

# Hopeless Phase Velocity

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## Abstract

Among the exciting outcomes of the *Beaumanner relative quantum formula RQF* is the linking of de Broglie's matter wave length to the velocity of light. I show that a phase velocity introduced by de Broglie is not believable since it comes from relating his matter wave length to the total Einstein energy. Instead it should relate to the energy of mechanical momentum which I have defined. In an additional argument I show that the strange phase velocity also can be viewed as coming from an assumption that mechanical momentum is linearly coupled to the total energy, which it is not.



## Right energy

Planck constant  $h$  and matter wave frequency  $f$ . Deploy also relative velocity  $v$ , mass in motion  $m$  and velocity of light  $c$ . RQF defines momentum energy from  $(h/mc) \cdot f = v$ .

$$\text{Momentum energy } hf = vmc$$

$$\text{Velocity of light } \lambda f = c$$

These two equations will produce the de Broglie matter wave length  $\lambda = h/mv$ .

## Wrong energy

In order to obtain his wave length from the total energy de Broglie had to surmise phase velocity  $c^2/v$ .

$$\text{Total energy } hf = mc^2$$

$$\text{Phase velocity } \lambda f = c^2/v$$

I propose that those two equations produced the noted matter wave length from incorrect sources.

## Mathematical argument

Only for photons is energy a linear function of momentum  $E=pc$ . In this case  $E/p$  and  $dE/dp$  are equal, namely  $c$ . But with rest mass  $m_0$  involved Einstein energy demands that

$$E = \sqrt{(p^2 c^2 + m_0^2 c^4)}$$

which is not a linear function of mechanical momentum  $p=mv$ . Then you must utilize the derivative  $dE/dp$  resulting in the relative velocity  $v$ .

If you apply only  $E/p$  in the mass you get the hopeless phase velocity again:

$$\text{Total energy } E = mc^2$$

$$\text{Mechanical momentum } p = mv$$

Clearly we must have  $dE/dp$ .

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<sup>1</sup> Alter ego. Two original printouts were signed on September 11 of 2005.