

Quantum Relativity Revisited

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Quantum Relativity and its consequences.

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Abstract

Here will be presented a formula that explains the de Broglie wave length as being generated by the Compton wave length in relative motion. Moreover, the Planck quantum energy emergent in this context fits right into Einstein's $E = mc^2$ when it is expressed like a function of momentum mv . The equation is the *Beaumanner relative quantum formula* and the associated energy vmc I call the relativistic energy of mechanical momentum.



1§ Quantum Relativity

The velocity of light is c . Planck's constant is h .

A. The Beaumanner relative quantum formula RQF.

Elementary particles with mass m define the Compton wave length h/mc . In motion with velocity v a relative matter wave frequency f is generated by way of the basic relationship between wave length, frequency and velocity in a wave

$$(h/mc) \cdot f = v.$$

B. Association to de Broglie's assumption.

The RQF in A produces the wave length h/mv in association with a wave at the velocity of light following

$$(h/mv) \cdot f = c.$$

C. A relative quantum.

The RQF gives rise to a strange quantum hf like

$$hf = vmc.$$

I suggest the term *relativistic energy of mechanical momentum* for the quantity vmc . It is enlightening to note that according to the RQF the wave momentum hf/c of this energy is equal to mechanical momentum mv .

2§ The Planck and Einstein connection

The relative Planck quantum hf arising from the RQF is vmc . Astonishingly this goes right into Einstein's $E = mc^2$ which can be written like a function of momentum

$$(mc^2)^2 = (vmc)^2 + (m_0 c^2)^2.$$

Here is m the relativistic mass $m_0 / \sqrt{1 - v^2/c^2}$ and m_0 the rest mass, of course.

3§ Conclusions & beyond

My RQF and quantum relativity QR is a strong link between quantum theory and relativity that has been high in demand for many years. They point in a direction of an extension of the wave description of mass and its fields. But it is not obvious how mass constitutes itself and for instance how the Compton wave length exists. There are some theories and hypotheses. To me, however, my Beaumanner relative quantum formula is already quite beautiful and well connected. I hope that the reader too will find that QR and the RQF provide a fruitful and reliable perspective.

¹ Alter ego. Two original printouts were signed on January 7 of 2003. I have changed the RQF formula name. And a wording in 1§A to 'matter wave' (frequency). Copyright. Do not resell or publicize this document without consent.