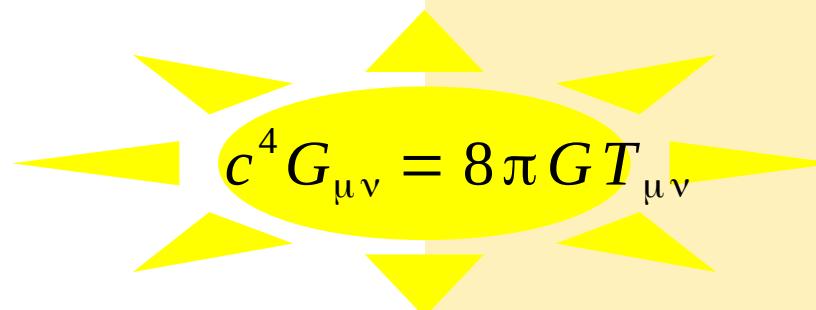


PHYSICAL DEGREES OF FREEDOM OF THE LINEAR GRAVITATIONAL FIELD

$$g_{\mu\nu} \simeq \eta_{\mu\nu} + h_{\mu\nu}, \quad |h_{\mu\nu}| \ll 1$$



6 Physical Degrees of Freedom

Spatial scalar $\Psi \equiv \psi - c^2 6^{-1} \nabla^2 B$

Magnetic 3-vector $A_k \equiv V_k + 4^{-1} \partial_t B_k, \quad \partial_k A^k = 0$

Newtonian scalar $\Phi \equiv U + \partial_t V + \partial_{tt} B / 2$

$\nabla^2 \Psi = -4\pi G \rho$ $\nabla^2 A_k = -4\pi G J_k$ $\nabla^2 \Phi = -4\pi G (\rho + 3Pc^{-2} + 3c^{-2} \partial_t J)$	<i>1 - elliptical</i>	$c^4 (\nabla^2 - \partial_{tt}) h_{mk}^{TT} = -16\pi G T_{mk}^{TT}$ $2 - radiative$	<i>2 - elliptical</i>
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$$\nabla^2 J = -\partial_t \rho$$

$$\nabla^2 \theta^k = -\partial_t J^k$$

$$2 \nabla^2 \theta = -3(\partial_t J + P)$$

Choose coordinates — $h_{tt} \equiv 2c^{-2} U$

$h_{tk} \equiv -4c^{-3} V_k - c^{-1} \partial_k V, \quad \partial_k V^k \equiv 0$

$$\partial_k B^k \equiv 0, \quad \partial_m h_{TT}^{mk} \equiv 0 \equiv \delta_{mk} h_{TT}^{mk}$$

Specify sources — $T^{tt} \equiv \rho c^2$ Energy density

$T^{tk} \equiv (J^k + \partial^k J) c, \quad \partial_k J^k \equiv 0$ Momentum density

$$T^{mk} \equiv P \delta^{mk} + (\partial^{mk} - 3^{-1} \delta^{mk} \nabla^2) \theta + \partial^m \theta^k + \partial^k \theta^m + T_{TT}^{mk}$$

$$\partial_k \theta^k \equiv 0, \quad \partial_m T_{TT}^{mk} \equiv 0 \equiv \delta_{mk} T_{TT}^{mk}$$