A MANIFESTLY LOCAL THEORY OF VACUUM ENERGY SEQUESTERING

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(TO APPEAR)

$M_p^2 H^2 = \Lambda$ $\qquad M_{pl} \sim 10^{18}\, GeV$

$$S = \int d^4x \sqrt{g} \left(\Lambda + M_p^2 R + R^2 + \ldots + \mathcal{L}_{m}^{\cancel{eff}} (g^{\mu\nu}, \varphi) \right)$$

$M_{EW} \sim TeV$

$\Lambda \approx 10^{-120} M_{pl}^4 \sim 10^{-12} (eV)^4$

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$$\Lambda \neq M_{Pl}^4 \; ?$$

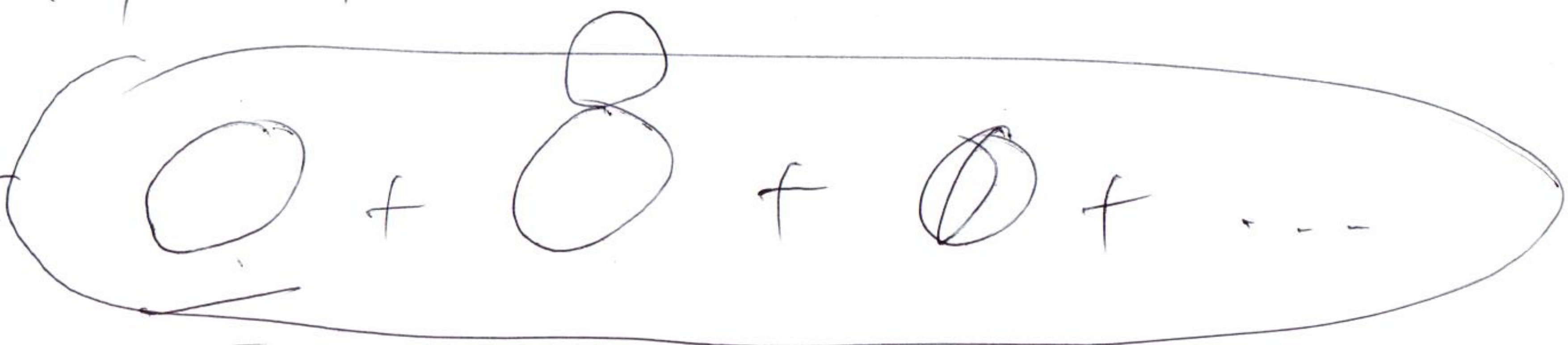
$$\Lambda \neq 0$$

$$\Lambda \simeq 10^{-12} (eV)^4$$

$\mathcal{L}$

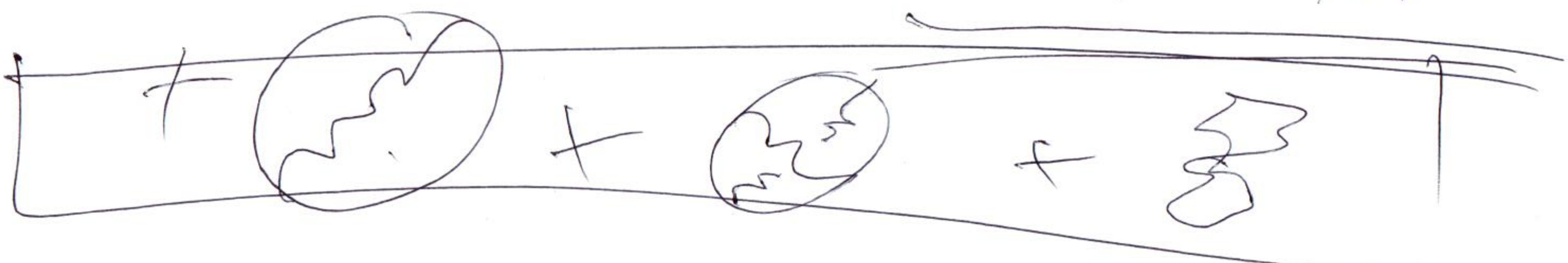
$$\sqrt{g}\,\Lambda = \Lambda + \Lambda h_{\mu\nu} h^{\mu\nu} + \Lambda h_{\mu\nu} h^{\nu\lambda} h^{\mu}_{\ \lambda}$$

$\Lambda = \langle 0 | \rho | 0 \rangle$

$=$ 

$\circ \quad O(1)\, M_{UV}^4 + M_{UV}^2 m^2 + \dots$

$+ m^4 \ln \frac{M_{UV}}{m}$



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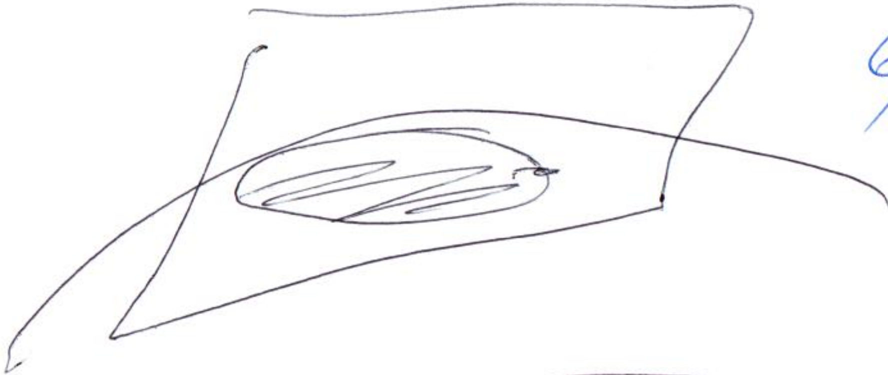
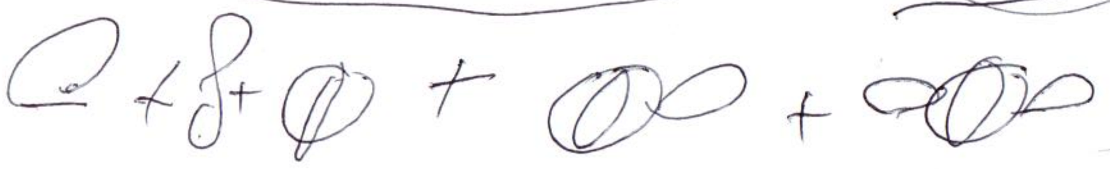
$$\boxed{\Lambda = M_{UV}^4}$$



$$\underline{\langle 0 | \mathcal{L} | 0 \rangle_{(\mu)}} + \underline{\Lambda^{(\mu)}_{BARE}} = \Lambda^{Ren}(\mu)$$



$$O(1)\, M_{UV}^4 + \ldots \quad \underline{\underline{\Lambda_{BARE}}} = 10^{-12} (eV)^4$$

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$$\tilde{\Lambda}_{BARE} = 10^{-12} (eV)^4$$

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$$S = \int d^4x \sqrt{g} \left(\frac{M_{pl}^2}{2} R - \Lambda + \lambda^4 \mathcal{L}\left(\frac{g^{\mu\nu}}{\lambda^2}, \psi \right) \right)$$

$$+ O\left(\frac{\Lambda}{\lambda^4 \mu^4} \right)$$

$$S(\phi) + \int \phi J$$

$$\Lambda = \frac{1}{4} \langle T^{\mu}_{\mu} \rangle$$

$$M_p^2 G^{\mu}_{\nu} = T^{\mu}_{\nu} - \frac{1}{4} \langle T^{\mu}_{\mu} \rangle \delta^{\mu}_{\nu}$$

$$S = \int d^4x \sqrt{g} \left[\frac{\kappa^2}{2} R - \Lambda - \mathcal{L}(g^{\mu\nu}, \psi) \right]$$

$$+ \sigma\left(\frac{\Lambda}{\mu^4} \right)$$

$$\bar{g}_{\mu\nu} = \lambda^2 g_{\mu\nu}$$

$$\bar{\kappa}^2 = \frac{M_p^2}{\lambda^2} \qquad \bar{\Lambda} = \frac{\Lambda}{\lambda^4}$$

$\underline{\sqrt{g} = 1}$

$$\int d^4x \, \Lambda(x) (\sqrt{g} - 1)$$

$\Lambda(x) \quad \sigma(\Lambda(x))$

$$\cancel{\Lambda(x)} \left(\sqrt{g} \, d^4x + F_{\mu\nu\lambda\sigma} \, dx^\mu dx^\nu dx^\lambda dx^\sigma \right)$$

$$F_{\mu\nu\lambda\sigma} = 4 \, \partial_{[\mu} A_{\nu\lambda\sigma]}$$

$$\sigma' \partial_\mu \Lambda = 0$$

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$$\int \underset{\Sigma}{\partial_\mu} \wedge A_{\nu\lambda\sigma}] \, dx^\nu$$

$$\int \underset{\Sigma}{\partial_\mu} \underset{\substack{\parallel \\ 0}}{\wedge} \delta \partial_\nu B_{\lambda\sigma}] = 0$$

$$S = \int d^4x \sqrt{g} \left(\frac{\kappa^2(x)}{2} R - \Lambda(x) \mathcal{L}(g^{\mu\nu}, \phi) \right)$$

$$+ \int d^4x \left(\sigma\left(\frac{\Lambda(x)}{\mu^4}\right) F_{\mu\nu\lambda\sigma} + \hat{\sigma}\left(\frac{\kappa^2(x)}{M_{Pl}^2}\right) \hat{F}_{\mu\nu\lambda\sigma} \right)$$

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$$\kappa^2 G^\mu{}_\nu = T^\mu{}_\nu - \Lambda(x)\,\delta^\mu{}_\nu$$

$$\frac{\delta'}{\mu^4}\partial_\mu \Lambda = 0 \qquad \frac{\hat{\delta}'}{M_p^2}\partial_\mu \kappa^2 = 0$$

$$\frac{\delta'}{\mu^4} F_{\mu\nu\lambda\sigma} = \frac{1}{4}\sqrt{g}\,\epsilon_{\mu\nu\lambda\sigma}$$

$$\frac{\hat{\delta}'}{M_{pl}^2}\hat{F}_{\mu\nu\lambda\sigma} = -\frac{1}{2\cdot 4!}R\sqrt{g}\,\epsilon_{\mu\nu\lambda\sigma}$$

$$\kappa G^\mu_\nu = T^\mu_\nu - \frac{1}{4}\delta^\mu_\nu \langle T \rangle$$

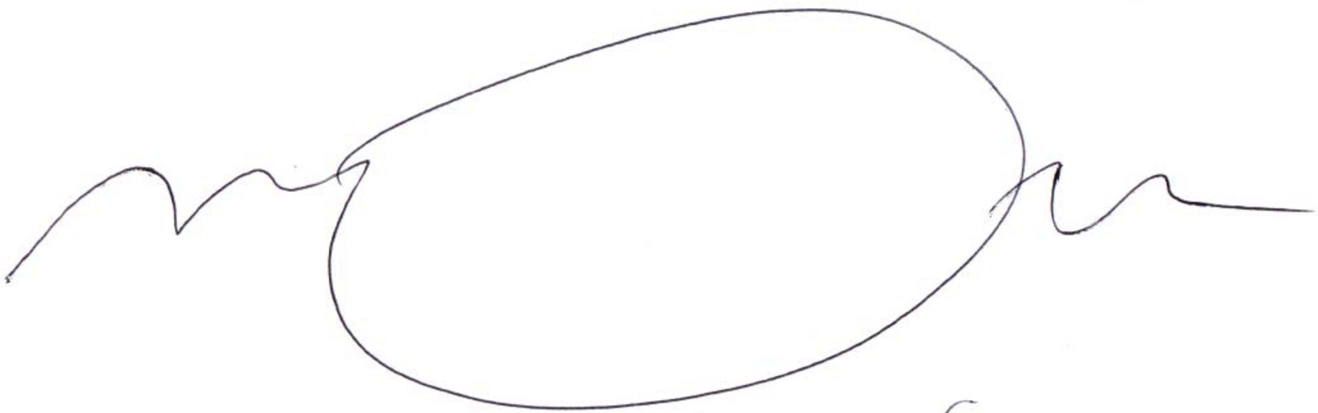
$$- \Delta\Lambda\, \delta^\mu_\nu$$

$$\boxed{\Delta\Lambda} = \frac{1}{4}\kappa^2 \langle R \rangle$$

$$= -\frac{\mu^4}{2}\, \frac{\kappa^2 \sigma^{-1}}{M_{pl}^2 \sigma}\, \frac{\int \hat{F}_4}{\int F_4}$$

$$\frac{\kappa^2}{M_p^2}, \quad \frac{\Lambda}{\mu^4}$$

$$\frac{\lambda^2}{M_p^2} < 1$$



$$M_p^2 R \to (M_p^2 + N M_{UV}^2) R$$

$$\frac{\Lambda}{M^4} < 1$$

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$$\delta\hat{\sigma} \sim \mathcal{O}\left(\frac{\Lambda^2}{M_p^2}\right)$$

$$\delta\sigma \sim \mathcal{O}\left(\frac{\Lambda}{\mu^4}\right)$$

$$\Delta\Lambda = \frac{\hat{\sigma}'}{\sigma'}\frac{\int \hat{F}}{\int \hat{F}}$$