The World is Binary!
When the Speed of Light is Zero from Any Reference Frame
The Turning Point of Light

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"...matter originates as Planck fireballs." — Fred Hoyle

This is a very short non-technical note pointing out a key finding from modern mathematical atomism, namely that the world is Binary, and that the Planck mass, the Planck length, and the Planck second are invariant entities.

With Einstein-Poincaré synchronized clocks, the speed of light (in a vacuum) is the same in every direction[1], it is isotropic and it is often represented with the character c. The speed of light is, per definition, exactly 299 792 458 m/s, a tremendous speed. We do not contest that this is the speed of light as measured with Einstein-Poincaré synchronized clocks, but still we ask: "Is this truly always the case?".

A point that we rarely see discussed concerns what the speed of a light particle is at the precise instant when it changes direction? That is to say, what is the speed of a photon at the very instant of reflection? I will claim that in this singular instant when a light particle changes direction it must (by definition) stand still. This is partly a philosophical question, where one could have long and serious discussions regarding the ultimate depth of reality. Can something stand still for an instant? Don't we need to choose a minimum time interval to even discuss the concept of velocity? If so, what time interval is needed? A Planck second could be the most likely candidate here. But what is most important is not whether we consider the light particle to be standing still or not, but to understand that the instant when the light particle changes direction is a very different situation from when it simply keeps moving steadily in one direction.

One could claim that a light particle no longer is a light particle when it interacts with something else. This is partly true, as it is then part of a particle system that constitutes what we call matter. However, Haug [2, 3, 5, 4] has recently shown that the turning point of the light particle is key linking the Planck mass to the framework of relativity theory and gaining a deeper understanding the nature of the interaction. Remarkably, the Planck mass is at rest as observed from any reference frame and the Planck length is invariant in any reference frame[2]. However, the Planck mass only lasts for one Planck second, so it is more correct to describe the mass of a "photon" to "photon" collision as a mass gap of only 1.17337×10^{-51}kg, see more details on this in [3, 4]. In our atomist model, matter can indeed be described as a Planck fireball (two indivisible particles colliding) that only lasts for a Planck second. Any non-Planck-mass particles are switching between Planck fireballs and energy (freely-moving indivisibles).

We can say that the speed of light is c when light is energy, and the speed of "light" is zero when light collides and creates a Planck mass. The Planck mass lasts only for an instant (a Planck second) before the two light particles leave each other[3]. This model is binary. Either we have a Planck mass (two colliding indivisible particles), or we have energy (non-colliding indivisible particles). Thus there is actually only one pure mass — the Planck mass (or the mass gap that only lasts for one Planck second). Any other subatomic particle is a mixture of Planck mass (colliding indivisible particles) and energy (non-colliding indivisible particles). An electron in this model, for example, actually fluctuates between being energy and Planck mass about 7.76344×10^{20} times per second[4].

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[1] Whether or not the one-way speed of light is isotropic or anisotropic when using other methods of clock synchronization is a topic outside of this note, but is discussed in detail in my book [2].

[2] The Planck length under atomism is the diameter of the only truly fundamental particle, the indivisible particle.

[3] With Einstein-Poincareé synchronized clocks we can say it lasts one Planck second.

[4] That is simply $\frac{c}{\lambda\!\!\!^{-}_e}$, where $\lambda\!\!\!^{-}_e$ is the reduced Compton wavelength of the electron.

This model is described in detail by Haug, see [2, 3, 6]. Figure 1 illustrates the idea that we should distinguish between the very instant when light particles collide (counter-strike) and the moments when light particles keep traveling without colliding. Based on my atomist theory, light is composed of indivisible particles traveling in the void, a view very similar to that of Isaac Newton. The indivisible particles were abandoned by modern physics, not because the theory was proven wrong, but because physicists educated in the current era do not understand how far atomism could take us in developing a model of this world.

So, can the speed of light be zero? Well, the answer is both yes and no. When light particles collide, they gain mass and are no longer light (free energy). However, the distinction between energy and matter is, under our version of atomism, simply the difference between the collision (counter-strike) and non-collision of indivisible particles. The World is Binary! Zero and one, or being and non being, as the ancient atomist masters explained.

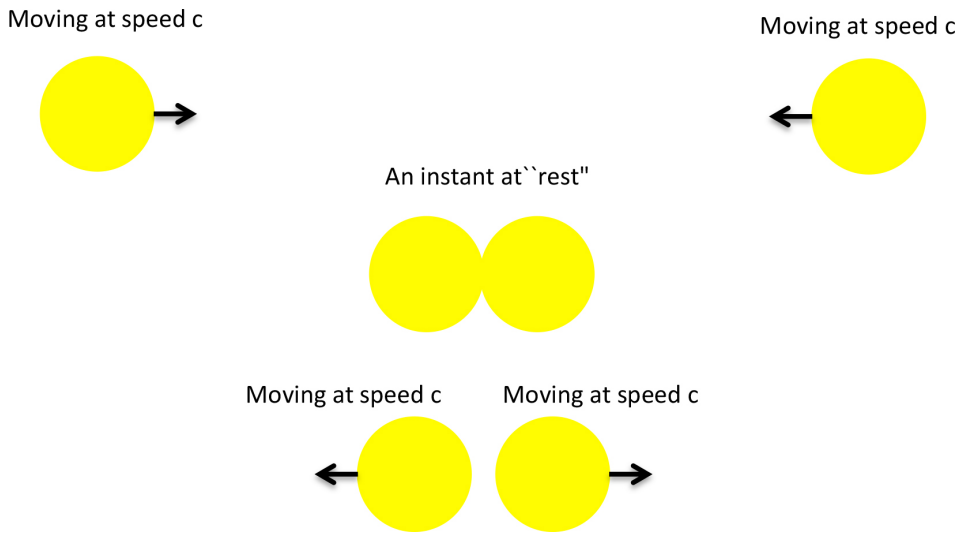

Figure 1: This figure shows that we should distinguish between the instant at which the light particles collide (reflection) from the case where the light particles keep traveling without colliding.

References

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