Newtonian extension

$$M(r) = \mu(r) + M_{(0)}$$

$$\vec{G} = \vec{A} + \text{grad}\varphi \qquad\qquad \alpha\,\text{div}\vec{G} = \sigma$$

$$\text{divgrad}\varphi = \sigma/\alpha - \text{div}\vec{A} = \frac{4}{3}\pi\gamma\left(9V\frac{d^2M}{dV^2} + 6\frac{dM}{dV}\right),$$

$$M(r)c^2 + \frac{\alpha}{2}\int \vec{G}^2\,dV - \frac{\beta}{2}\int \vec{\mu}^2 dV = M_0 c^2 = E = \text{const}$$

$$\omega^2\alpha|\beta| = 1$$

$$a\left(\frac{dm}{dr}\right)^2 + (1 - 2am/r)\frac{dm}{dr} + a(m/r)^2 = 0$$

Appendix B. *The Smallest Distance and the Metron*

In the macroscopic domain Heim finds the following expression for the gravitational potential $\varphi(r)$ due to a mass $M(r)$, including the r–dependent field mass:

$$\varphi(r) = \frac{\gamma M(r)}{r}\left(1 - \frac{r}{\rho}\right)^2$$

$$\rho = \frac{h^2}{\gamma m_0^3},$$

m_0 being the mass of a single nucleon composing the nuclei of $M(r)$. $M(r)$ is determined from the transcendental equation,

$$r q e^{-q} = A\left(1 - \frac{r}{\rho}\right)^2$$

$$q = 1 - \sqrt{1 - \varepsilon\,\varphi(r)}$$

$$\varepsilon = \frac{3}{8c^2}$$

$$A = \frac{3\gamma M_0}{16c^2},$$

$$R_- = \frac{3\gamma M(R_-)}{8c^2}\left(1 - \frac{R_-}{\rho}\right)^2$$

$$\lambda = \frac{h}{M(R_-)c}.$$

$$\lambda R_- = \frac{3\gamma h}{8c^3}\left(1 - \frac{R_-}{\rho}\right)^2. \qquad \text{(B11)}$$

The condition for space to be empty is $\lambda \to \infty$. In this limit the right–hand side of Eq. (B11) stays finite because $\lim\limits_{\lambda\to\infty}\frac{R_-}{\rho} = 0$. Identifying the left–hand side in the limit with the metronic area τ, Eq. (B11) becomes,

$$\tau = \frac{3\gamma h}{8c^3},$$

Newtonian extension

$$M(r) = \mu(r) + M_{(0)}$$

$$\vec{G} = \vec{A} + \mathrm{grad}\varphi \qquad \alpha \mathrm{div}\vec{G} = \sigma$$

$$\mathrm{divgrad}\varphi = \sigma/\alpha - \mathrm{div}\vec{A} = \frac{4}{3}\pi\gamma\left(9V\frac{d^2M}{dV^2} + 6\frac{dM}{dV}\right),$$

$$M(r)c^2 + \frac{\alpha}{2}\int \vec{G}^2\,dV - \frac{\beta}{2}\int \vec{\mu}^2 dV = M_0c^2 = E = \mathrm{const}$$

$$\omega^2\alpha|\beta| = 1$$

$$a\left(\frac{dm}{dr}\right)^2 + (1 - 2am/r)\frac{dm}{dr} + a(m/r)^2 = 0$$

Appendix B. *The Smallest Distance and the Metron*

In the macroscopic domain Heim finds the following expression for the gravitational potential $\varphi(r)$ due to a mass $M(r)$, including the r–dependent field mass:

$$\varphi(r) = \frac{\gamma M(r)}{r}\left(1 - \frac{r}{\rho}\right)^2$$

$$\rho = \frac{h^2}{\gamma m_0^3},$$

m_0 being the mass of a single nucleon composing the nuclei of $M(r)$. $M(r)$ is determined from the transcendental equation,

$$r q e^{-q} = A\left(1 - \frac{r}{\rho}\right)^2$$

$$q = 1 - \sqrt{1 - \varepsilon\,\varphi(r)}$$

$$\varepsilon = \frac{3}{8c^2}$$

$$A = \frac{3\gamma M_0}{16c^2},$$

$$R_- = \frac{3\gamma M(R_-)}{8c^2}\left(1 - \frac{R_-}{\rho}\right)^2$$

$$\lambda = \frac{h}{M(R_-)c}.$$

$$\lambda R_- = \frac{3\gamma h}{8c^3}\left(1 - \frac{R_-}{\rho}\right)^2. \qquad \text{(B11)}$$

The condition for space to be empty is $\lambda \to \infty$. In this limit the right–hand side of Eq. (B11) stays finite because $\lim\limits_{\lambda\to\infty}\frac{R_-}{\rho} = 0$. Identifying the left–hand side in the limit with the metronic area τ, Eq. (B11) becomes,

$$\tau = \frac{3\gamma h}{8c^3},$$

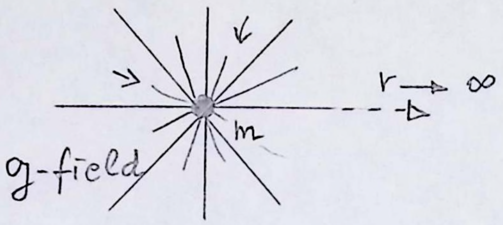
Newton:

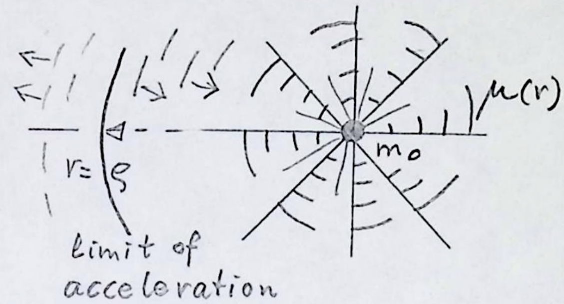
Heim:

Source of gravitation

mass: $\boxed{m = const}$

$\boxed{m = m_0 + \mu_g}$





field mass $\mu_g = \lim\limits_{r \to \rho} (m - m_0) = m(\rho) - m_0$

$$\boxed{g = \operatorname{grad} \varphi(r) = -\frac{\gamma m}{r^2}}$$

(1)

$$\boxed{g = -\frac{\gamma m(r)}{r^2}\left(1 - \frac{r}{\rho}\right)^2}$$

$$\rho = \frac{\hbar^2}{\gamma m_0^3}$$

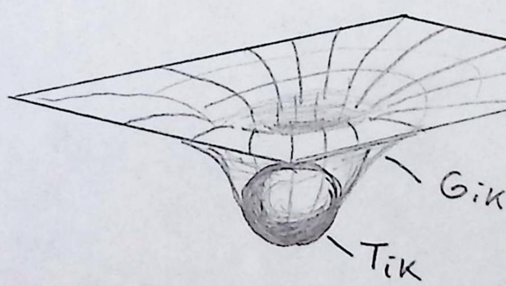
$\rho = 150$ Mio LJ

$(1\,LJ = 5.9 \cdot 10^{12}$ (trillion) miles

Einstein:

(2)

$\left\{\begin{matrix}\text{space-}\\ \text{curvature}\end{matrix}\right\}$ $G \sim T$ $\left\{\begin{matrix}\text{energy-}\\ \text{matter}\\ \text{density}\end{matrix}\right\}$



$$G_{ik} = R_{ik} - \tfrac{1}{2} g_{ik} = \varkappa T_{ik}$$

with $R_{ik} = f(\Gamma^i_{ke})$

$\Gamma^i_{ke} = f(g_{ik})$

$\left.\begin{matrix}\text{gravitational}\\ \text{potential}\end{matrix}\right\}$ $g_{ik} \sim \varphi(r)$

(3)

$$g_{ik} = \begin{pmatrix} g_{11} & 0 & 0 & 0 \\ 0 & g_{22} & 0 & 0 \\ 0 & 0 & g_{33} & 0 \\ 0 & 0 & 0 & g_{44} \end{pmatrix} \quad \begin{matrix} i = 1 \\ 2 \\ 3 \\ 4 \end{matrix}$$

4 = number of dimensions $\to R_4$

Einstein:

gravitation in macrocosm

Heim:

... in microcosm

$$\left(\begin{array}{lcl} \Gamma^i_{ke} & \longrightarrow & \varphi^i_{ke}(x_1, \ldots, x_4) \\ R^i_{ke} & \longrightarrow & C_p \varphi^p_{km} \end{array} \right)$$

$$G_{ik} = \varkappa T_{ik} \longrightarrow \quad (4) \quad \boxed{C_i \varphi^i_{km} = \lambda_i(m,k)\, \varphi^i_{km} = \varepsilon^i_{km}}$$

$$\Lambda$$

$i, k, m = 1, \ldots, 4 \longrightarrow 4^3 = 64$

eigenvalu equations describe metric structure steps of R_4

28 ~~equations~~ eigenvalues $= 0 \longrightarrow$

$64 - 28 = 36$ equations have to form a tensor for energy density ε_{km}, which is invariant undr coordinate transformations

(5)

$$\begin{array}{c} m = 1, 2 \ \ldots \ 6 \ | \ 7, 8 \\ \varepsilon_{im} = \left(\begin{array}{cccc|cc} \varepsilon_{11} & \varepsilon_{21} & \cdots & \varepsilon_{61} & 0 & 0 \\ \varepsilon_{12} & \varepsilon_{22} & & \vdots & \vdots & \vdots \\ \vdots & & \ddots & \vdots & \vdots & \vdots \\ \varepsilon_{16} & \cdots & \cdots & \varepsilon_{66} & & \\ \hline 0 & \cdots & \cdots & 0 & 0 & 0 \\ 0 & \cdots & \cdots & 0 & 0 & 0 \end{array} \right) \end{array}$$

Number of colums = dimensions of world $= 6 \longrightarrow$

$$\boxed{R_6 \equiv (\underbrace{x_1 \ x_2 \ x_3}_{R_3} \ x_4 \ x_5 \ x_6)}$$

space: R_3

time: ict

entelechial coordinate $i\varepsilon$

aeonic coordinate $i\eta$