Superluminal Quantum Models of the Photon and Electron

http://superluminalquantum.org

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A single superluminal quantum composes a photon or an electron.

A photon and an electron may be modeled by a point-like superluminal quantum moving in an open or closed helical trajectory, respectively, and characterized by an energy E and a forward momentum p, with a frequency ω and a wavelength λ along its trajectory. Each superluminal quantum is associated with the usual quantum wave function which can produce interference and diffraction effects. A superluminal quantum is also point-like when it interacts with another superluminal quantum.

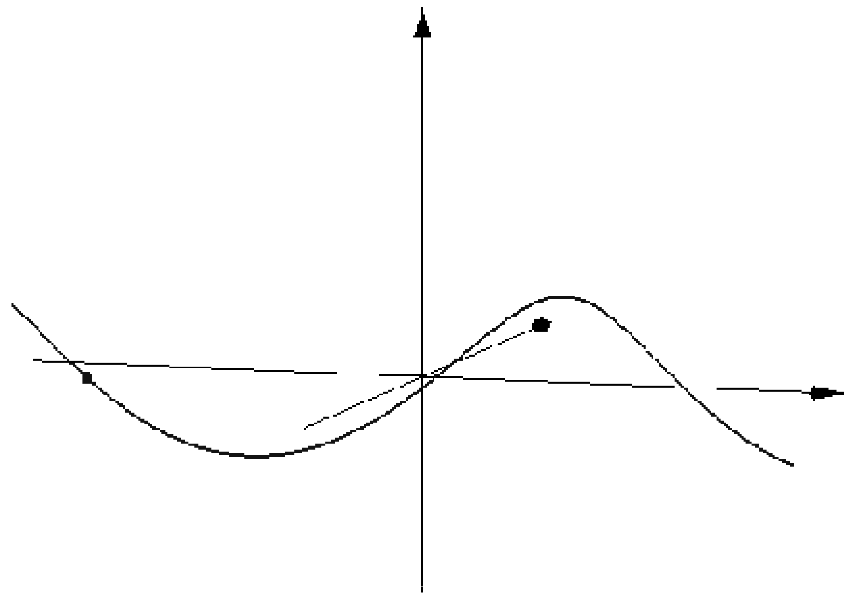
The photon model is a superluminal uncharged quantum moving in an open helical trajectory.

A photon is modeled as a helical movement of a superluminal quantum with forward momentum p along a helical path of radius R, pitch (wavelength) λ , and forward helical angle θ . By combining the angular momentum and linear momentum relations for a photon with this spatially extended helical geometry, the result is:

1) The forward helical angle θ of the superluminal quantum is found to be 45 degrees, for any photon wavelength.

2) The superluminal quantum's helical radius is found to always be $R = \lambda / 2\pi$.

3) The speed of the superluminal quantum is $\sqrt{2}\, c = 1.414..\, c$ along the helical path.



A photon is modeled by an uncharged superluminal quantum moving at $1.414c$ along an open 45-degree helical trajectory of radius $R = \lambda / 2\pi$.

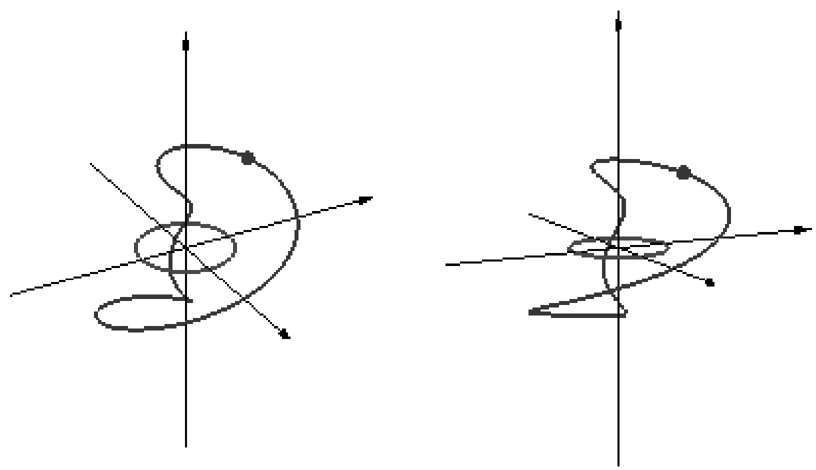
Proof of the above three statements for the superluminal quantum model of the photon.

Assume all the momentum P of the superluminal quantum along its helical path is concentrated at a single point on the helical path .This instantaneous momentum P at this point is directed along its helical path, which makes a constant forward angle θ with the longitudinal direction of the photon. So the longitudinal component of the superluminal quantum's momentum is $P\cos(\theta) = 2\pi\hbar / \lambda$, the experimental longitudinal or linear momentum of a photon. The momentum P's transverse component (which is also perpendicular to the helical radius R to this point object from the helical axis) of momentum is $P\sin(\theta)$, so the angular momentum or spin of this simple photon model is $S = RP\sin(\theta) = \hbar$, the experimental spin or angular momentum of the photon. Combining these two equations containing θ gives $\sin(\theta)/\cos(\theta) = \tan(\theta) = \lambda / 2\pi R$ (the values $\hbar$ and P cancel out) . Now consider the helical geometry. As the superluminal quantum advances a distance λ in the longitudinal direction, it moves a transverse distance 2π R, i.e. once around the circle of radius R defined by the helix. From the way θ is defined, tan(θ) equals this transverse distance divided by the longitudinal distance traveled in one wavelength, or tan(θ) = 2π R/ λ . So we now have two equations for tan(θ). So $\tan(\theta) = 2\pi R / \lambda = \lambda / 2\pi R$ This will only be true if $\lambda = 2\pi R$, that is, when $R = \lambda / 2\pi$ and $\theta = 45^{\circ}$. So since $\theta = 45^{\circ}$ and the forward velocity of the photon is c, the speed of the superluminal quantum is $c / \cos(45^{o}) = c / .707 = 1.414c$.

The electron model is a superluminal charged quantum moving in a closed double-looped helical trajectory.

The electron is modeled by a closed double-looped helical trajectory of a superluminal quantum of charge -*e* and energy $E = mc^2$. Consider one turn of a helix of pitch one Compton wavelength to be looped twice before joining its ends together. It will have a double-looped circular axis of total length one Compton wavelength. If the radius of its circular axis is $R_0 = \frac{1}{2}\hbar / mc$ and the radius of the closed helix is $R_0\sqrt{2}$, then the equation for the coordinates of the superluminal quantum as it moves around this closed helix with angular frequency $\omega_0 = mc^2/\hbar$ is

$$x(t) = R_0(1+\sqrt{2}\cos(\omega_0 t))\cos(2\omega_0 t)$$
$$y(t) = R_0(1+\sqrt{2}\cos(\omega_0 t))\sin(2\omega_0 t)$$
$$z(t) = R_0\sqrt{2}\sin(\omega_0 t)$$



Two views of the superluminal quantum model of the electron. The circle is the axis of the double-looped helical trajectory of the superluminal quantum.

Properties the superluminal quantum model of the electron shares with the Dirac equation's electron with *Zitterbewegung*

1. The calculated electron spin $s = \frac{1}{2}\hbar$.

2. The calculated electron magnetic moment $\mu = e\hbar / 2mc$ the Bohr magneton (g=2).

3. The *Zitterbewegung* light velocity *c* of the electron (the electron model resembles a circling photon model with speed *c*).

4. The *Zitterbewegung* frequency $2\omega_0$, where $\omega_0 = mc^2 / \hbar$.

5. The *Zitterbewegung* radius $R_0 = \frac{1}{2}\hbar / mc$.

6. The prediction of the electron and the positron (due to the two possible helicities in the electron model).

7. The *Zitterbewegung* distinction between the coordinates of the electron's point charge and the position of the electron as a whole.

8. The non-conservation of momentum of the *Zitterbewegung* motion.