

## Several Physical Facts

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### It's impossible to violate causality

If we found a phenomenon faster than light speed, the causality is not violated because that phenomenon will define a new causality. Causality doesn't stay attached to light, but to the fastest phenomenon.

### A spacecraft has no speed limit

At light speed, the mass of the craft is infinite, but the reaction mass is also infinite, so we have infinite energy. In the reference frame of the craft, everything stays the same as classical physics predict.

### Gravitational constant

$$G = \frac{cH_0R_U^2}{M_U}$$

Hubble constant --  $H_0 = 2.3 \times 10^{-18} \text{ Hz}$

Light speed --  $c$

Mass of the universe --  $M_U = 1.76 \times 10^{53} \text{ kg}$

Radius of the universe --  $R_U = 1.3 \times 10^{26} \text{ m}$

### Graviton

$$G = \frac{kw^3}{h} = 6.67 \times 10^{-11}; \quad w = 4.8 \times 10^{-4} \text{ ms}^{-1}$$

$$m = \frac{h\sqrt{c^2 - w^2}}{w^2\sqrt{k}} = 4.3 \times 10^{-2} \text{ kg}$$

$$x = \sqrt{k} \frac{w}{c} = 3.2 \times 10^{-29} \text{ m}$$

Group speed of gravity:

$$V = \frac{c^2}{w} = 1.87 \times 10^{20} = 6.2 \times 10^{11} c$$

### Electron and neutrino

All the electrons are binding to a neutrino.

$$\lambda = 137x_e = 3.324 \times 10^{-10}; \quad x_e = \text{electron wavelength}$$

$$m = \frac{h}{c\lambda} = 6.65 \times 10^{-33}$$

Average mass of the neutrino:

$$m_\nu = \frac{m^2}{m_e} = 4.85 \times 10^{-35}$$

Universe mass --  $M_U = 1.76 \times 10^{53}$

Observable mass --  $M_O = 2 \times 10^{52}$  (11%)

$$\Delta M = 1.56 \times 10^{53}$$

Number of neutrinos --  $n = 2.761 \times 10^{87}$

Average mass of the neutrino:

$$m_\nu = \frac{\Delta M}{n} = 5.65 \times 10^{-35}$$

Tau neutrino:

$$m_T = 3 \times 5 \times 10^{-35} = 1.5 \times 10^{-34}$$

### **How can the orbit of an electron be stable?**

The interaction of an electron that orbits a proton propagates at light speed. Due to aberration the orbit must be unstable and we know that's not the case. Why? Because the time delay is equal for both particles. The interaction happens at near half distance of the two particles, so both particles are delayed an equal amount. In this case the orbit is stable.

The same happens with gravity and all the forces. So, the no aberration of gravity doesn't prove that the speed of gravity is greater than light speed. We know that it has a greater speed but the no aberration is not a proven fact.