On the Colours of Time

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2022-07-19.19:00 EDT Tue

Message Excerpt

Currently, I'm focusing on finishing my paper on age gradients in special relativity. It's simpler yet still introduces exciting issues.

Here's the thought problem I used to open the paper: As a 100 m spaceship passes, you observe that the clock at the ship's rear is 100 ns ahead of the clock at its front. What is the ship's velocity? Answer: About 0.3 c.

Age gradients are low-hanging fruit because the math needed is absurdly simple. Also, all that is needed to get there is to take the fundamental precepts of special relativity _more_ seriously, not less. Still, without age gradients, SR is necessarily incomplete. They are as fundamental to special relativity as Lorentz contraction, especially since they are a direct geometric consequence of Lorentz contraction.

>... Can you tell me more about the classical time axis being a vector sum of the three short-range time axes?

We have spacetime wrong. It's a 3-space of mutually orthogonal areas rather than a 4-space of vectors. The areas are (technical term here) "squishy" and, in certain situations, collapse in a coordinated fashion that creates persistent information. The information organizes nicely at classical speeds into xyz and t, but that 3+1 structure is never more than an approximation that fails at the relativistic and quantum limits.

A better mental model for how long-time emerges from three short-times is not a vector sum but a three-sided coil.

Hold a clear display cube with two fingers on opposite vertices. Pick one of the edges at your bottom finger and colour it magic-marker red with an arrowhead at the top. Colour the edge to the right of the red arrowhead green and add an arrowhead at its end. Finally, colour the edge from the green arrowhead to your top finger blue and add the final arrowhead.

Now look down above the cube, and you'll see a hexagon. One of the triangles of the hexagon now displays a red-green-blue vector spiral heading towards you. That spiral is classical or net-colourless time, capable of indefinite forward progress. The three mutually orthogonal colour vectors are repeating snippets of the time axis of Lorentz area dimensions, squeezed down and confined by large-set instability in which their space components end up sharing orientations with adjacent areas to form large-scale space.

A proton is a brutally blunt example of colourless time emergence. The quarks perform a boldly chaotic colour dance in xyz space for all to see. Shy electrons hide their more orderly and lower-energy colour dance in the same 3-space of charge that generalizes

Maxwell's electric displacement. It's the same dance of time, though, and it moves in the same direction. That's a good thing for both hydrogen atoms and us. Amusingly — and this emphatically is not something in the Standard Model — that also makes protons and positrons an essential broken symmetry pair. The electron is also composite, just in a more cryptic fashion than the proton — and yes, rishons were indeed hinting at this.

I'm still working concept level for what model works best. I started to say spacetime Clifford algebra might be helpful, but alas, on a quick reminder look, STA also starts with 3+1 and Minkowski's unfortunate obscurations. The directed areas are nice, however.

>… Am I right in thinking that the possible fermion particle charges seem to be an emergent phenomenon?

Look at Maxwell's equations. How complex are they when you elaborate them sufficiently to give actual predictions about natural phenomena? Given that level of complexity, ask the question the other way around: How can fermion particle charges _not_ be emergent? How can concepts such as electric charge _not_ be the large-scale outcomes of some more straightforward set of effects that mutually limit each other until complex behaviors emerge?

Our brains are structured at the neural level to seek out and accept simple outcomes of complex behaviors as givens. Cut your finger lately? Did you then fret about the billions of bytes of bio nanotech calculations your body cells had to perform to fix the problem?

Ditto for time and fields. Our brains skim the cream by design and accept it as a given.

>… I suspect physicists tend to think of electric and colour charges separately purely due to the historical context of when they were discovered.

Yes, emphatically. The electric charge came first, by millennia. So, speaking satirically: "How _dare_ those silly quarks hint that unit electric charge is not fundamental? Hmph! Silly reality sometimes has _no_ respect for centuries of learned pondering!"

Similarly: How does one grand-unify the electric and colour forces and charges? Easy! Throw away every paper that refuses to acknowledge that quarks already have a unified charge! Every experiment that attempted to separate colour and electric charges proves this point. What amuses me is this: Is the 3-space generalization of Maxwell's 1-space electric displacement truly _that_ difficult of a concept to comprehend?

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2022-07-19.19:00 EDT Tue
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