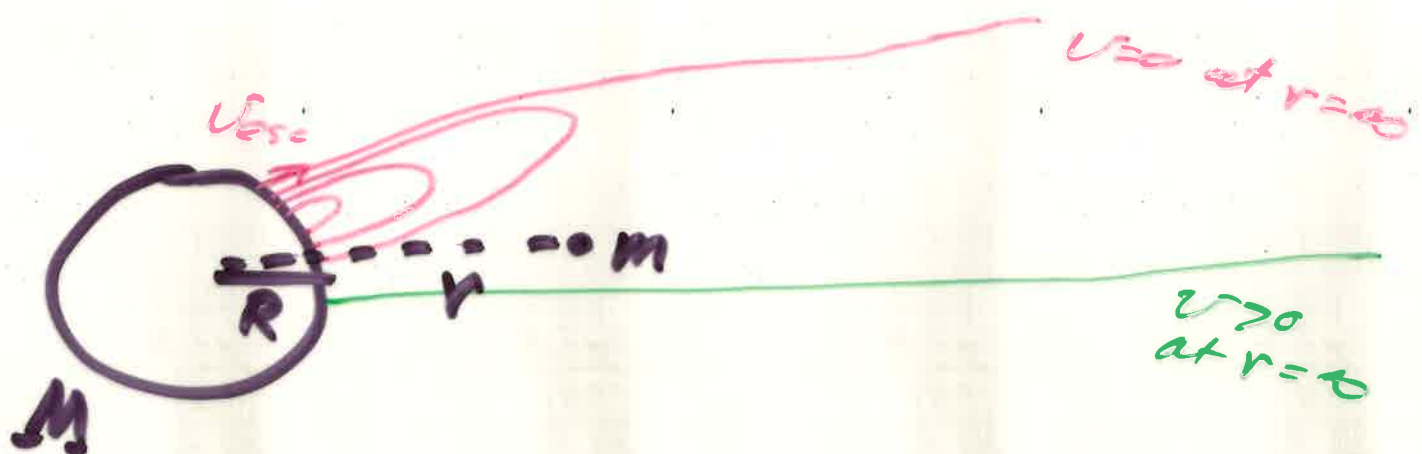


# Newtonian Black Hole



$$E = K + U = \frac{1}{2} m v^2 - \frac{GMm}{r}$$

$$E = 0 \rightarrow v = v_{esc}$$

$$E < 0 \rightarrow v < v_{esc}$$

$$E > 0 \rightarrow v > v_{esc}$$

particle is bound

$$E = 0, v_{esc} = c$$

$$\frac{1}{2} m c^2 = \frac{GMm}{r_s}$$

$$r_s = \frac{2GM}{c^2}$$

Schwarzschild

Correct even with  
General Relativity

Iso tropy - same in all directions  
rotational symmetry



isotropic, but not homogeneous.

Homogeneity - same at all locations  
translational symmetry



homogeneous, not isotropic

Copernican principle.  
Cosmological Principle.

