The Unified Equation of Quantum and Gravity
Based on the Unified Classical/Quantum Final Particle

Samir Hussein Abuzaid
14 Ahmed Kassem Gouda street – Nasr City –
Cairo – Egypt - Post no. 11317
samir_abuzaid_h@hotmail.com, samirabuzaid@gmail.com
www.arabphilosophers.com

Abstract. Classical Mechanics is based on the concept of the final particle (the indivisible atom) that is endowed with the power of attraction. Since the appearance of QM, we know that Quantum particles are endowed with irreducible randomness. Therefore, the final particle should be endowed with both features: gravity and randomness. In this paper we show that admitting this postulate to current physics leads to Unification of Gravity and QM, from one side, and a Generalized Theory of Gravity that makes possible to admit an exact solution to the forces between two compact bodies, from the other side.

I- Analytic Proof

1- The total mass of the particle is given by multiplying the number of the final particles $\boldsymbol{N}$ by its unit mass $\bar{\boldsymbol{\mu}}$ (i.e. $\boldsymbol{m = \bar{\mu} N}$). Classical bodies represent a special case in which $\boldsymbol{N}$ approaches infinity. Therefore, Schrödinger equation in such a special case reduces to Laplace equation which governs gravitational forces. As such, Schrödinger equation turns out to be a probabilistic continuity equation that unifies both realms on the classical level (i.e., non-relativistic motion and very week gravitational effects).

2- The effects of relativistic motion is already known and is given by Lorentz transformation, therefore mass transformation is given by,

$$\boldsymbol{m_v = m_0 \left(1 - \frac{(V_b)^2}{c^2}\right)^{-1/2}} \qquad (\mathbf{1})$$

The effects of high gravitational fields is given by calculating the average instantaneous velocity of the final particles of the body, which is to be used to calculate the effects of high gravitational field on a flat local background space-time , as follows,

$$\overline{\boldsymbol{Vb}}^2 = \int_{-r}^{r} \frac{\boldsymbol{mG}}{\boldsymbol{r^2}} \boldsymbol{dr} = \frac{\boldsymbol{2mG}}{\boldsymbol{r}} \qquad \textbf{or}, \qquad \overline{\boldsymbol{V_b}} = \sqrt{\frac{\boldsymbol{2mG}}{\boldsymbol{r}}}$$

Substituting in (1), we get $\boldsymbol{m_g = m_0 \left(1 - \frac{2mG}{rc^2}\right)^{-1/2}}$, which is equivalent to Schwarzschild solution of GTR. Knowing the effects of relativistic motion and high gravitational fields on the distribution of the final particles of the body in space-time makes possible for us to deduce the general form of the unified equation of Gravity and QM from the unified continuity/Schrödinger equation given in 1 above.

II- Experimental Proof

The exact formula for the acceleration of body1 under gravitational effects of body2, for the case of non-relativistic compact bodies for harmonic coordinates, is given by,

$$\boldsymbol{a_1 = G \frac{\bar{\gamma}_1 m_2}{r^2}}$$

$$\boldsymbol{\bar{\gamma}_1 = \left(1 - \frac{{V_b}^2}{c^2}\right)^{-\frac{1}{2}} \left(1 - \frac{2m_2G}{\rho c^2}\right)\left(1 - \frac{m_2G}{\rho c^2}\right)^2 \left(1 - \frac{2m_1G}{\rho c^2}\right)^{-\frac{1}{2}}}$$

$$\boldsymbol{V_b = V_{b1} - V_{b2}} \quad , \quad \boldsymbol{\rho = r\left(1 - \frac{m_2G}{rc^2}\right)^{-1}}$$

This formula is in agreement with the calculations of Blanchet and Guillaume (2001:, *Physical Review D*, V. 63, 062005: 1-43.), which is found to be within specific limitations in agreement with experimental results. Comparison shows agreement with the results of Blanchet and Guillaume up to 9 digits at $\boldsymbol{mg/rc^2 = 0.01}$ and 5 digits (0.99999) at $\boldsymbol{mg/rc^2 = 0.03}$, and as expected starts to deviate after wards and reaches 0.99 when this ratio becomes equal to 0.1 as well as when the ratio $\boldsymbol{m_1/m_2}$ exceeds 10%.