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Is Planck's Constant Really Constant

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We know from the acoustics that the energy of an acoustic wave or its density of energy can be written as $E = M \cdot v^2$ or $w = \rho \cdot v^2$, where *v* is real additional non thermal velocity of sound particles. This energy consists of two equally large parts of energy: Kinetic energy and potential energy. Potential portion has its cause in the elasticity of the transmitting medium and the kinetic portion in the displacement speed of the single particles of the medium.

If a particle (electron) in a medium is accelerated it affects other particle in the surrounding medium whereby the effect is transferred with the characteristic speed of the respective medium. That means that waves has two speeds: The speed of displacement of the particle $v(\xi)$ and the transmission speed of the effect on the surrounding medium *c*. In case of air this speed *c* corresponds to the thermal velocity of the air particles. In a liquid or in a solid body this speed depends on the elasticity of the medium. Until a particle is moved into the maximum position the effect spreads over a distance *ct* and all particles along this distance experience a certain deflection from the resting point. The energy, which is transferred during the deflection to the maximum and back distributes over a half wavelength in the medium. From the principle of conservation of energy it follows that the energy which was invested into production of a wave, can be received back again at the arrival point of the wave. The invested energy is thus twice as large as the energy which is necessary to overcome the elastic potential energy. If the wave does not move it would have only a half of the energy which is exchanged between the potential and the kinetic portion (harmonic oscillator). Moves an observer with the wave he sees only the potential portion, i.e. only one half of the energy.

The transmission and displacement speed of particles of a wave are linked by the energy and/or momentum relations:

$$M \cdot v^2 = m \cdot c^2 \quad \text{and/or} \quad M \cdot v = m \cdot c \,,$$

whereby *m* is the apparent mass of a half wave. In case of sound in a fluid this mass can be thought as increase or decrease of density of medium in some regions of the wave.

Similar, the mass of the electromagnetic waves can be regarded as mass difference between unperturbed part of ether and 'compressed' part of it:

$$m = \Delta M = M' - M \,.$$

This mass advances with the velocity *c* and carries the energy $E = \Delta M \cdot c^2$ and Momentum $p = \Delta M \cdot c$ with itself.

The energy and momentum of an electromagnetic wave is after Planck: $E = hf = hc/\lambda$ and $p = h/\lambda = hf/c$ respectively. From momentum follows: $h = \Delta M \cdot c \cdot \lambda$ or $\Delta M = h/(c \cdot \lambda) = hf/c^2$ and $h = M \cdot v \cdot \lambda = 2\pi M \cdot \xi_o \cdot f \cdot \lambda = 2\pi M \cdot \xi_o \cdot c$ or $M = h/(v \cdot \lambda) = hf/(v \cdot c)$. This is compatible with De Broglie relation for the light and matter.

With $M \cdot v^2 = \Delta M \cdot c^2$ one receives $\Delta M = M \cdot v^2 / c^2 = h/(\mathrm{c} \cdot \lambda)$ or $h = M \cdot v^2 \cdot \lambda / c = M \cdot \lambda \cdot (\xi_o \cdot \omega)^2/\mathrm{c} = 4\pi^2 \mathrm{M} \cdot \xi_o^2 \cdot f$ and the energy $E = 4\pi^2 \mathrm{M} \cdot \xi_o^2 \cdot f^2$. If Planck's Constant is constant $4\pi^2 \mathrm{M} \cdot \xi_o^2 \cdot f$ should also be a constant i.e. $\xi_o^2 \cdot f$ should be constant. But especially for moving systems the frequency varies with the speed of system and *h* can not stay unchanged. According to old theory of light the energy of a light wave per unit of length is inversely proportional to square of the wavelength and thus the energy per a wave is inversely proportional to the first power of its wavelength:

$$w = K/\lambda = hc/\lambda$$

and we obtain the same result [1]. That means if *h* is a constant the energy would not change in the moved system.

Comparing equations for energy $M \cdot v^2 = \Delta M \cdot c^2$ and momentum $M \cdot v = \Delta M \cdot c$ one can see that both equations can not be fulfilled simultaneously. Multiplying right side with c we would have:

$$M \cdot v \cdot c = \mathrm{M} \cdot \mathrm{v}^2 = \Delta M \cdot c^2$$

and the De Broglie relation can not hold. Also for the photons in an optical medium the formulas for energy and momentum can not bi simultaneously valid.

It is known from the mechanics that mechanical momentum is defined as derivation of kinetic energy with respect to velocity and we receive:

$$p = \frac{dE}{dv} = \frac{d}{dv}\left(\frac{\mathrm{M} \cdot \mathrm{v}^2}{2}\right) = M \cdot v = M \cdot \xi_o \cdot \omega = 2\pi M \cdot \xi_o \cdot f$$

with $\xi = \xi_o \cdot \sin(\omega \cdot t)$.

This consideration shows that electromagnetic interactions between electromagnetic waves and matter are mere mechanical interactions between ether and matter.

References

1. F. Hasenöhrl: Theorie der Strahlung in bewegten Körpern, Ann. Phys. Folge IV. Band 15, (1904), 344-370