1)

181(6): Flow Chart of Equations for Field Particle Interaction.

In this theory the free particle is described by the Einstein energy equation with the measured mass m_0. The field with which the particle interacts is described by $\hbar\kappa^\mu$. The field is described by its covariant mass m. The covariant mass m of particle 2 interacts with the measured mass of particle $\underline{1}$. The Einstein / de Broglie equations are applied to the covariant mass m.

$$\boxed{p^\mu p_\mu = m_0^2 c^2}$$

$$\downarrow$$

$$\boxed{p^\mu \rightarrow p^\mu - \hbar\kappa^\mu}$$

$$\downarrow$$

$$\boxed{(p^\mu - \hbar\kappa^\mu)(p_\mu - \hbar\kappa_\mu) = m_0^2 c^2}$$

$$\downarrow$$

$$\boxed{p^\mu p_\mu = \hbar^2 \kappa^\mu \kappa_\mu + m_0^2 c^2}$$

$$\downarrow$$

$$\boxed{(\Box + R)\phi = 0}$$

$$\boxed{R = \frac{\omega^2}{c^2} - \kappa^2 + \left(\frac{m_0 c}{\hbar}\right)^2}$$

$$\downarrow$$

$$\boxed{m^2 = \left(\frac{\hbar}{c}\right)^2 \left(\frac{\omega^2}{c^2} - \kappa^2\right)}$$

2)

Therefore the mass m is that associated with the field of particle 2. The mass m_0 is the measured mass of particle 1. In standard particle theory, notably that of scattering processes such as Compton scattering, there is no field present. A rigorous examination of standard particle theory in 2010 revealed severe self inconsistencies, and this is known now to be due to the absence of a field of force.

The field of force of the particle 2 is describable by its covariant mass:

$$m^2 = \left(\frac{\hbar}{c}\right)^2\left(\frac{\omega^2}{c^2} - \kappa^2\right) \quad -(1)$$

This is in general a matter field. So in general:

$$\frac{\omega^2}{c^2} - \kappa^2 \neq 0. \quad -(2)$$

The total mass of particle 2 is:

$$m_2^2 = m^2 + m_{20}^2 \quad -(3)$$

where m_{20} is the mass of the free particle 2.

The mass of a particle is therefore the mass of the free particle combined with the mass of the force field generated by the particle. These

?, masses are defined geometrically by curvatures:

$$\boxed{R(\text{total}) = R(\text{free particle}) + R(\text{field})} \quad -(4)$$

in which:

$$R(\text{total}) = (m(\text{total})\, c / \hbar)^2 \quad -(5)$$

and so on. This is based on the philosophy of relativity, where physics is derived from geometry.

Defining the total mass as:

$$m^2 = m_0^2 + \left(\frac{\hbar}{c}\right)^2 \left(\frac{\omega^2}{c^2} - \kappa^2\right), \quad -(5)$$

the de Broglie / Einstein equations are:

$$E = \gamma m c^2 = \hbar \omega \quad -(6)$$

$$\underline{p} = \gamma m \underline{v} = \hbar \underline{\kappa} \quad -(7)$$

and are applied to the total mass. For the hypothetical "massless" particle:

$$p^\mu = \hbar \kappa^\mu, \quad -(8)$$

$$\frac{\omega}{c} = \kappa. \quad -(9).$$
