

gravitace

$$g_{mn} \rightarrow \nabla_n \rightarrow R_{mn}{}^k{}_l$$

$$S_{GR}[g] = \frac{1}{2\kappa} \int_{\Omega} (R - 2\Lambda) g^{-\frac{1}{2}}$$

$$S = S_{GR} + S_{scat}(\dots, g)$$

$$\frac{\delta S}{\delta g} = 0 \quad \frac{\delta S_{GR}}{\delta g} = -\frac{1}{2\kappa} (\text{Ric} - \frac{1}{2} Rg + \Lambda g)$$

$$\text{Ric} - \frac{1}{2} Rg + \Lambda g = \kappa T \quad \nabla_m T^{mn} = 0$$

$$T = -\frac{2}{\kappa} \frac{\delta S_{scat}}{\delta g}$$

$$g \rightarrow g + \delta g \quad \delta g_{mn} = \nabla_m \xi_n \quad \delta S_{GR} = \int \frac{\delta S_{GR}}{\delta g} \delta g$$

skal. pole

$$\phi(x) \quad d\phi$$

$$S_{SP}[\phi, g] = -\frac{1}{2} \int_{\Omega} (d\phi \cdot g^{-1} d\phi + m^2 \phi^2) g^{-\frac{1}{2}}$$

$$S_{SPI}[\phi, g] = - \int_{\Omega} U(\phi) g^{-\frac{1}{2}}$$

$$S[\phi, g] = -\frac{\kappa}{2} \int_{\Omega} R \phi^2 g^{-\frac{1}{2}}$$

$$\frac{\delta S_{SP}}{\delta \phi} = -g^{-\frac{1}{2}} \left[-\square + m^2 \right] \phi$$

$$\frac{1}{g^{-\frac{1}{2}}} \frac{\delta S_{scat}}{\delta \phi} = \left[-\square + m^2 \right] \phi = J$$

$$T_{SP} = d\phi d\phi - \frac{1}{2} g (d\phi \cdot g^{-1} d\phi + m^2 \phi^2)$$

kalibrační a látková pole

GM

lokální kal. grupa

gM

lokální kal. algebra

$C_{\mu\nu}{}^{\kappa}{}_{\lambda}$ $K_{\alpha\beta}$

D

kalibrační pole

kov. der. na gM $Dc = 0$

AM

asoc. vektor. bundle

$$T_{\alpha}{}^A{}_{\beta} \quad t_{m\beta}{}^A = m^{\alpha} t_{\alpha}{}^A{}_{\beta}$$

$H_{\alpha\beta}$ metra. (ob. součin)

$$t_{m\beta}{}^+ = -t_{m\beta}{}^-$$

látková pole $\in \text{Vect AM}$

Φ^A

gravitace

$$g_{mn} \rightarrow \nabla_m \rightarrow R_{mn}{}^k{}_l$$

$$S_{GR}[g] = \frac{1}{2\kappa} \int (R - 2\Lambda) g^{\frac{1}{2}}$$

$$S_f = S_{GR} + S_{mat}(\dots, g)$$

$$\frac{\delta S}{\delta g} = 0 \quad \frac{\delta S}{\delta g^{\mu\nu}} \frac{\delta S_{GR}}{\delta g^{\mu\nu}} = -\frac{1}{2\kappa} (\text{Ric} - \frac{1}{2} Rg + \Lambda g)$$

$$\text{Ric} - \frac{1}{2} Rg + \Lambda g = \kappa T \quad \nabla_m T^{mn} = 0$$

$$T = -\frac{1}{2\kappa} \frac{\delta S_{mat}}{\delta g^{\mu\nu}}$$

$$g \rightarrow g + \delta g \quad \delta g_{mn} = \nabla_{(m} \xi_{n)} \quad \delta S_{GR} = \int \frac{\delta S_{GR}}{\delta g^{\mu\nu}} \delta g^{\mu\nu}$$

Skal. pole

$$\phi(x) \quad d_m \phi$$

$$S_{SP}[\phi, g] = -\frac{1}{2} \int_{\Omega} (d_m \phi g^{mn} d_n \phi + m^2 \phi^2) g^{\frac{1}{2}}$$

$$S_{SPI}[\phi, g] = - \int_{\Omega} U(\phi) g^{\frac{1}{2}}$$

$$S[\phi, g] = -\frac{\xi}{2} \int_{\Omega} R \phi^2 g^{\frac{1}{2}}$$

$$\frac{\delta S_{SP}}{\delta \phi} = -g^{\frac{1}{2}} \left[\underbrace{-\square}_{\nabla_m g^{mn} \nabla_n} + m^2 \right] \phi$$

$$\frac{1}{g^{\frac{1}{2}}} \frac{\delta S_{SP}}{\delta \phi} = \left[-\square + m^2 \right] \phi = \left[\right]$$

$$T_{SP} = d\phi d\phi - \frac{1}{2} g (d\phi \cdot g^{-1} \cdot d\phi + m^2 \phi^2)$$

Kalibracím a lätzková pl

GM lokalní kal. grupa

gM lokalní kal. algebra

$$C_{\mu\nu} \stackrel{K}{=} K_{\alpha\beta}$$

D kalibracím pl

kov. der. na gM $Dc = 0$

AM asoc. metr. bundl

$$T_{\alpha\beta}^A \quad t_{m\beta}^A = m^\alpha t_{\alpha\beta}^A$$

$H_{\alpha\beta}$ metr. (sk. součin)

$$t_m^+ = -t_m$$

Φ^A

lätzková pl $\in \text{Vect } AM$