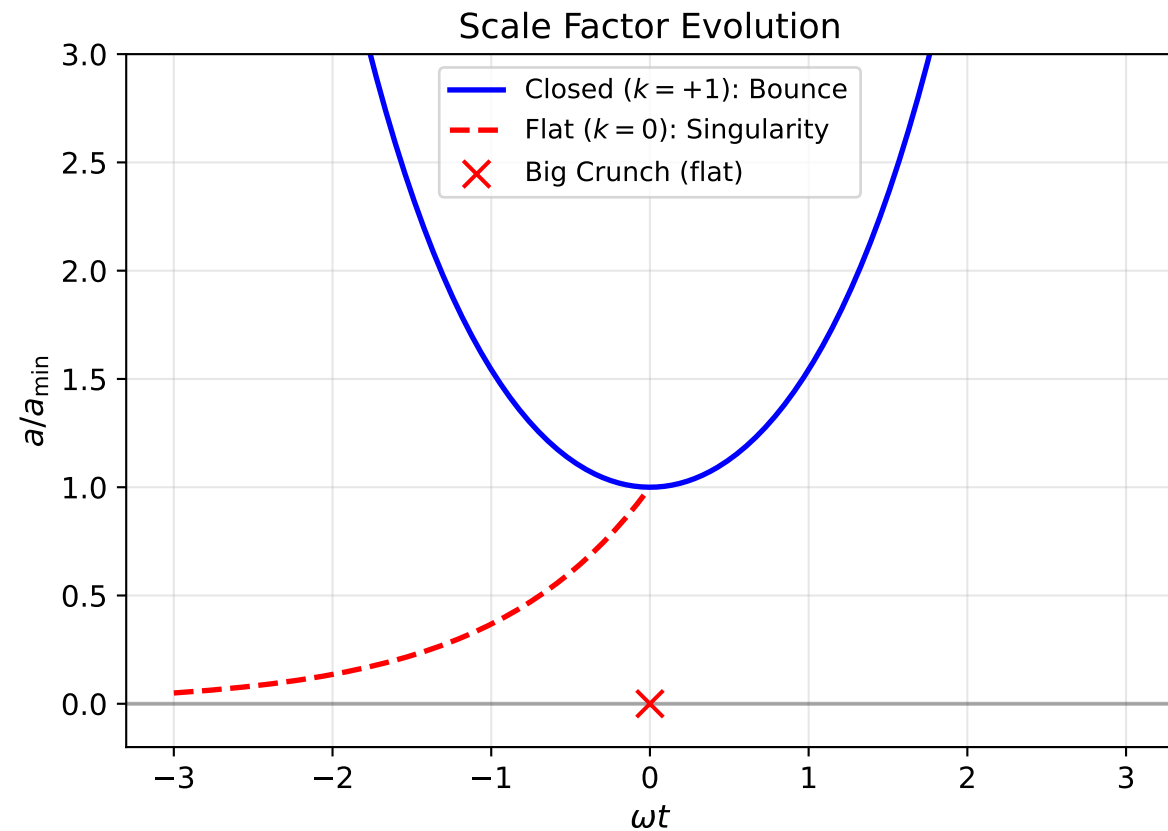


Why Spatial Curvature Matters



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!