

$$\frac{dT}{dt} = \frac{-L_\nu - L_\gamma + L_{\text{dm}}}{V c_V} = \frac{V(-\epsilon_\nu - \epsilon_\gamma + \epsilon_{\text{dm}})}{V c_V} = \frac{-\epsilon_\nu - \epsilon_\gamma + \epsilon_{\text{dm}}}{c_V}$$