Speedless Gonzaly [1]

or

How many angels can race on the head of a pin?

(August 2024)

1. The only physical phenomena known to propagate or travel in a vacuum at the speed of **c = 299,792,458 m/s** are electromagnetic waves, among them light, hence said speed being called the speed of light [2];

2. Electromagnetic waves are **massless**;

3. Therefore, electromagnetic phenomena, having no inertia, reach their speed of propagation instantly without having to undergo acceleration;

4. No other phenomenon has been recorded propagating or traveling at a higher speed (and one could wonder why a massless entity should not travel faster if it could);

5. Leaving that aside, the appearance of two physical objects traveling away from or toward each other as observed reciprocally can be calculated in a Newtonian referential;

6. Such calculation leads to a discrepancy that increases with speed if each object is to appear to the other similarly in the same relative referential;

7. To resolve the discrepancy clocks as seen from each other object must be adjusted mathematically by a certain factor [3], which in addition puts **c** as the upper limit for the maximum theoretically possible speed;

8. Similarly, to resolve the discrepancy mass must also be adjusted mathematically by an equal factor;

9. From an experimental practical perspective, said calculated factor is regularly recognized in the behavior of artificial electromagnetic devices traveling in space, and is taken into account for the proper operation thereof;

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[1] The Mastest Fouse in All Mexico (¡Ándale! ¡Ándale! ¡Arriba! ¡Arriba!)

[2] Although it probably shouldn't, as being too narrow a definition

[3] If he's prepared to, the reader may be tempted to do the calculation himself.

10. As regards massive [4] physical objects, the issue of very high velocities is altogether quite different from that of massless phenomena, since, due to inertia, objects with a mass must undergo acceleration to attain any speed;

11. To wit, the problem of accelerating a non-massless object to a speed only a fraction of **c** leads to the following considerations:

A. <u>WHEREAS:</u>

i. The largest operational launch vehicle ever built, Saturn V, which propelled six missions to the Moon, and back, had a mass of nearly **3,000** metric tons, most of it being the propellant;

ii. Let us assume a new launcher carrying **3,000** tons of a propellant several million times as potent per unit of mass as that used in Saturn V;

iii. Assuming that said **3,000** tons of propellant have the same energy density as that of the core of modern nuclear warheads, a quantity of **12,900** megatons of TNT-equivalent would be required as propellant, or more than **twice** all (100%) of the current nuclear arsenals existing around the world, at a cost of **$1,300 billion**, or **$160** per human being;

iv. Let us assume the tanks for the propellant not exceed **3%** of the mass thereof, which is less than half the Saturn V ratio;

v. Let us assume the propulsion efficiency of the new propellant be **100%**, as opposed to that of Saturn V being between **35%** and **60%** depending on the fuel used, leading to an exhaust velocity **2,000** times that exiting Saturn V's engines;

vi. Let us assume the launcher be assembled in orbit, since no expulsion of nuclear matter through the engines could be envisaged on the surface of Earth;

vii. The assembly in orbit would require **30** trips using **30** hydrocarbon and hydrogen propelled Saturn V launchers with a payload of **100** metric tons each to the required orbit;

viii. Let us now propose a target speed upon departure from orbit equal to only **1/10th of c**, or about **30,000** km/s, which is more than **2,000** times as fast as the highest speed ever achieved by a launcher, to attain escape velocity;

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[4] Refers to any object with a mass, irrespective of magnitude

ix. Note: relativistic effects at the speed of **1/10th of c** are negligible [5];

B. THEREFORE:

i. For a roundtrip at **1/10th of c** to any point in space [6], and considering a launch vehicle filled with **3,000** tons of nuclear fuel equal to more than twice the world's total nuclear arsenal with a combined energy release **5 million** times that of Saturn V, the maximum payload would be:

6 grams (six grams);

ii. For a speed of a little over **1/3rd of c (exactly 7/19th)**, the payload would be just:

One molecule of water [7].

In view of such limitations at speeds only a fraction of **c**, it can thus be suggested that the issue of whether or not a speed **higher** than that of light in a vacuum can be achieved is quite theological in nature, especially when considering that no **massless** phenomenon has been measured at a speed exceeding **c**, let alone extrapolating for one with even the teensiest mass.

Furthermore, any characterization of the speed of massive objects at such magnitudes and distances would assume that the following concepts are well understood:

1. Linearity of very far distances;
2. Nature and linearity of time;
3. Nature and linearity of speed;
4. Nature of mass;
5. Nature of inertia;
6. Nature of universal gravity.

We are not addressing here the nature of other physical quantities, such as energy or entropy, for example, since those are definitions derived from other concepts.

Shouldn't the mere observation of phenomena be absolutely detached from any prior theoretical understanding or misunderstanding thereof?

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[5] At 0.5%

[6] A 90 years voyage to the closest star, including the return.

[7] It takes 33 trillions of trillions [sic] (33.10^{24}) of water molecules to fill one liter.