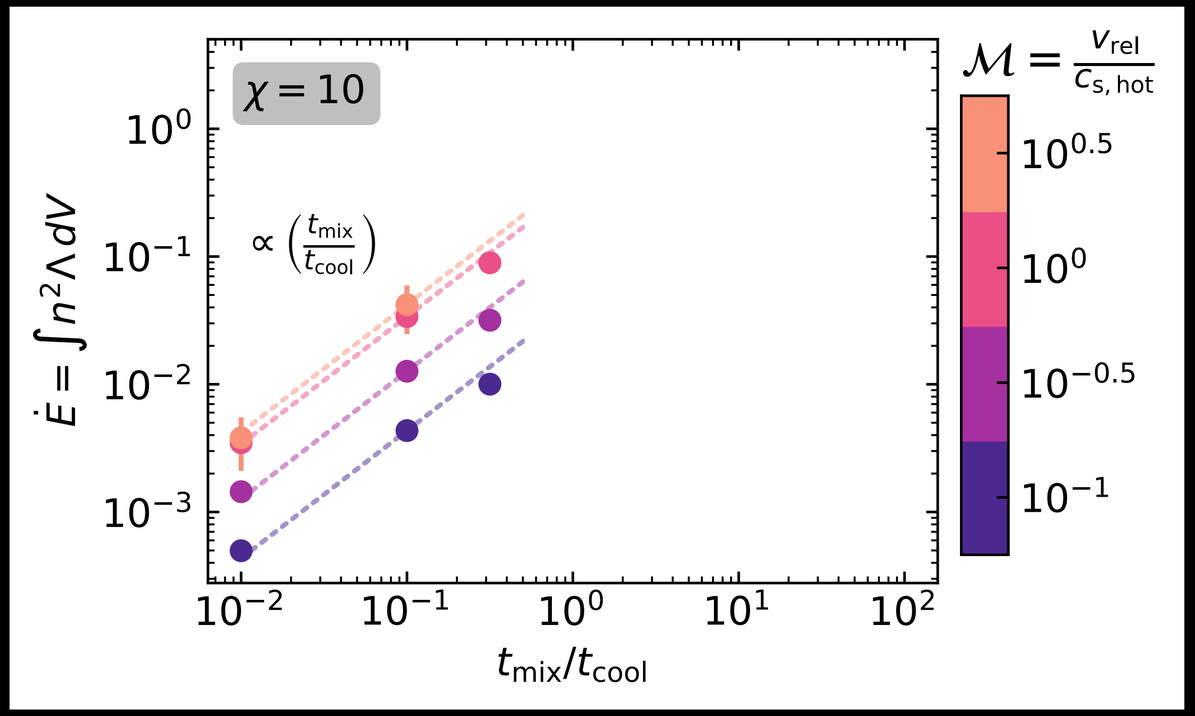
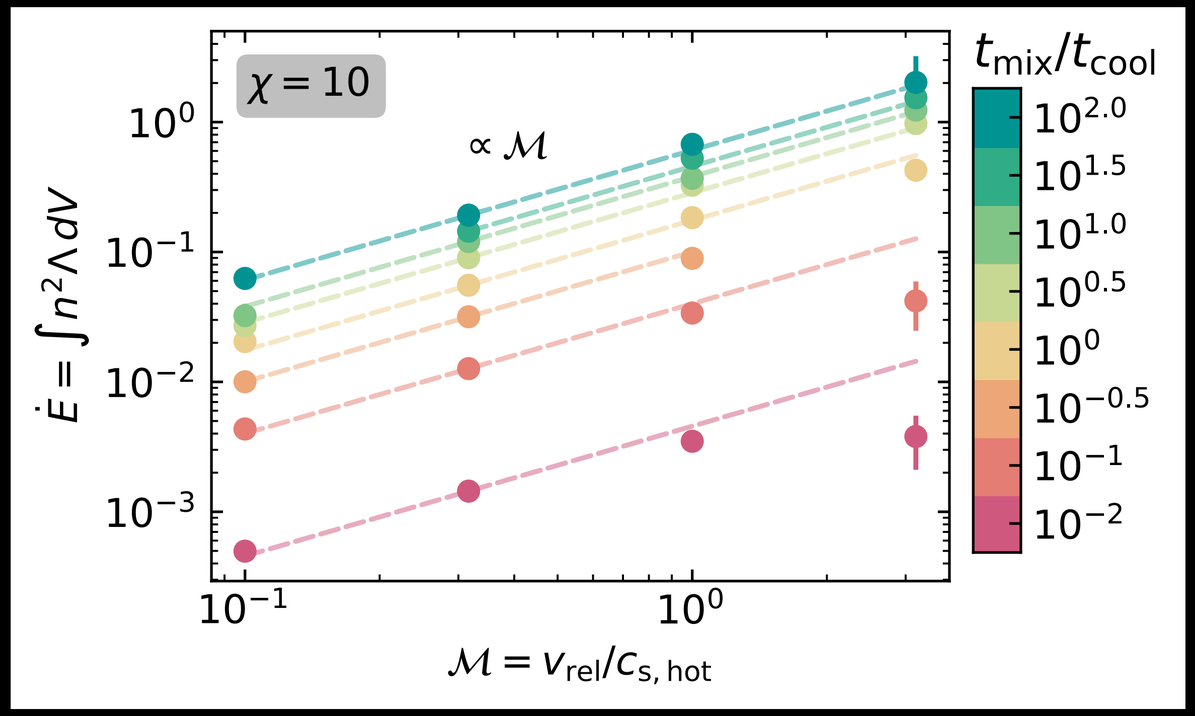
Entrainment, acceleration, & cooling

Slow cooling limit, i.e. when $t_{mix}/t_{cool} \lesssim 1$:

$$\dot{E}_{cool} \propto (t_{mix}/t_{cool})\ \text{Mach} \sim \left(\frac{\chi^{1/2} L}{v_{rel}\, t_{cool}}\right)\left(\frac{v_{rel}}{c_s}\right) \propto \frac{1}{t_{cool}}$$





Entrainment, acceleration, & cooling

Rapid cooling limit, i.e. when $t_{mix}/t_{cool} \gtrsim 1$:

$$\dot{E}_{cool} \propto \left(t_{mix}/t_{cool}\right)^{1/4} \quad \text{Mach} \sim \left(\frac{\chi^{1/2} L}{v_{rel}\, t_{cool}}\right)^{1/4} \left(\frac{v_{rel}}{c_s}\right) \propto \frac{L^{1/4}\, v_{rel}^{3/4}}{t_{cool}^{1/4}}$$