Inference of Schrodinger Equation from Classical Wave Mechanics[1]

P-I. JOHANSSON, Uppsala Univ., SWE, J.X. ZHENG-JOHANSSON, IOFPR, SWE — A localized oscillatory point charge \( q \) generates in a one-dimensional box electromagnetic waves which for potential field \( V = 0 \) may be generally described by monochromatic plane waves \( \{ \varphi_i = C_K e^{i(KX - \Omega T + \alpha_i)} \} \) of angular frequency \( \Omega \), wavevector \( K = \Omega/c \), and initial phases \( \{ \alpha_i \} \), traveling at the velocity of light \( c \). \( q \) and \( \{ \varphi_i \} \) as a whole is here taken as a particle, which total energy \( E \) and mass \( M \) are given by the basic equations \( E = \hbar \Omega = Mc^2 \), \( 2\pi \hbar \) being Planck constant. (For example, \( q = -e \) and \( \hbar \Omega = 511 \) keV give an electron.) \( \{ \varphi_i \} \) as incident and reflected and those from the charge as reflected in the box superimpose into a total wave \( \psi = \sum \varphi_i \) that, as with \( \varphi_i \), obeys the classical wave equation (CWE): \( c^2 \frac{d^2 \psi}{dX^2} = \frac{d^2 \psi}{dT^2} \). If now the particle is traveling at velocity \( v \), then \( \{ \varphi'_i \} \) are Doppler effected and form a total wave \( \psi' = \Phi \Psi \), with \( \Psi = C \sin(K_d X) e^{i\Omega_d T} \) enveloping a beat wave and identifiable as de Broglie wave of angular frequency \( \Omega_d = \Omega(v/c)^2 \), and \( \Phi \) being an undisplaced monochromatic wave. Using \( \psi' \) in CWE (see [1]2004b for incorporation of \( V \neq 0 \)), gives upon decomposition a separate equation describing the particle dynamics, \[ -\hbar^2 \frac{\partial^2}{\partial X^2} + V \right] \Psi(X, T) = i\hbar \frac{\partial \Psi(X, T)}{\partial T} \], which is equivalent to Schrödinger’s equation. [1] J. X. Zheng-Johansson and P-I. Johansson, arXiv:Physics/0411134 (2004a); ”Unification of Classical, Quantum and Relativistic Mechanics and of the Four Forces”, (Nova Science, 2004b).