction, however it cannot go precisely in the up direction since this would require infinite momentum.

38 Let S_{AP1}, S_{AP2} of $\underline{Fp_1}$look like in Figure 1.1, (just turned upside down and with events, left out events interchanged). 29 -> 32.1

39 Let the starting position (after one instance of time) of Fp_1 and $\underline{Fp_1}$ be as drawn in figure 1.2 (only the curled up S_1 and S_2-direction shown). 29



Fp1
Fp1

Figure 1.2

The figure shows a Fp_1 and $\underline{Fp_1}$ with the $\underline{Fp_1}$ taking events from Fp_1. We postulate that the $\underline{Fp_1}$ is made of left out eents, so it carries the positive points (4 of them) from Fp_1. It is easily seen that the two annihilate if becoming superimposed. They are defined to have momentum in opposite directions.

40 Let the two left out events of Fp_1 A and B and the other two left out events sense the closest four events of CB_{ST} in direction p and let them engage these events even if the whole Fp_1 needs to turn or move linearly (see force on Fp_1 at item 47). 35

41 If four events were engaged: distinguish four new events and go to 40. 35

42 Let $\underline{Fp_1}$ move similarly to 40, just sensing the nearest events of negative coordinates in the -p direction. 35

43 Fp_1 and $\underline{Fp_1}$ may be polarised: circularly, transversely, or longitudinally. 37

43 is true since the point at infinity gives Fp_1 an orientation in CB_{ST}.

45 Fp_1 has spin 1. 44,
23.4

This is true since Fp_1 looks the same if turned through 360 degrees.

46 The events of CB_{ST} cause a force with a nonzero component in the p direction. Define F = ma. With m = 0 we have infinite acceleration thus infinite speed. But infinite speed would saturate at c. Hence Fp_1 goes p-wards at the speed of light. 24.2,
37

47 That the movement of Fp_1 causes Electro-Magnetic waves can be seen from the following figure. The F forces have a tiny reaction force in the up direction due to the curve at A and B not being straight. Figure 1.3

47.1 To get a fuller wave we must have another Fp_1 cooperating with this one such that "C" points in the up direction. Figure 1.3

47.2 To get a perpendicular magnetic force we need to include events on the other circle as shown in Figure 1.1. Figure 1.1

47.3 The force F depends on the stiffness of spacetime and distance d (in Figure 1.1). Figure 1.3

This force is the initial mechanism whereby a protophoton is accelerated to light speed. At light speed this force is balanced by a force in the -p direction, working in on the topmost point.

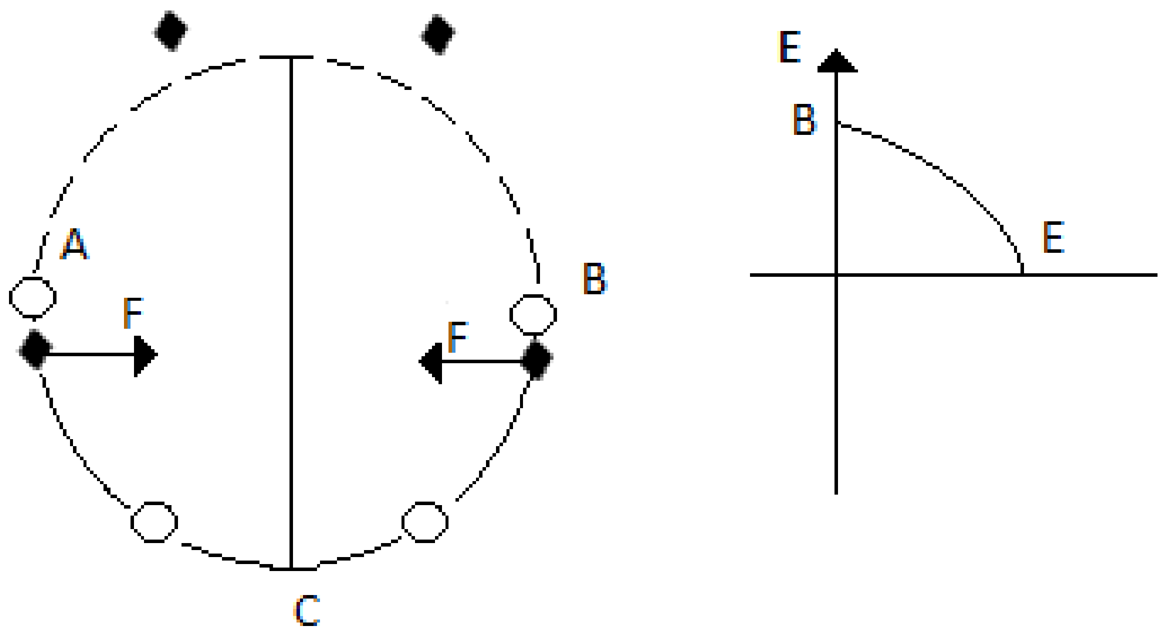


Figure 1.3

48 Fp$_1$ gets deflected if CB$_{ST}$ is curved by gravity. 37

48.1 Let the other circle at C also have 2 events on it removed, so left out events remain. These events must be magnetic in nature. Figure 1.3

For this, we need 2 types of events of CB$_{ST}$ U {Magnetic field}.

49 Fp$_1$ is a photon. 43 -> 48

49.1 <u>Fp$_1$</u> is an antiphoton. 43 -> 48

Comments:

In trying to construct photons by inserting a half circle on Pp one is led (because the half-circle must come from a copy of space) to also construct antiphotons and they are not made of anti-dimensions.

After line 34 we have constructed a photon and an anti-photon and basic spacetime and time. We may postulate that EM comes from 3 dimensions of space x the 5'th dimension.

We have that the theory of defining photons may be tested by proving: there is a direction in which photons with the same orientation will not go.

We finally state that time defined by: "It is what a clock measure." has problems since a clock can be turned back or not tightly wound up i.e. clocks don't dictate time. Also: a clock has moving parts and movement requires time: definition circular**.**

Appendix A: Computations

Now we make a lot of data for the particles (n, set m (after encounter = m)T_{snm}):

n	T_{sn1}	T_{sn2}	Ave(T_{sn1})	Ave(T_{sn2})	Delta t_{B1}	Delta t_{B2}
1	3	5				
2	4	4				
3	2	3				
4	2	2				
5	3	3	14/5	17/5	1/14/5	1/17/5
					0.357	0.294

t_{Bm} = Ave(T_{sn1}) + Ave(T_{sn2}) + ... + Ave(T_{snm})

Fast clock: t'_{Bm}: $T_{sn1} = T_{sn1}$, $T_{sn2} = 4*T_{sn1}$, ...

If slow clock: $t_{Bm:}$ $T_{sn1} = T_{sn1}$, $T_{sn2} = 2*T_{sn1}$, ... then t_{Bm} must > t'_{Bm}. Yes condition holds.

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