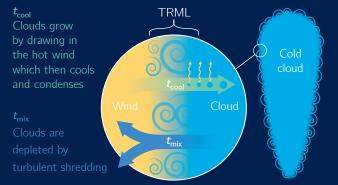
## Multiphase Galactic Winds

Supernovae drive hot (> $10^6$  K) winds that are peppered with pockets of cold (~ $10^4$  K) gas out into the surrounding circumgalactic medium. The fate of these cold clouds — and their impact on the hot wind — depends on the competition between turbulent shredding and radiative cooling.

## The Impact of the Hot Wind on the Cold Clouds

The relative motion of the hot wind and a cold cloud gives rise to a *turbulent radiative* mixing layer (TRML) at their interface. The cloud's fate is set by the relative timescales for cooling ( $t_{cool}$ ; primarily set by the pressure and metallicity) and mixing ( $t_{mix}=r_{cl}/v_{turb}$ ; where  $r_{cl}$  is the cloud's size and  $v_{turb}$  is the turbulent velocity).



In large clouds cooling wins

 $t_{\rm cool} < t_{\rm mix}$ 

In small clouds shredding wins

 $t_{\mathsf{mix}} < t_{\mathsf{cool}}$ 

## The Impact of the Cold Clouds on the Hot Wind

The clouds back react causing the wind to:

**Decelerate** as momentum transfers to the clouds **Heat up** from thermalization of relative kinetic energy Cool down as it mixes with the cold material Gain/lose mass from/to the clouds

Circumgalactic medium

Supernovae

Cold clouds

- Hot wind

Galaxv