THE PHYSICS OF THE DISC-CORONA INTERFACE:

How galactic fountains regulate the accretion and quenching

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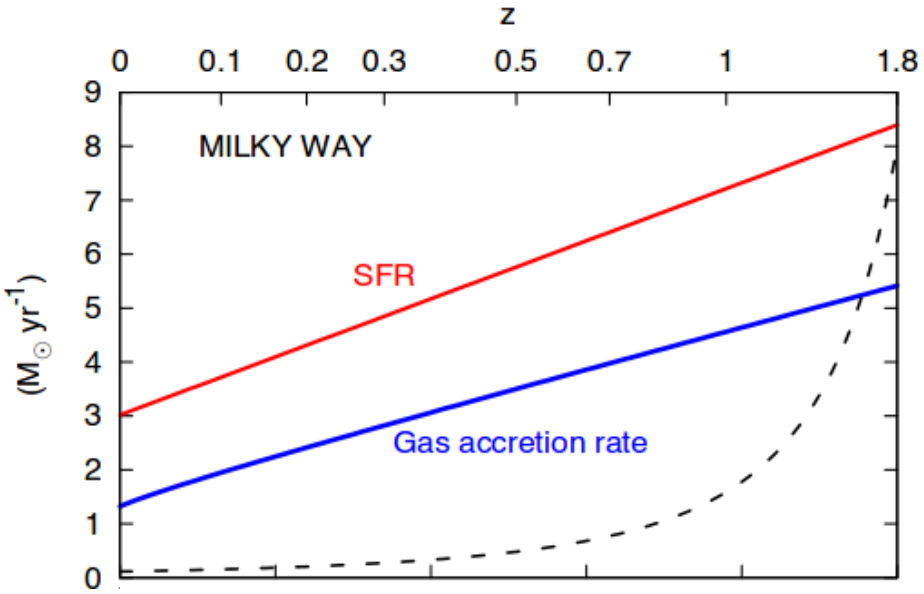
Collaborators: F. Fraternali, F. Marinacci

FROM BLACK HOLE TO ENVIRONMENT – Canberra, 23/08/2017

How does gas accretion take place?



Slight decrease of SFR with time

NEED FOR GAS ACCRETION

(e.g., Fraternali & Tomassetti 2012, Aumer & Binney 2009)

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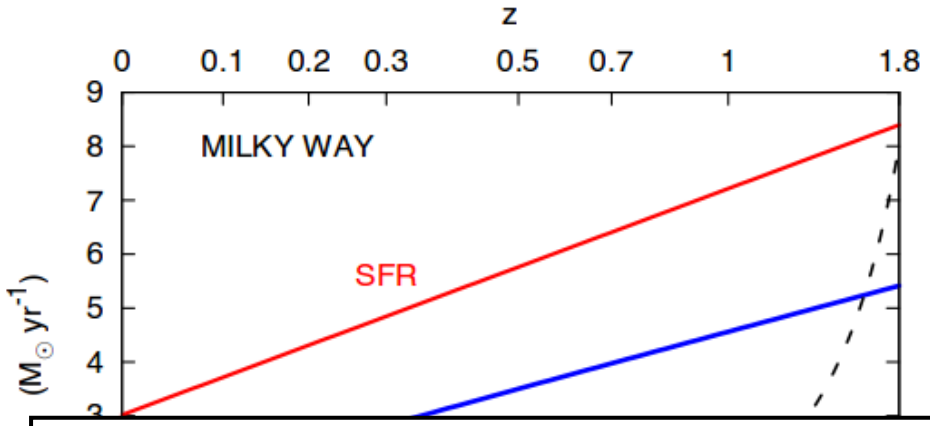

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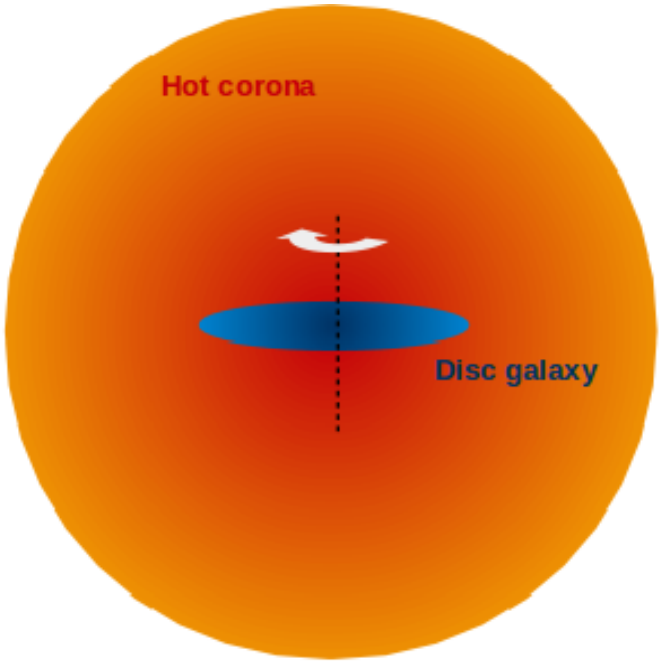

Accretion from corona at virial temperature ($T_{vir} \sim 10^6 K$) ?

LONG COOLING TIME!

9)

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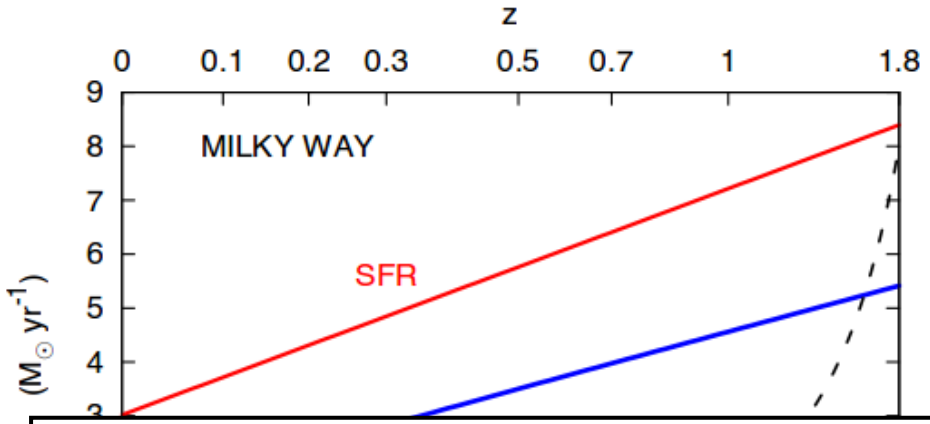

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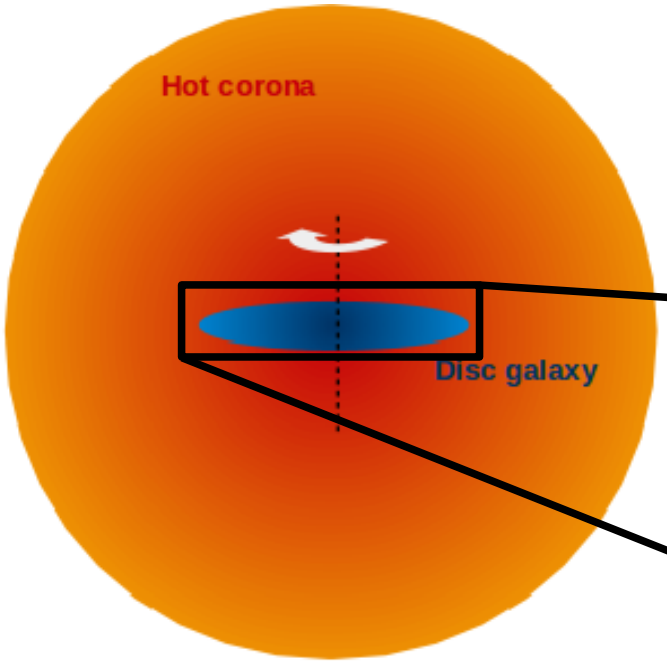
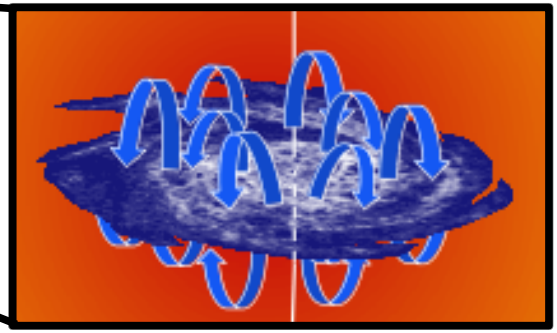
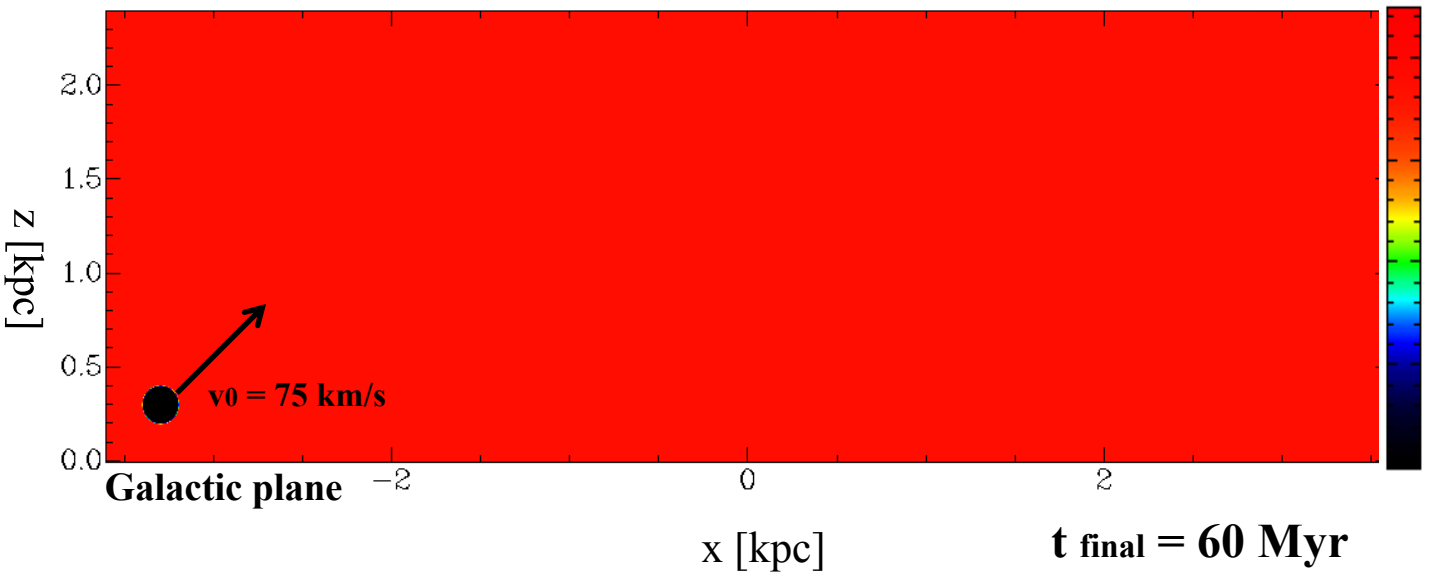


Disc-corona interface:
GALACTIC FOUNTAINS

(e.g., Fraternali & Binney 2008, Marinacci et al. 2010, Marasco et al. 2012)



Interaction between hot coronal gas and fountain clouds



$\mathbf{T}_{hot} = \mathbf{2{\times}10^6\ K}$

$\mathbf{Z}_{hot} = \mathbf{0.1\ Z}_{sun}$

$\mathbf{Z}_{cloud} = \mathbf{Z}_{sun}$

$\mathbf{n}_{hot} = \mathbf{10^{-3}}cm^{-3}$

t final = 60 Myr

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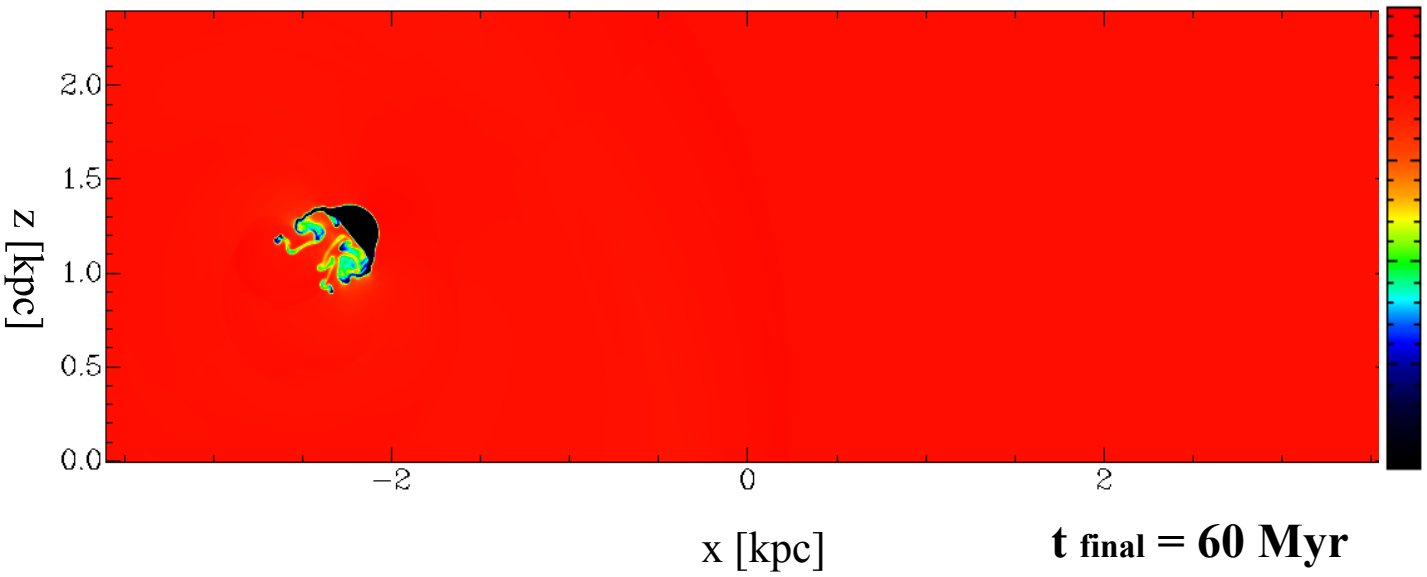

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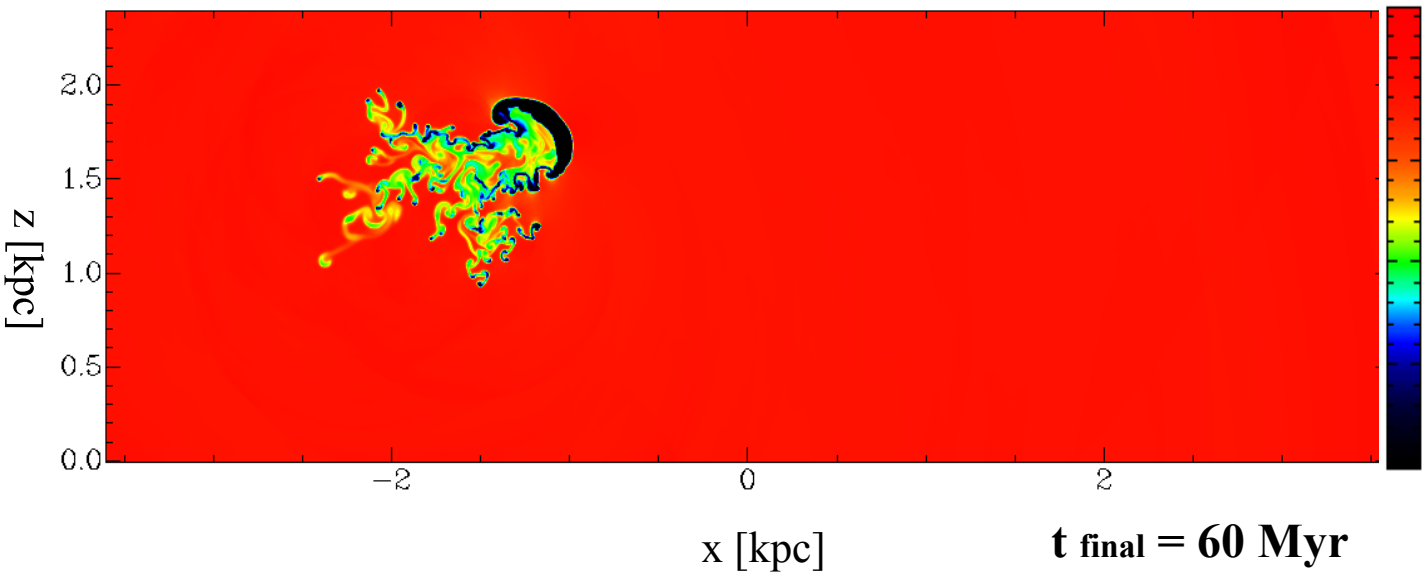

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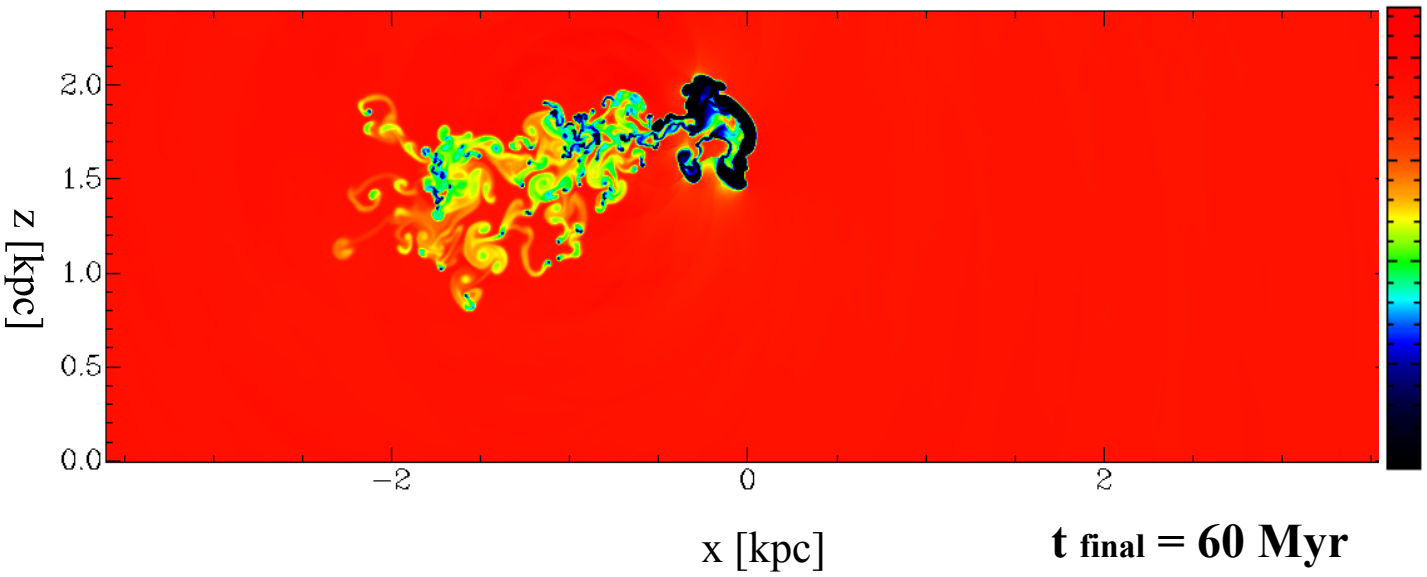

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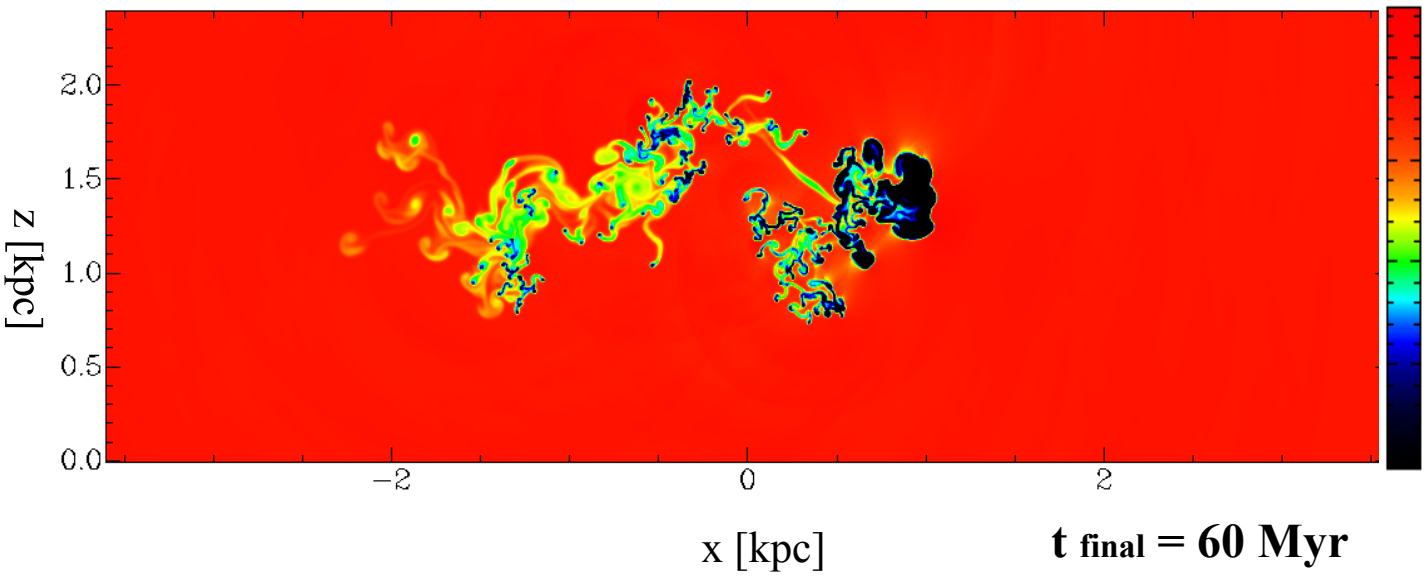

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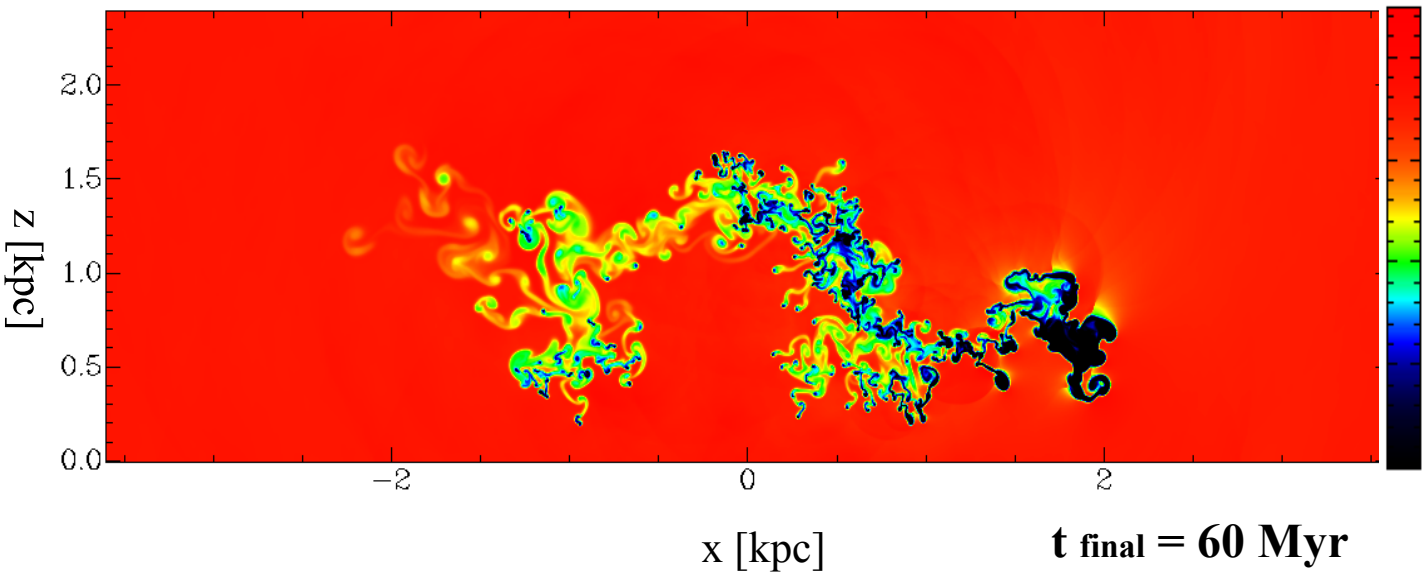

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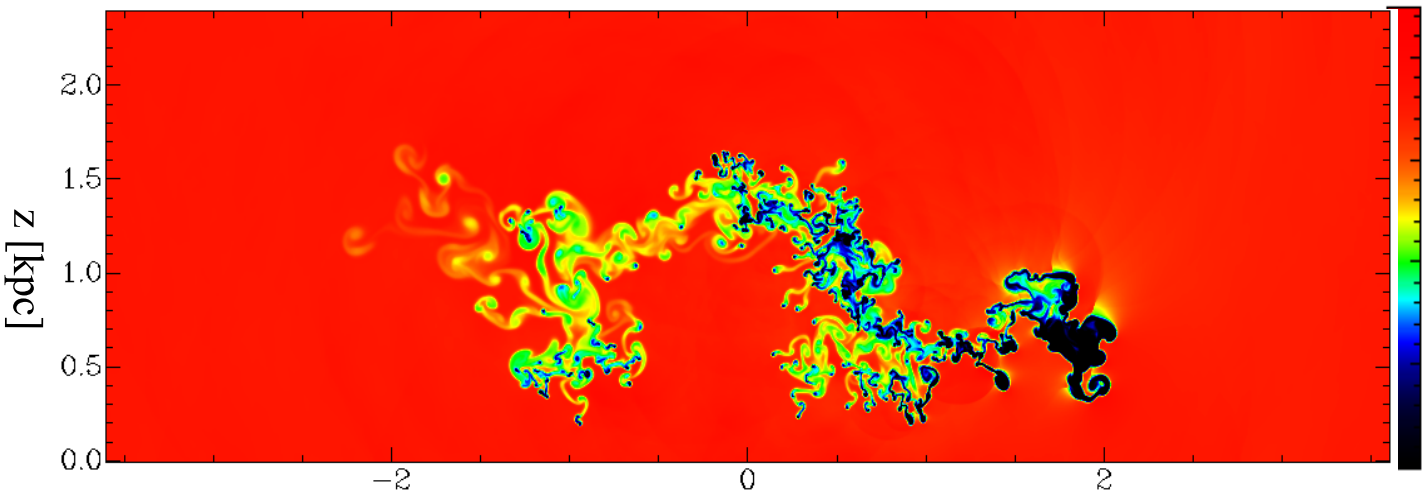

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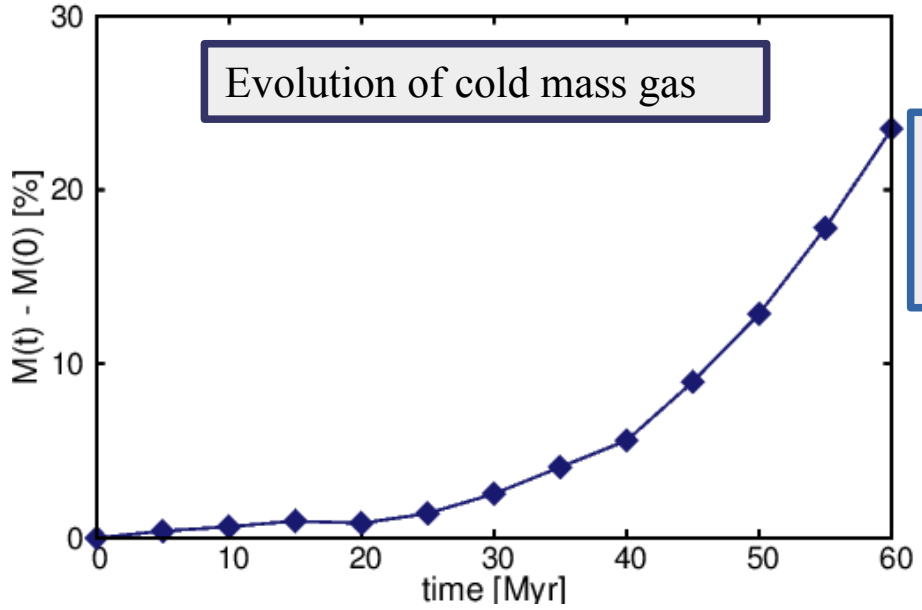


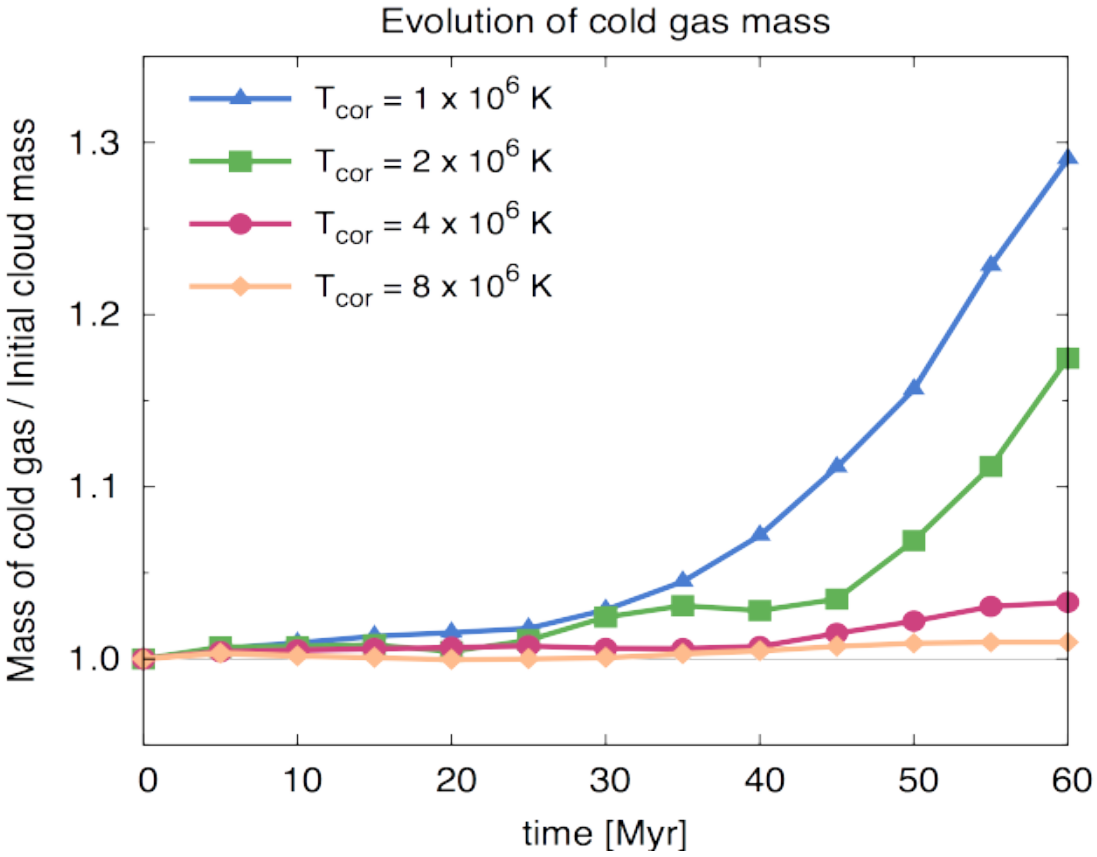
Condensation of **hot coronal gas**
Mass of cold gas increses by ~ 20 % !

↓

Gas available for star-formation

(Marinacci et al. 2010, Armillotta et al. 2016)

Efficiency of condensation at different coronal temperatures



Condensation strongly depends on the **coronal temperature**

High at $T_{cor} \leqslant 2\times10^6 K$

Ineffective at $T_{cor} \geqslant 4\times10^6 K$

(Armillotta et al. 2016)

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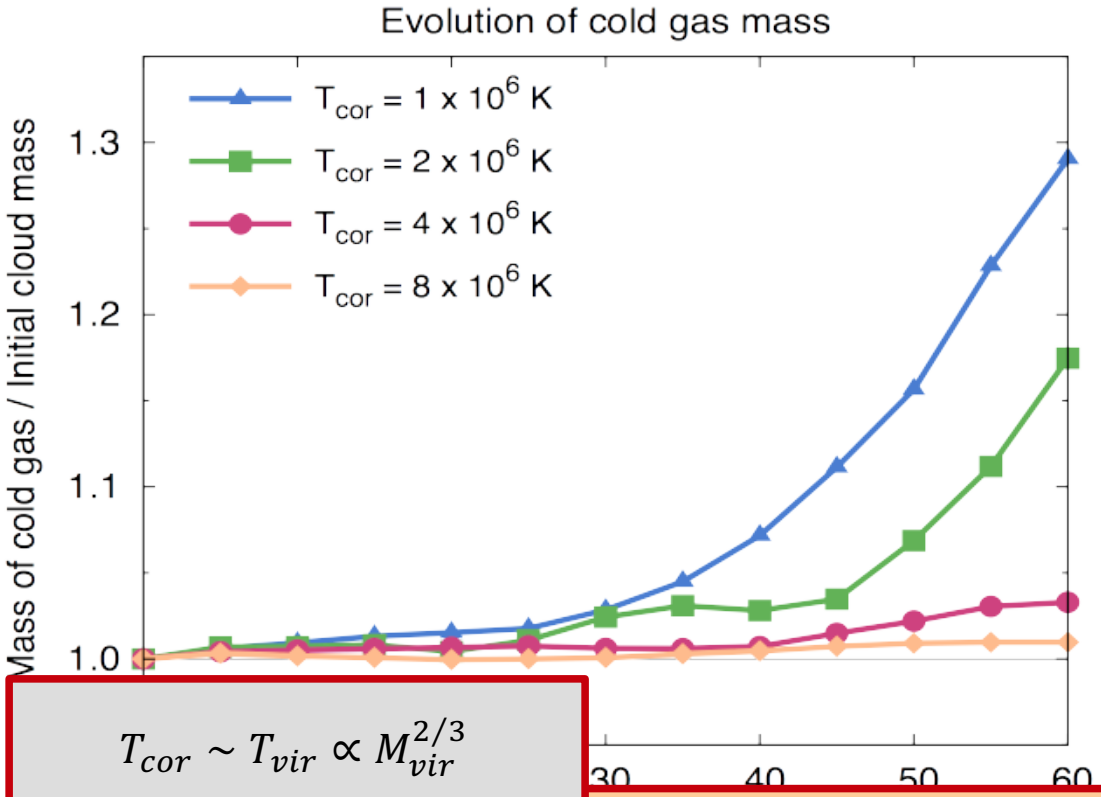

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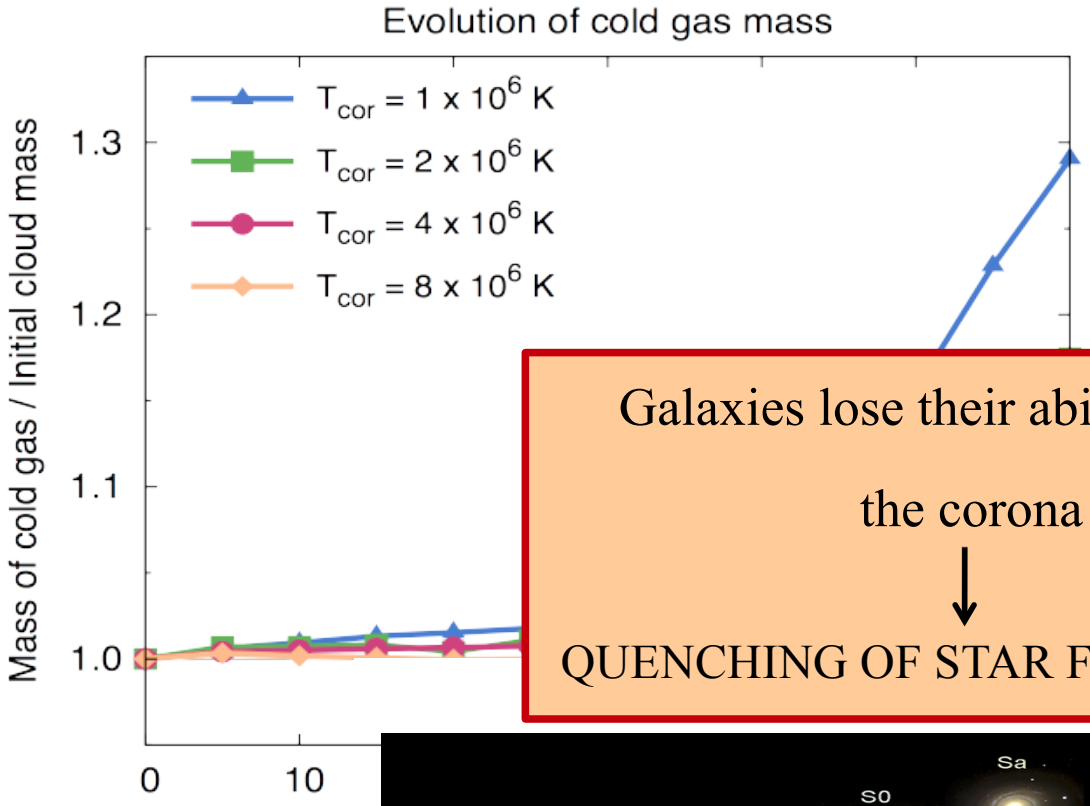
$$T_{cor} \sim T_{vir} \propto M_{vir}^{2/3}$$

... *IN TERMS OF VIRIAL MASS* ...

$T_{vir} = 2\times10^6 K \rightarrow M_{vir} \sim 3\times10^{12} M_{sun} \rightarrow$ *Milky-Way-like galaxies*

$T_{vir} = 8\times10^6 K \rightarrow M_{vir} \geqslant 10^{13} M_{sun} \rightarrow$ *Massive galaxies (S0/Sa)*

Efficiency of condensation at different coronal temperatures



Condensation strongly depends on the **coronal temperature**

Galaxies lose their ability to cool the corona

QUENCHING OF STAR FORMATION ?

at $T_{cor} \leqslant 2{\times}10^6 K$

at $T_{cor} \geqslant 4{\times}10^6 K$