40 Schwarzschild Frequency

The Schwarzschild metric may be modified to represent a scalar frequency field. The field is associated with a primary object. If a second object interacts with the field the result is a force field. The force field equation may be reduced to the Schrodinger energy equation. Frequency provides a link between the Schwarzschild metric and the Schrodinger energy equation.

The Schwarzschild Metric;

The Schwarzschild metric may be written as:

$$\partial s^2 = -(R/r)c^2\partial t^2 + (r/R)\partial r^2 + r^2\partial\theta^2 + r^2 Sin^2(\theta)\partial\phi^2$$

Where: the set $(-t, r, \theta, \phi)$ represents the polar co-ordinates of space-time

s is the space-time interval

R is a difference of radial distance; $R = r - r_S$

r_S is the Schwarzschild radius; $r_S = 2Gm/c^2$

c is the light constant

G is the gravitational constant

m is mass

Spatial Structure;

The angles (θ, ϕ) are: $\theta = U_\theta/r$ and: $\phi = U_\phi/w$

Where: U_θ, U_ϕ are the arc lengths

w is a radial distance; $w^2 = x^2 + y^2$

r is a radial distance; $r^2 = x^2 + y^2 + z^2$

the set (x, y, z) represents the Cartesian co-ordinates of space

Spatial structure may be represented as:

$x = wCos(\phi)$ and: $y = wSin(\phi)$

$z = rCos(\theta)$ and: $w = rSin(\theta)$

$U_\theta = r\theta$ and: $U_\phi = w\phi$

$\partial U_\theta = r\partial\theta$ and: $\partial U_\phi = w\partial\phi = rSin(\theta)\partial\phi$

The Schwarzschild metric may be written as: $\partial s^2 = -(R/r)c^2\partial t^2 + (r/R)\partial r^2 + \partial U_\theta^2 + \partial U_\phi^2$

Reciprocal Wavelength;

Assume the interval (s) reciprocates to the complex interval wavelength ($i\lambda_S$), giving:

$$s + i\lambda_S = 0$$

$$\partial s + i\partial\lambda_S = 0$$

$$\partial s^2 + \partial\lambda_S^2 = 0$$

The Schwarzschild metric may be written as:

$$-\partial\lambda_S^2 = -(R/r)c^2\partial t^2 + (r/R)\partial r^2 + \partial U_\theta^2 + \partial U_\phi^2$$

$$(R/r)c^2\partial t^2 = (r/R)\partial r^2 + \partial U_\theta^2 + \partial U_\phi^2 + \partial\lambda_S^2$$

The Modified Metric;

The geometric average of radial distance (R_G) is: $R_G = (rR)^{½}$

Division of the metric by the squared average gives:

$$c^2\partial t^2/r^2 = \partial r^2/R^2 + \partial U_\theta^2/rR + \partial U_\phi^2/rR + \partial\lambda_S^2/rR$$

$$c^2\partial t^2/r^2 = \partial r^2/R^2 + \partial U_\theta^2/R_G^2 + \partial U_\phi^2/R_G^2 + \partial\lambda_S^2/R_G^2$$

The modified Schwarzschild metric is:

$$c^2/r^2 = (\partial r^2/\partial t^2)/R^2 + (\partial U_\theta^2/\partial t^2)/R_G^2 + (\partial U_\phi^2/\partial t^2)/R_G^2 + (\partial\lambda_S^2/\partial t^2)/R_G^2$$

also: $c^2/r^2 = (\partial r^2/\partial t^2)/R^2 + (\partial U_\theta^2/\partial t^2)/R_G^2 + (\partial U_\phi^2/\partial t^2)/R_G^2 - (\partial s^2/\partial t^2)/R_G^2$

Frequency;

The modified Schwarzschild metric includes squared velocities (v_n^2):

$$c^2/r^2 = v_r^2/R^2 + v_\theta^2/R_G^2 + v_\phi^2/R_G^2 + v_\lambda^2/R_G^2$$

and: $c^2/r^2 = v_r^2/R^2 + v_\theta^2/R_G^2 + v_\phi^2/R_G^2 - v_S^2/R_G^2$

Frequency (f_n) is: $f_n = v_n/R_n$

$$c/r = 1/t = f_t$$

Giving the frequency equations; $f_t^2 = f_r^2 + f_\theta^2 + f_\phi^2 + f_\lambda^2$

$$f_t^2 = f_r^2 + f_\theta^2 + f_\phi^2 - f_S^2$$

The magnitude of spatial frequency (f_R) is related to components of spatial frequency: $f_R^2 = f_r^2 + f_\theta^2 + f_\phi^2$

The frequencies of space-time are: $f_t^2 = f_R^2 + f_\lambda^2$

$f_t^2 = f_R^2 - f_S^2$

Where: f_t is temporal frequency; $f_t = c/r = 1/t$

f_R is spatial frequency; $f_R^2 = f_r^2 + f_\theta^2 + f_\phi^2$

f_λ is frequency associated with wavelength in space-time (“wave” space-time)

f_S is frequency associated with displacement in space-time (“particle” space-time)

Wave Interference;

A ratio of constructive wave interference (C) is: $C = (f_t + f_R)/f_\lambda$

A ratio of destructive wave interference (D) is: $D = (f_t - f_R)/f_\lambda$

The product of opposite ratios is unity: $CD = 1$

Giving the wave frequencies of space-time; $f_\lambda^2 = f_t^2 - f_R^2$

The Tensor Equation;

The modified Schwarzschild metric includes squared velocities (v_n^2):

$$c^2/r^2 = v_r^2/R^2 + v_\theta^2/R_G^2 + v_\phi^2/R_G^2 + v_\lambda^2/R_G^2$$

$$(R^2/r^2)c^2 = v_r^2 + (R^2/R_G^2)(v_\theta^2 + v_\phi^2 + v_\lambda^2)$$

Assume; $v_1/c = R/r$

$v_r/v_2 = a/b$

$v_\theta^2 + v_\phi^2 + v_\lambda^2 = ½v_3^2$

Giving; $v_1^2 = (a/b)^2 v_2^2 + ½(R^2/R_G^2)v_3^2$

Upgrade scalar velocities to vectors: $\boldsymbol{v_1}^2 = (a/b)^2 \boldsymbol{v_2}^2 + ½(R^2/R_G^2)\boldsymbol{v_3}^2$

A basic Tensor ($\underline{\boldsymbol{T_n}}$) is: $\underline{\boldsymbol{T_n}} = \boldsymbol{v_n}^2$

Giving a basic tensor field equation; $\underline{\boldsymbol{T_1}} = (a/b)^2 \underline{\boldsymbol{T_2}} + ½(R^2/R_G^2)\boldsymbol{T_3}$

Particle Interference;

Constructive particle frequency interference (C) is: $C = (f_{SR} + if_{S0})$ where; $i^2 + 1 = 0$

Destructive particle frequency interference (D) is: $D = (f_{SR} - if_{S0})$

The product cancels: $CD = 0$

$$(f_{SR} + if_{S0})(f_{SR} - if_{S0}) = 0$$

$$f_{SR}^2 + f_{S0}^2 = 0$$

$$f_{SR} = -if_{S0}$$

Special Frequencies;

The frequencies of space-time are: $f_t^2 = f_R^2 + f_\lambda^2$ (wavelength interval)

$f_t^2 = f_R^2 - f_S^2$ (displacement interval)

Special frequencies (f_{t1} , f_{t2} , f_{Sr} , f_{SR}) are:

$f_t^2 = f_{t1}f_{t2}$ assume; $\text{Cos}(T) = f_{t1}/f_t = f_t/f_{t2}$ where; f_t is present, f_{t1} is past, f_{t2} is future

$f_S^2 = v_S^2/R_G^2 = v_S^2/rR = (v_S/r)(v_S/R) = (f_{Sr})(f_{SR})$

The frequencies of displacement space-time are: $f_t^2 = f_R^2 - f_S^2$

The scalar frequency field associated with a primary object is: $f_{t1}f_{t2} = f_R^2 - (f_{Sr})(f_{SR})$

$$f_{t1}f_{t2} = f_R^2 - (f_{Sr})(-if_{S0})$$

$$f_{t1}f_{t2} = f_R^2 + i(f_{Sr})(f_{S0})$$

Interaction;

The Schwarzschild metric may be modified to give the Schrodinger equation.

Two objects interact. The frequency field of a primary object interacts with the momentum (p_2) of a secondary object. The result is a scalar force field. The interaction is:

$$(f_{t1}p_2)(f_{t2}p_2) = (f_R p_2)^2 + i(f_{Sr}p_2)(f_{S0}p_2)$$

Force (F_n) is: $F_n = f_n p_2$

Giving a scalar force field: $F_{t1}F_{t2} = F_R^2 + iF_{Sr}F_{S0}$

Force (F_n) is: $F_n = E_n/r$

Giving: $E_{t1}E_{t2}/r^2 = E_R^2/r^2 + iE_{Sr}E_{S0}/r^2$

Energies of the interaction are: $E_{t1}E_{t2} = E_R^2 + iE_{Sr}E_{S0}$

Energy definitions are:

E_{t1} is potential energy; $E_{t1} = V$

E_{t2} is kinetic energy; $E_{t2} = ½mv_{t2}^2$

E_R is photonic energy; $E_R = ½ħf_R$

E_{Sr} is photonic energy; $E_{Sr} = ħf_{Sr}$

E_{S0} is kinetic energy; $E_{S0} = ½mv_{S0}^2$

Where: ħ is the reduced Plank constant; $ħ = h/2\pi$

Energy definitions give the energies of interaction:

$V(½mv_{t2}^2) = (½ħf_R)^2 + i(ħf_{Sr})(½mv_{S0}^2)$

$-½ħ^2f_R^2 + V(mv_{t2}^2) = i(ħf_{Sr})(mv_{S0}^2)$

Frequency definitions are:

$f_{Sr} = \partial/\partial t$ (operator)

$f_R^2 = \partial^2 v_R^2/\partial R^2$

The energies of interaction may be written as:

$-½ħ^2(\partial^2 v_R^2/\partial R^2) + V(mv_{t2}^2) = iħ(\partial/\partial t)(mv_{S0}^2)$

$-½ħ^2(\partial^2/\partial R^2)v_R^2 + V(mv_{t2}^2) = iħ(\partial/\partial t)(mv_{S0}^2)$

Velocity definitions are:

$v_R = v_{t2} = v_{S0} = \psi/t$ where; ψ is a wave function

The energies of interaction may be written as:

$-½ħ^2(\partial^2/\partial R^2)(\psi^2/t^2) + Vm(\psi^2/t^2) = iħ(\partial/\partial t)m(\psi^2/t^2)$

Giving the Schrodinger wave equation: $-(ħ^2/2m)(\partial^2/\partial R^2)\psi + V\psi = iħ(\partial/\partial t)\psi$

Where the spatial operator $(\partial^2/\partial R^2)$ is; $\partial^2/\partial R^2 = \partial^2/\partial x^2 + \partial^2/\partial y^2 + \partial^2/\partial z^2$ (LaPlace operator)

The operator equation for interaction is: $(ħ^2/2m)(\partial^2/\partial R^2) - V + iħ(\partial/\partial t) = 0$

Conclusion;

The Schwarzschild metric may be modified to represent frequency, leading to the Schrodinger equation.