Deriving the Maximum Velocity of Matter from the Planck Length Limit on Length Contraction

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December 27, 2016

Here we will assume that there is a Planck length [1] limit on the maximum length contraction that is related to the reduced Compton wavelength. Our focus will be on the maximum velocity of subatomic particles, which "have" what is known as a reduced Compton wavelength, $\bar{\lambda}$. We assume that the reduced Compton wavelength of a moving particle as measured from the laboratory frame ("rest" frame) cannot be shorter than the Planck length l_p as measured with Einstein-Poincaré synchronized clocks. To measure length contraction, in general we will "always" need a minimum of two clocks (placed some distance apart from each other) that are synchronized. This because we need to know the one-way velocity of the "object" we are observing in order to measure the length contraction[1]. Based on this, we must have

$$\begin{aligned} l_p &= \bar{\lambda}\sqrt{1-\frac{v_{max}^2}{c^2}} \\ \frac{l_p}{\bar{\lambda}} &= \sqrt{1-\frac{v_{max}^2}{c^2}} \\ \frac{l_p^2}{\bar{\lambda}^2} &= 1-\frac{v_{max}^2}{c^2} \\ v_{max} &= c\sqrt{1-\frac{l_p^2}{\bar{\lambda}^2}} \end{aligned} \tag{1}$$

This is exactly the same maximum velocity of a subatomic particle as derived by Haug [2, 3, 4] in a series of different ways. The simplest way to understand this limitation on length contraction is by referring to the background in atomism. Haug [2] assumes the diameter of the indivisible particles that make up all matter and energy is equal to the Planck length and that the Planck mass only exists at the counter-strike between two indivisible particles. Further, the reduced Compton wavelength can be seen as the distance[2] between two (minimum) indivisible particles traveling back and forth in a "stable pattern" counter-striking[3]. The indivisible particles cannot contract as they are fully hard and indivisible, only the void-space between two indivisible particles can be altered. The closest two indivisible particles can be next to each other, as measured from the center to center of each indivisible particle, is the Planck length as illustrated in Figure 1.

For this length contraction limit to hold, the Planck length must be the minimum distance between the center to center of two indivisible particles. In addition, the two indivisible particles making up the Planck mass must stand still as observed from any reference frame. This is also what the maximum velocity equation tells us: when setting $\bar{\lambda} = l_p$, we namely have a maximum velocity of zero. That is to say that the maximum velocity for a Planck mass particle is zero. This can only happen if the Planck mass merely exists for an instant, which is exactly what is predicted by Haug's interpretation of atomism.

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[1] Despite Einstein's work in this area [6], length contraction often is called Lorentz length contraction or Lorentz-FitzGerald length contraction, although it is not exactly the same as the FitzGerald [7], Lorentz [8], and Larmor [9] length contraction. FitzGerald, Lorentz, and Larmor are not very clear when they talk about the speed against the ether; they also do not explain exactly how this speed should be measured. Under Einstein's theory it is clear that any velocity is assumed to be measured with Einstein-Poincaré synchronized clocks, see Patheria [10]. I plan to put out a paper in 2017 discussing the similarities and differences in detail. However, for our purposes here, we will assume that the length contraction is measured with Einstein-Poincaré synchronized clocks.

[2] or, more precisely, the average distance; under atomism a subatomic particle consists of a minimum of two indivisible particles moving back and forth at the speed of light, at times counter-striking, and so their distance is not constant.

[3] Under atomism we have indivisible-void duality, but no wave-particle duality. We think that the wave-particle interpretation is incomplete.

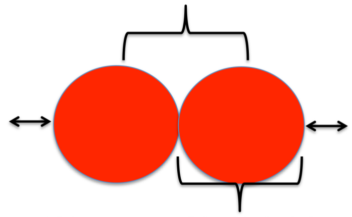

Figure 1: This figure simply illustrates how close two indivisible particles can get to each other, as measured from center to center, when their diameter is equal to the Planck length l_p. The closest they can be relative to each other is $\bar{\lambda} = l_p$. The two-way arrows illustrate that after the indivisible particles collide they will move away from each other again. .

Haug [2] has explained the mass of other subatomic particles based on their reduced Compton wavelength and the mechanism of atomism. Atomism gives all the same mathematical end results as Einstein's special relativity theory when using Einstein-Poincaré synchronized clocks for measurement; see [5]. In addition, it gives a series of other results based on getting around Einstein-Poincaré synchronization. Atomism gives us the well-known relativistic energy momentum relationship and is fully consistent with the maximum velocity formula for subatomic particles given here; see [5, 11]. It may be helpful for interested readers to study my previous work on atomism in order to understand these concepts more thoroughly.

References

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