

## Coordinate System

$$(r, \theta, \phi)$$

## Metric Tensor

$$g = \begin{pmatrix} 1 & 0 & 0 \\ 0 & r^2 & 0 \\ 0 & 0 & r^2 \sin^2(\theta) \end{pmatrix}$$

## Geodesic Equations

$$\ddot{r} - r\dot{\theta}^2 - r \sin^2(\theta)\dot{\phi}^2 = 0$$

$$\ddot{\theta} + \frac{2}{r}\dot{r}\dot{\theta} - \frac{\sin(2\theta)}{2}\dot{\phi}^2 = 0$$

$$\ddot{\phi} + \frac{2}{r}\dot{r}\dot{\phi} + \frac{2}{\tan(\theta)}\dot{\theta}\dot{\phi} = 0$$

## Christoffel Symbols (non-zero)

$$\Gamma_{\theta\theta}^r = -r$$

$$\Gamma_{\phi\phi}^r = -r \sin^2(\theta)$$

$$\Gamma_{r\theta}^\theta = \frac{1}{r}$$

$$\Gamma_{\theta r}^\theta = \frac{1}{r}$$

$$\Gamma_{\phi\phi}^\theta = -\frac{\sin(2\theta)}{2}$$

$$\Gamma_{r\phi}^\phi = \frac{1}{r}$$

$$\Gamma_{\theta\phi}^\phi = \frac{1}{\tan(\theta)}$$

$$\Gamma_{\phi r}^\phi = \frac{1}{r}$$

$$\Gamma_{\phi\theta}^\phi = \frac{1}{\tan(\theta)}$$

## Riemann Curvature Tensor (non-zero components)

none

## Ricci Tensor (non-zero components)

none

## Ricci Scalar

$$R = 0$$

## Einstein Tensor (non-zero components)

none