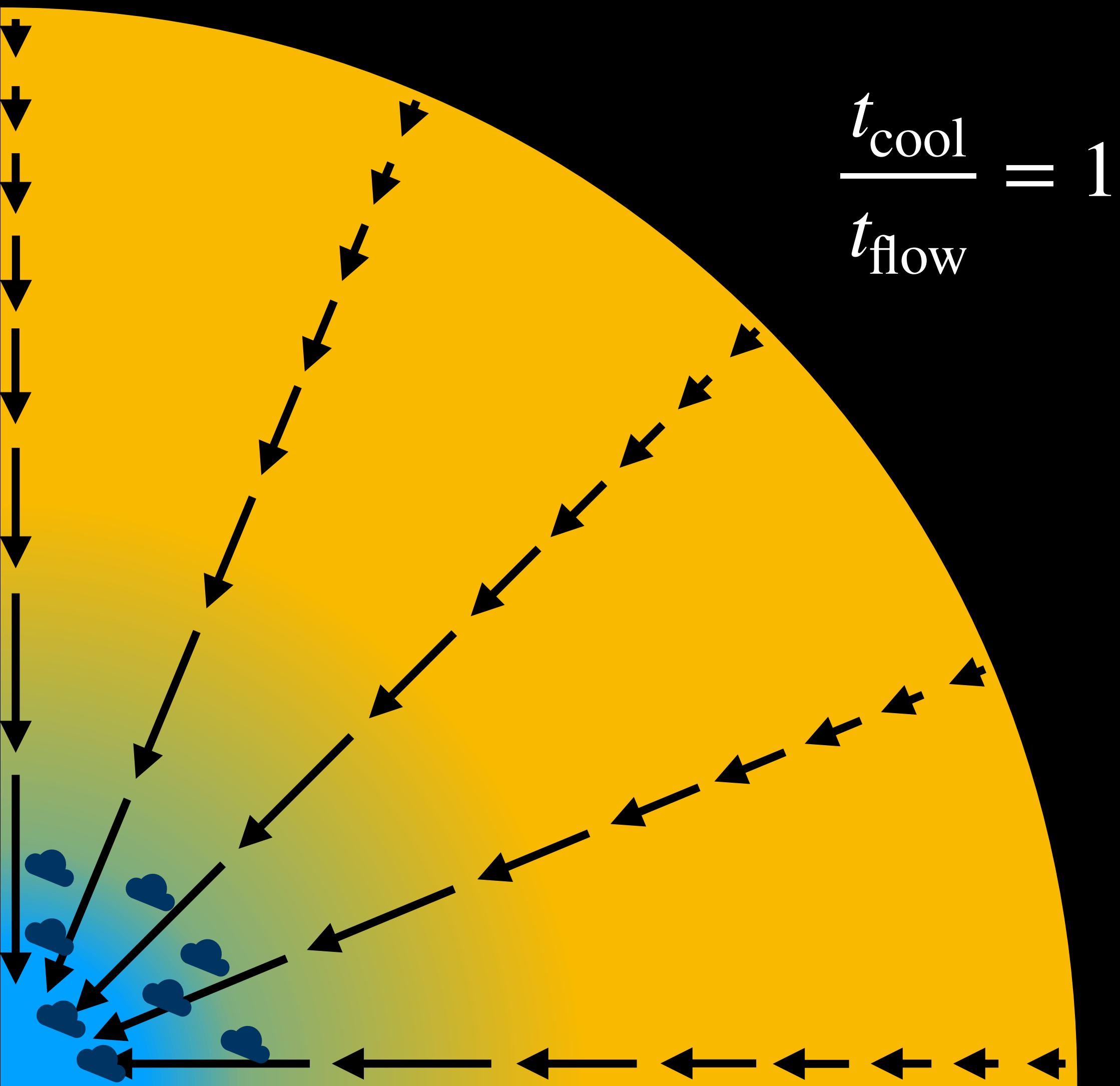


thermally instability

cooling flow



faster *cooling*
leads to more
rapid *inflows*

until $\mathcal{M} > 1$

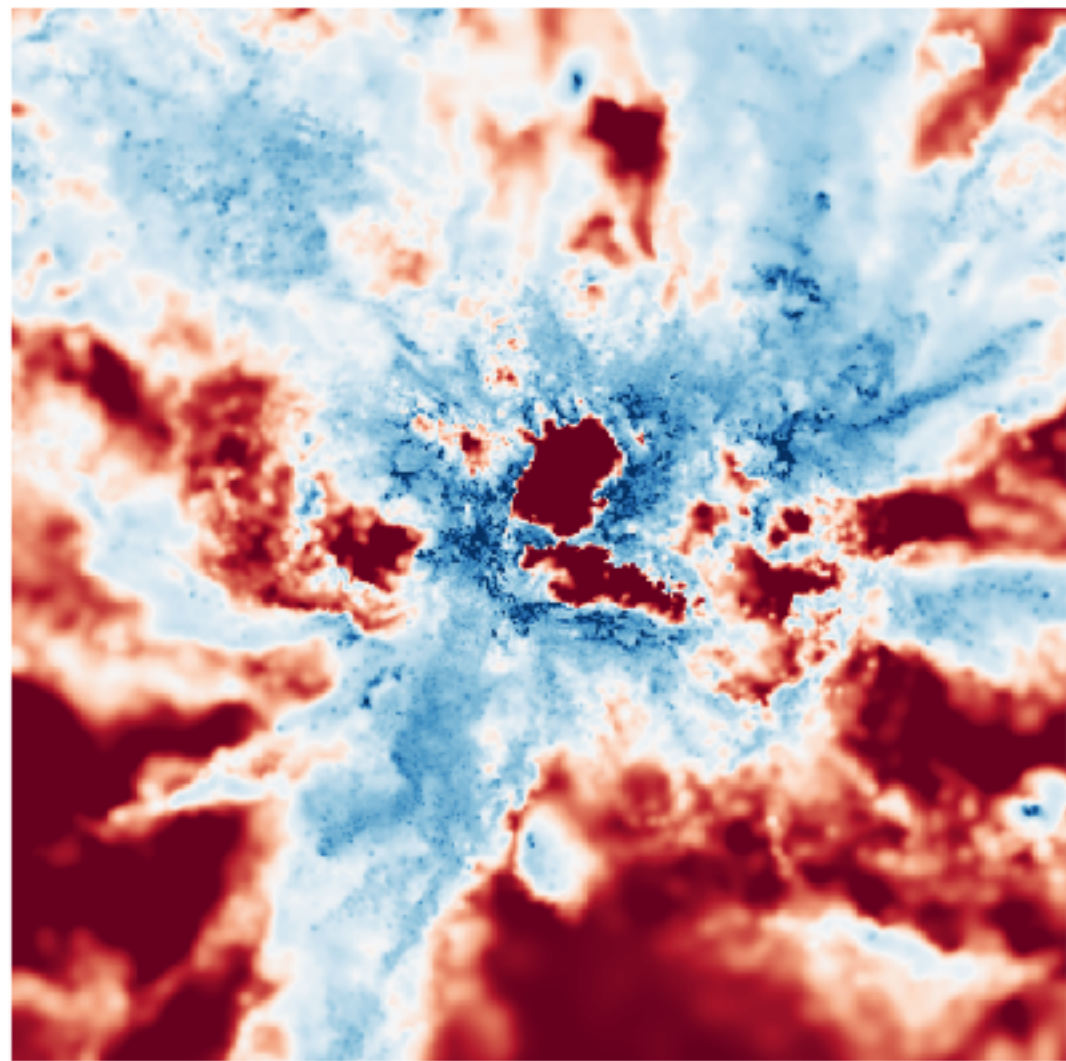
and $\frac{t_{\text{cool}}}{t_{\text{ff}}} < 1$

thermally unstable cooling flows

in FIRE

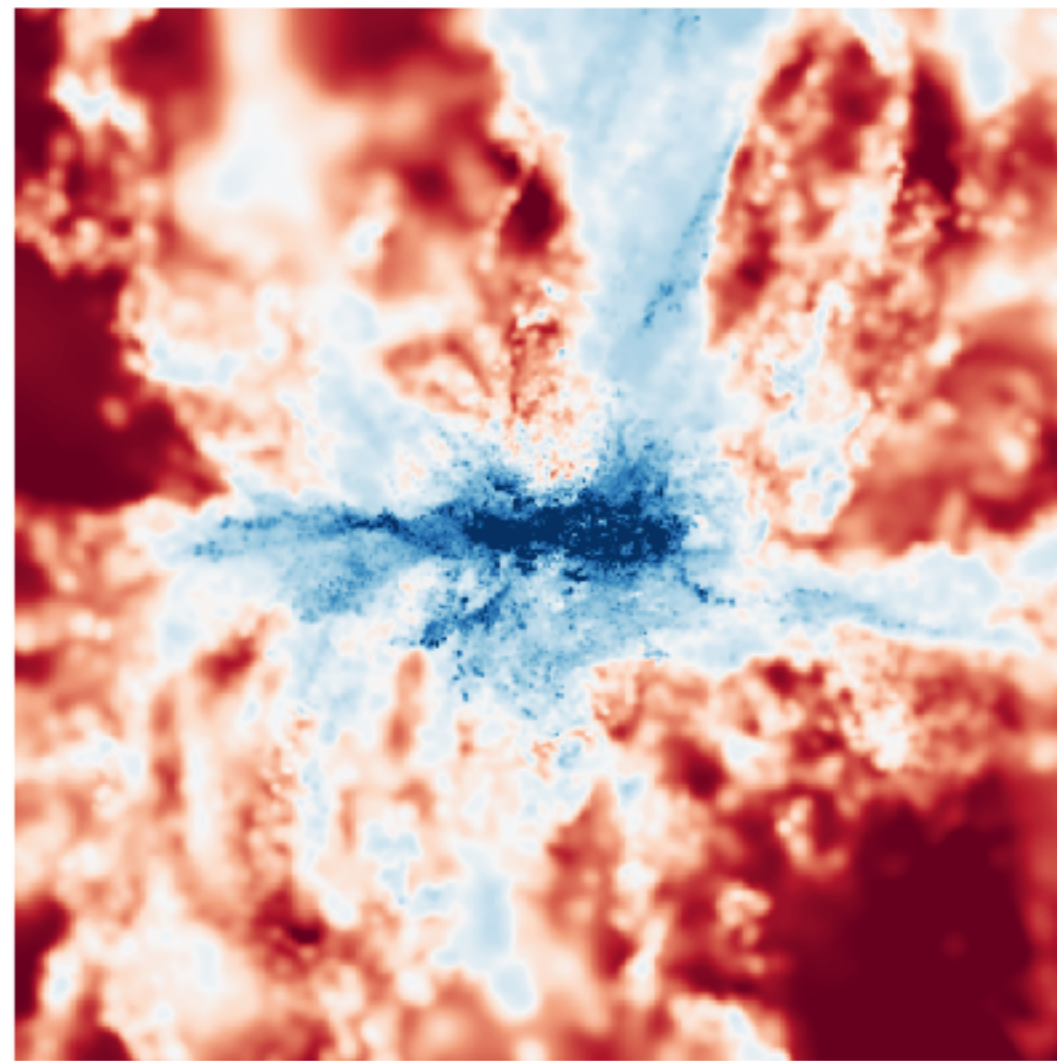
$$t_{\text{cool}}^{(s)}/t_{\text{ff}} = 0.25$$

$$0.2 R_{\text{vir}}$$



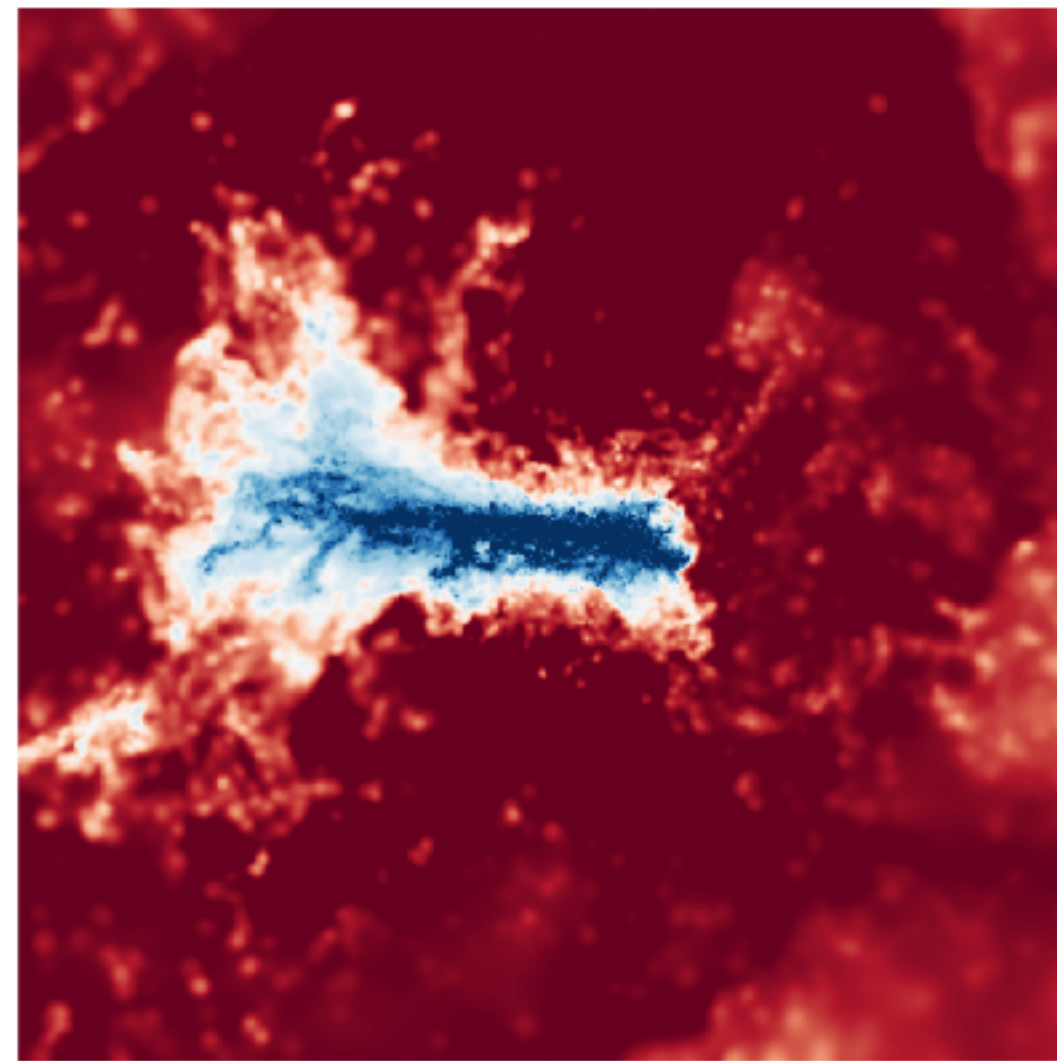
$$t_{\text{cool}}^{(s)}/t_{\text{ff}} = 1$$

$$0.2 R_{\text{vir}}$$



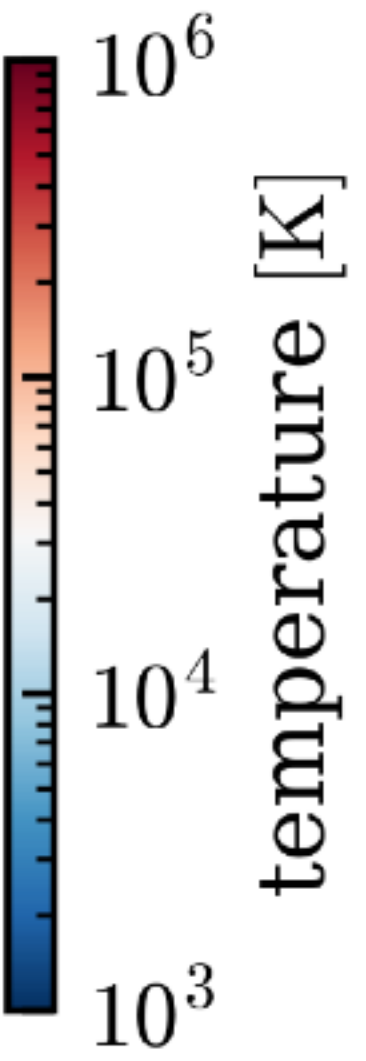
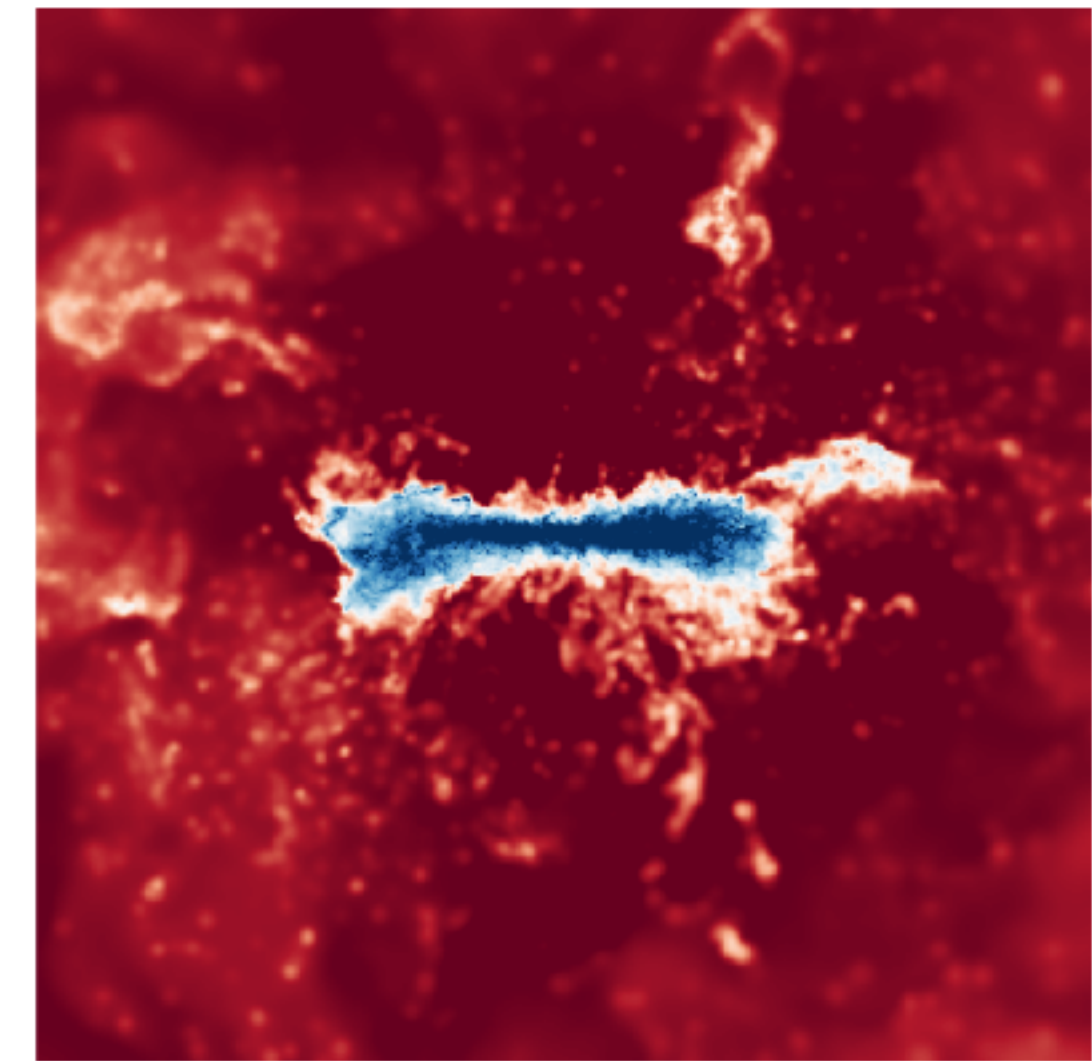
$$t_{\text{cool}}^{(s)}/t_{\text{ff}} = 4$$

$$0.2 R_{\text{vir}}$$



$$t_{\text{cool}}^{(s)}/t_{\text{ff}} = 16$$

$$0.2 R_{\text{vir}}$$



supersonic ← → subsonic