

Fira Math

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General relativity

- Covariant derivative:

$$\nabla \mathbf{X} = X^\alpha{}_{;\beta} \frac{\partial}{\partial x^\alpha} \otimes dx^\beta = (X^\alpha{}_{,\beta} + \Gamma_{\beta\gamma}^\alpha X^\gamma) \frac{\partial}{\partial x^\alpha} \otimes dx^\beta$$

- Einstein's field equations:

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

- Schwarzschild metric:

$$c^2 d\tau^2 = \left(1 - \frac{r_s}{r}\right) c^2 dt^2 - \left(1 - \frac{r_s}{r}\right)^{-1} dr^2 - r^2 \underbrace{(d\theta^2 + \sin^2 \theta d\varphi^2)}_{d\Omega^2}$$

- Einstein–Hilbert action:

$$S = \frac{1}{2\kappa} \int R \sqrt{-g} d^4x$$