FIRST BLACK HOLE IMAGE
by Event Horizon Telescope (EHT)

- 首張黑洞照片
- 室女座A(M87)
- 黑洞身影專案
- 黑洞101
- 黑洞與相對論
- 黑洞輻射

黑洞與相對論

廣義相對論 (General relativity)

- 愛因斯坦重力場方程式（重力場幾何化）

$$R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}R - \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4}\Theta_{\mu\nu}\,, \qquad R_\mu{}^l - \frac{1}{2}e_\mu{}^l R - \Lambda e_\mu{}^l = \frac{8\pi G}{c^4}\Theta_\mu{}^l$$

- 史瓦西度規（空間）(Schwarzschild metric)

$$ds^2 = \left(1 - \frac{2GM}{c^2 r}\right)c^2 dt^2 - \left(1 - \frac{2GM}{c^2 r}\right)^{-1} dr^2 - r^2\left(d\theta^2 + \sin^2\theta d\varphi^2\right)$$

- 克爾度規（空間）(Kerr metric)

$$ds^2 = \left(\frac{\Delta - a^2\sin^2\theta}{\rho^2}\right)c^2 dt^2 + \left(\frac{4GMa}{c\rho^2}\right)r\sin^2\theta d\varphi dt - \frac{\rho^2}{\Delta}dr^2 - r^2 d\theta^2 - \left(\frac{A\sin^2\theta}{\rho^2}\right)d\varphi^2\,,$$

$$\Delta = r^2 - \frac{2GM}{c^2}r + a^2\,, \qquad \rho^2 = r^2 + a^2\cos^2\theta\,, \qquad A = \left(r^2 + a^2\right)^2 - a^2\Delta\sin^2\theta\,,$$

$$a = \frac{J}{Mc}\,, \quad J:角動量\,, \qquad a = J = 0 \Rightarrow 克爾度規 = 史瓦西度規$$

黑洞與相對論

廣義相對論 (General relativity)

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