The spherical solution of the quantum gravity

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ABSTRACT

In the general relativity theory, using Einstein's gravity field equation, discover the spherical solution of the quantum gravity. The careful point is that this theory is different from the other quantum theory. This theory is made by the Einstein's field equation.

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I.Introduction

This theory is that it discovers the spherical solution of the quantum gravity.

Think that use following the formula.

$\alpha = \frac{hc}{GM^2}$ is non-Dimension number. α 's Dimension is $\frac{J \cdot s \cdot m/s}{N \cdot m^2 \cdot kg^2/kg^2} = \frac{J \cdot m}{J \cdot m} = 1$

h is the plank constant, c is the light speed, G is the gravity constant, M is the matter's mass.

The spherical solution (The Schwarzshild solution) of the general relativity is

$$d\tau^2 = (1 - \frac{2GM}{rc^2})dt^2 - \frac{1}{c^2}[\frac{dr^2}{1 - \frac{2GM}{rc^2}} + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2] \tag{1}$$

II. Additional chapter -I

In this theory, the general relativity theory's field equation is written completely.

$$R_{\mu\upsilon} - \frac{1}{2} g_{\mu\upsilon} R = -\frac{8\pi G}{c^4} T_{\mu\upsilon} \tag{2}$$

Eq (2) multiply $g^{\mu\upsilon}$ and does contraction,

$$g^{\mu\upsilon} R_{\mu\upsilon} - \frac{1}{2} g^{\mu\upsilon} g_{\mu\upsilon} R$$

$$= -R = -\frac{8\pi G}{c^4} T^{\lambda}{}_{\lambda} \tag{3}$$

Therefore, Eq (2) is

$$R_{\mu\upsilon} - \frac{1}{2} g_{\mu\upsilon} \frac{8\pi G}{c^4} T^{\lambda}{}_{\lambda} = -\frac{8\pi G}{c^4} T_{\mu\upsilon}$$

$$R_{\mu\upsilon} = -\frac{8\pi G}{c^4} (T_{\mu\upsilon} - \frac{1}{2} g_{\mu\upsilon} T^{\lambda}{}_{\lambda}) \tag{4}$$

In this time, the spherical coordinate system's vacuum solution is by $T_{\mu\upsilon} = 0$

$$R_{\mu\upsilon} = 0 \tag{5}$$

The spherical coordinate system's invariant time is

$$d\tau^2 = A(t,r)dt^2 - \frac{1}{c^2}[B(t,r)dr^2 + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2] \tag{6}$$

Using Eq(6)'s metric, save the Riemannian-curvature tensor, and does contraction, save Ricci-tensor.

$$R_{tt} = -\frac{A''}{2B} + \frac{A'B'}{4B^2} - \frac{A'}{Br} + \frac{A'^2}{4AB} + \frac{\ddot{B}}{2B} - \frac{\dot{B}^2}{4B^2} - \frac{\dot{A}\dot{B}}{4AB} = 0 \tag{7}$$

$$R_{rr} = \frac{A''}{2A} - \frac{A'^2}{4A^2} - \frac{A'B'}{4AB} - \frac{B'}{Br} - \frac{\ddot{B}}{2A} + \frac{\dot{A}\dot{B}}{4A^2} + \frac{\dot{B}^2}{4AB} = 0 \tag{8}$$

$$R_{\theta\theta} = -1 + \frac{1}{B} - \frac{rB'}{2B^2} + \frac{rA'}{2AB} = 0 \tag{9}$$

$$R_{\phi\phi} = R_{\theta\theta} \sin^2\theta = 0 \tag{10}$$

$$R_{tr} = -\frac{\dot{B}}{Br} = 0$$

$$R_{t\theta} = R_{t\phi} = R_{r\theta} = R_{r\phi} = R_{\theta\phi} = 0 \tag{11}$$

In this time, $' = \frac{\partial}{\partial r}$, $\cdot = \frac{1}{c}\frac{\partial}{\partial t}$

By Eq(11),

$$\dot{B} = 0 \tag{12}$$

By Eq(7) and Eq(8),

$$\frac{R_{tt}}{A} + \frac{R_{rr}}{B} = -\frac{1}{Br}\left(\frac{A'}{A} + \frac{B'}{B}\right) = -\frac{(AB)'}{rAB^2} = 0 \tag{13}$$

Therefore,

$$A = \frac{1}{B} \tag{14}$$

If Eq(9) is inserted by Eq(14),

$$R_{\theta\theta} = -1 + \frac{1}{B} - \frac{rB'}{2B^2} + \frac{rA'}{2AB} = -1 + \left(\frac{r}{B}\right)' = 0 \tag{15}$$

If solve Eq(15)

$$\frac{r}{B} = r + C \rightarrow \frac{1}{B} = 1 + \frac{C}{r} \tag{16}$$

In this time, be able to think following the formula.

$$C = -\frac{2GM}{c^2}\exp\left[-\alpha_1\left(\frac{hc}{GM^2}\right)^{\beta_1} - \alpha_2\left(\frac{hc}{GM^2}\right)^{\beta_2} - \ldots\alpha_i\left(\frac{hc}{GM^2}\right)^{\beta_i} \ldots - \alpha_n\left(\frac{hc}{GM^2}\right)^{\beta_n}\right]$$

$$N_i > \alpha_i \geq 0, \beta_i \geq 1 - \varepsilon_{0i}, \ 0 < \varepsilon_{0i} << 1$$

$\alpha_1, \alpha_2, .. \alpha_n, \beta_1, \beta_2, .. \beta_n$ are real numbers.

N_i is the large number. ε_{0i} is the smallest number.

(17)

The reason of $\beta_i \geq 1 - \varepsilon_{0i}$ is that if $0 \leq \beta_i < 1 - \varepsilon_{0i}$,in this case, it isn't able to be the real gravity situation. In this time, the large number N_i is the number that is befitted the real gravity situation. And the smallest number ε_{0i} is the positive number.

$$\frac{1}{B} = 1 - \frac{2GM}{rc^2}\Sigma(M)$$

$$\Sigma(M) = \exp[-\alpha_1(\frac{hc}{GM^2})^{\beta_1} - \alpha_2(\frac{hc}{GM^2})^{\beta_2} - ..\alpha_i(\frac{hc}{GM^2})^{\beta_i} - ..-\alpha_n(\frac{hc}{GM^2})^{\beta_n}]$$

$$N_i > \alpha_i \geq 0 , \beta_i \geq 1-\varepsilon_{0i} , 0 < \varepsilon_{0i} << 1$$

$\alpha_1, \alpha_2, ..\alpha_n, \beta_1, \beta_2, ..\beta_n$ are real numbers.

N_i is the large number. ε_{0i} is the smallest number.

(18)

Therefore, Eq(18) is

$$A = \frac{1}{B} = 1 - \frac{2GM}{rc^2}\Sigma(M)$$

$$\Sigma(M) = \exp[-\alpha_1(\frac{hc}{GM^2})^{\beta_1} - \alpha_2(\frac{hc}{GM^2})^{\beta_2} - ..\alpha_i(\frac{hc}{GM^2})^{\beta_i} - ..-\alpha_n(\frac{hc}{GM^2})^{\beta_n}]$$

$$N_i > \alpha_i \geq 0 , \beta_i \geq 1-\varepsilon_{0i} , 0 < \varepsilon_{0i} << 1$$

$\alpha_1, \alpha_2, ..\alpha_n, \beta_1, \beta_2, ..\beta_n$ are real numbers.

N_i is the large number. ε_{0i} is the smallest number.

(19)

To know Eq(19)'s second term, does Newton's limitation

$$\frac{d^2x^\lambda}{d\tau^2} = -\Gamma^\lambda{}_{\mu\upsilon}\frac{dx^\mu}{d\tau}\frac{dx^\upsilon}{d\tau}$$

$$\frac{d^2r}{dt^2} \approx \frac{1}{2}c^2\frac{\partial(-A)}{\partial r} = -\frac{GM}{r^2}\exp[-\alpha_1(\frac{hc}{GM^2})^{\beta_1} - \alpha_2(\frac{hc}{GM^2})^{\beta_2} - ..-\alpha_n(\frac{hc}{GM^2})^{\beta_n}]$$

(20)

Therefore, by Eq(19) ,in this theory, the spherical solution of the quantum gravity is

$$d\tau^2 = (1-\frac{2GM}{rc^2}\Sigma(M))dt^2 - \frac{1}{c^2}[\frac{dr^2}{(1-\frac{2GM}{rc^2}\Sigma(M))} + r^2d\theta^2 + r^2\sin^2\theta d\phi^2]$$

$$\Sigma(M) = \exp[-\alpha_1(\frac{hc}{GM^2})^{\beta_1} - \alpha_2(\frac{hc}{GM^2})^{\beta_2} - ..\alpha_i(\frac{hc}{GM^2})^{\beta_i} - ..-\alpha_n(\frac{hc}{GM^2})^{\beta_n}]$$

$$N_i > \alpha_i \geq 0 , \beta_i \geq 1-\varepsilon_{0i} , 0 < \varepsilon_{0i} << 1$$

$\alpha_1, \alpha_2, ..\alpha_n, \beta_1, \beta_2, ..\beta_n$ are real numbers.

N_i is the large number. ε_{0i} is the smallest number.

(21)

III. Additional chapter-II

In Eq(21), if $h \to 0$,

$$\Sigma(M) = \exp[-\alpha_1(\frac{hc}{GM^2})^{\beta_1} - \alpha_2(\frac{hc}{GM^2})^{\beta_2} - ... - \alpha_n(\frac{hc}{GM^2})^{\beta_n}] \to 1$$

$$d\tau^2 = (1-\frac{2GM}{rc^2})dt^2 - \frac{1}{c^2}[\frac{dr^2}{1-\frac{2GM}{rc^2}} + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2] \quad (22)$$

In Eq(21), if $M \to 0$,

$$M\Sigma(M) = M\exp[-\alpha_1(\frac{hc}{GM^2})^{\beta_1} - \alpha_2(\frac{hc}{GM^2})^{\beta_2} - \ldots - \alpha_n(\frac{hc}{GM^2})^{\beta_n}] = 0$$

$$d\tau^2 = dt^2 - \frac{1}{c^2}[dr^2 + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2] \quad (23)$$

If $u = 0$,

$$u^2 = \frac{g_{rr}dr^2 + g_{\theta\theta}d\theta^2 + g_{\phi\phi}d\phi^2}{dt^2} = 0$$

$$d\tau^2 = (1-\frac{2GM}{rc^2}\Sigma(M))dt^2 \quad (24)$$

In this time, if the particles' mass is m_i and the binding energy e_{ij} of particle's mass m_i and m_j ,the

fusion energy is e ,and if $E = Mc^2 = m_1c^2 + m_2c^2 + \ldots + m_nc^2 + e$,

$$d\tau^2 = (1-\frac{2GM}{rc^2}\Sigma(M))dt^2$$

$$= dt^2 - \frac{2Gm_1}{rc^2}\Sigma(m_1)dt^2 - \frac{2Gm_2}{rc^2}\Sigma(m_2)dt^2 \ldots - \frac{2Gm_n}{rc^2}\Sigma(m_n)dt^2$$

$$-[\frac{2Ge_{12}}{rc^4}\Sigma(e_{12}/c^2) + \frac{2Ge_{13}}{rc^4}\Sigma(e_{13}/c^2) + \frac{2Ge_{23}}{rc^4}\Sigma(e_{23}/c^2) + \ldots + \frac{2Ge_{n(n-1)}}{rc^4}\Sigma(e_{n(n-1)}/c^2)]dt^2$$

$$\Sigma(e_{ij}/c^2) = \exp[-\alpha_1(\frac{hc^5}{Ge_{ij}^2})^{\beta_1} - \alpha_2(\frac{hc^5}{Ge_{ij}^2})^{\beta_2} - \ldots - \alpha_n(\frac{hc^5}{Ge_{ij}^2})^{\beta_n}] \quad (25)$$

IV. Conclusion

It found the spherical solution of the quantum gravity.

The careful point is that this theory is different from the other quantum theory. This theory is made by the Einstein's field equation.

Reference

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