Relativistic Non-Ideal Flows

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24/09/2019

The Schwarzschild metric

Flat metric:

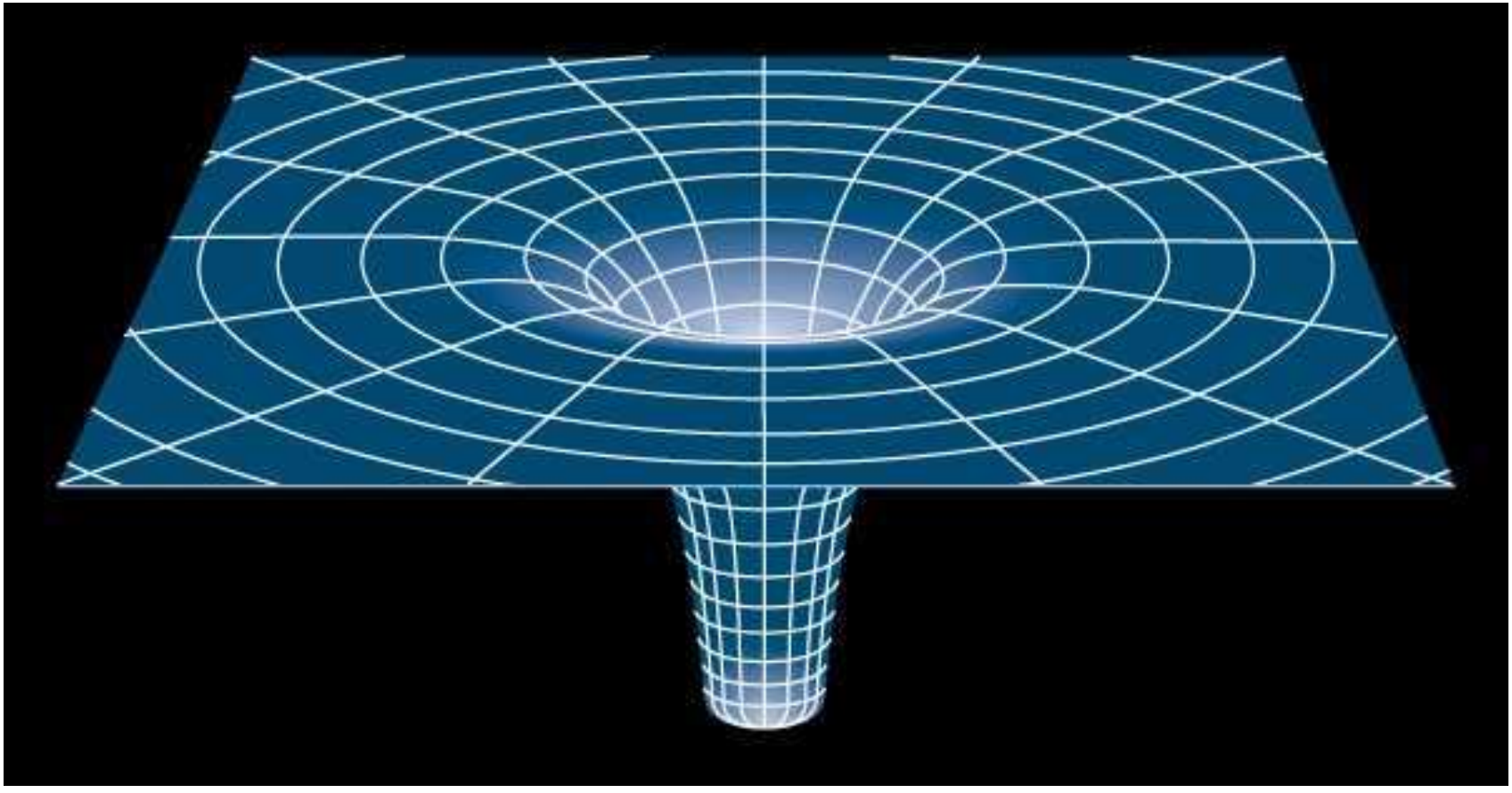
$$\mathrm{d}s^2 = -\,\mathrm{d}t^2 + \mathrm{d}r^2 + r^2\left(\mathrm{d}\theta^2 + \sin^2\theta\,\mathrm{d}\varphi\right).$$

Schwarzschild metric:

$$\mathrm{d}s^2 = -\left(1 - \frac{2M}{r}\right)\mathrm{d}t^2 + \frac{1}{1 - \frac{2M}{r}}\,\mathrm{d}r^2 + r^2\left(\mathrm{d}\theta^2 + \sin^2\theta\,\mathrm{d}\varphi\right),$$

where $c = G = 1$.

The Schwarzschild metric



The stress-energy tensor

The component $T^{\mu\nu}$ is the flux of μ-th component of the four-momentum p^{μ} through a surface of constant coordinate x^{ν}. For an ideal fluid ($\eta = \zeta = \kappa = 0$) in the Local Rest Frame:

$$T^{\mu\nu} = \begin{bmatrix} \rho & & & \\ & p & & \\ & & p & \\ & & & p \end{bmatrix}_{\text{fid}} .$$

The Local Rest Frame

A set of vectors such that

$$g_{\mu\nu} V^{\mu}_{(\alpha)} V^{\nu}_{(\beta)} = \eta_{(\alpha)(\beta)} \, .$$

The PSTF moments