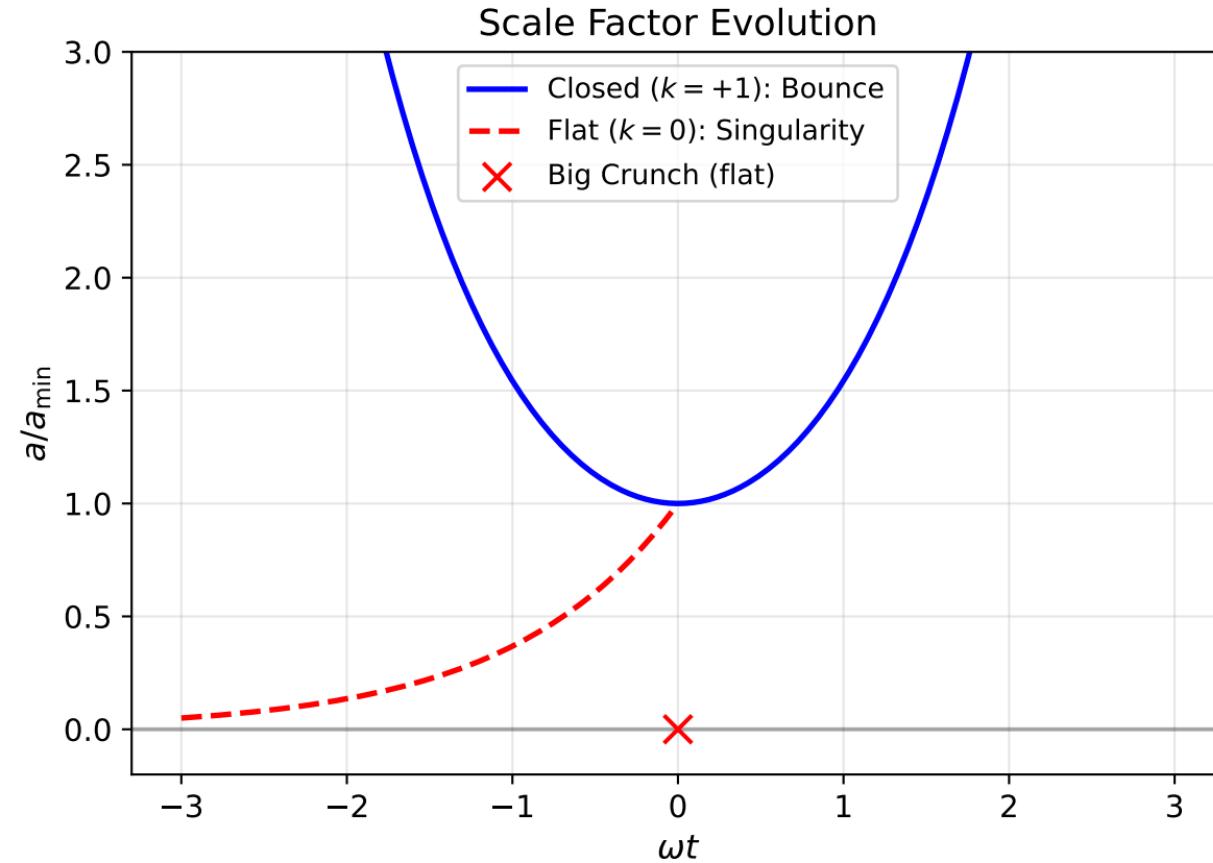


# Why Spatial Curvature Matters



### The Key Difference

#### Flat Universe ( $k = 0$ ):

$$\dot{H} = -\frac{\rho + p}{2M^2} \leq 0 \text{ always}$$

→ No bounce possible

#### Closed Universe ( $k = +1$ ):

$$\dot{H} = -\frac{\rho + p}{2M^2} + \frac{1}{a^2}$$

$+\frac{1}{a^2}$  can make  $\dot{H} > 0$

→ Bounce without NEC violation!