

## Virtual Photons

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Virtual photons must exist to transport the forces but they are undetectable.

They are longitudinal waves of great frequency and constant wavelength with speeds greater than light speed.

The electron has a field of rotation:

$$w_e = c; \quad f_e = 1.2 \times 10^{20} \text{ Hz}; \quad x_e = 2.426 \times 10^{-12} \text{ m}$$

For virtual photons the quotient between electric and magnetic fields is greater than light speed:

$$\frac{E}{B} > c$$

Virtual photons of the electron:

$$f_B = \frac{f_M^2}{f_e} = 3.91 \times 10^{30} \text{ Hz}; \quad f_M = \frac{c}{\sqrt{k}}; \quad k = 1.9 \times 10^{-34} \text{ m}^2$$

Speed of the virtual photons:

$$w_B = \sqrt{k} f_B = 5.41 \times 10^{13} \text{ ms}^{-1}$$

This is the speed of the electric force.

For the neutrino:

$$f_B = 8.9 \times 10^{35} \text{ Hz}; \quad f = 5.3 \times 10^{14} \text{ Hz}$$

$$w_B = 137c^2; \quad \text{Neutrino mass: } m = 3.9 \times 10^{-36} \text{ kg}$$

The wavelength of the virtual photons is a constant:

$$x = \sqrt{k} = 1.384 \times 10^{-17} \text{ m}$$

The rest energy is also a constant:

$$E = \frac{hc}{\sqrt{k}} = 89.6 \text{ GeV}$$