Bursty AGN jets in compact galaxies

from 3D simulations

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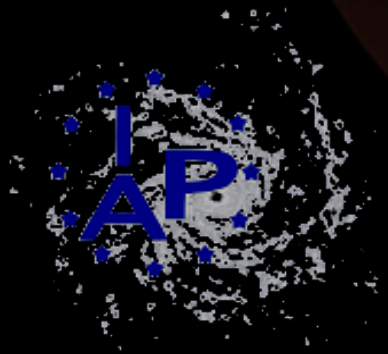
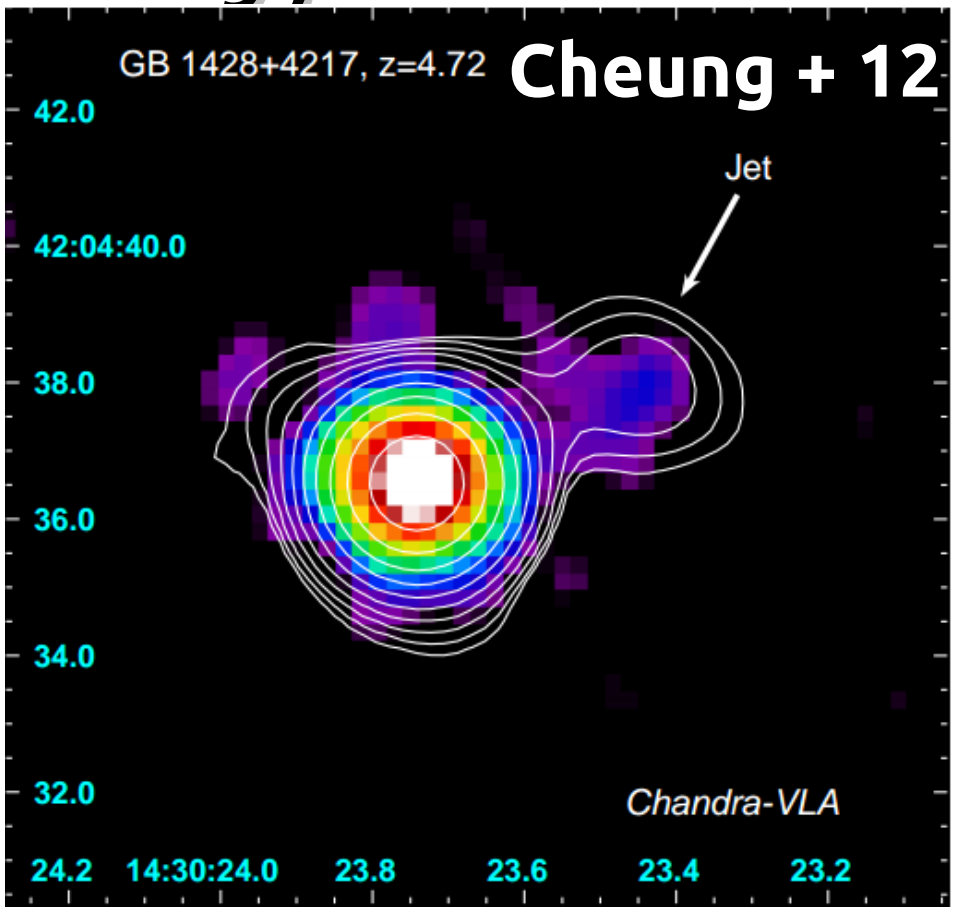
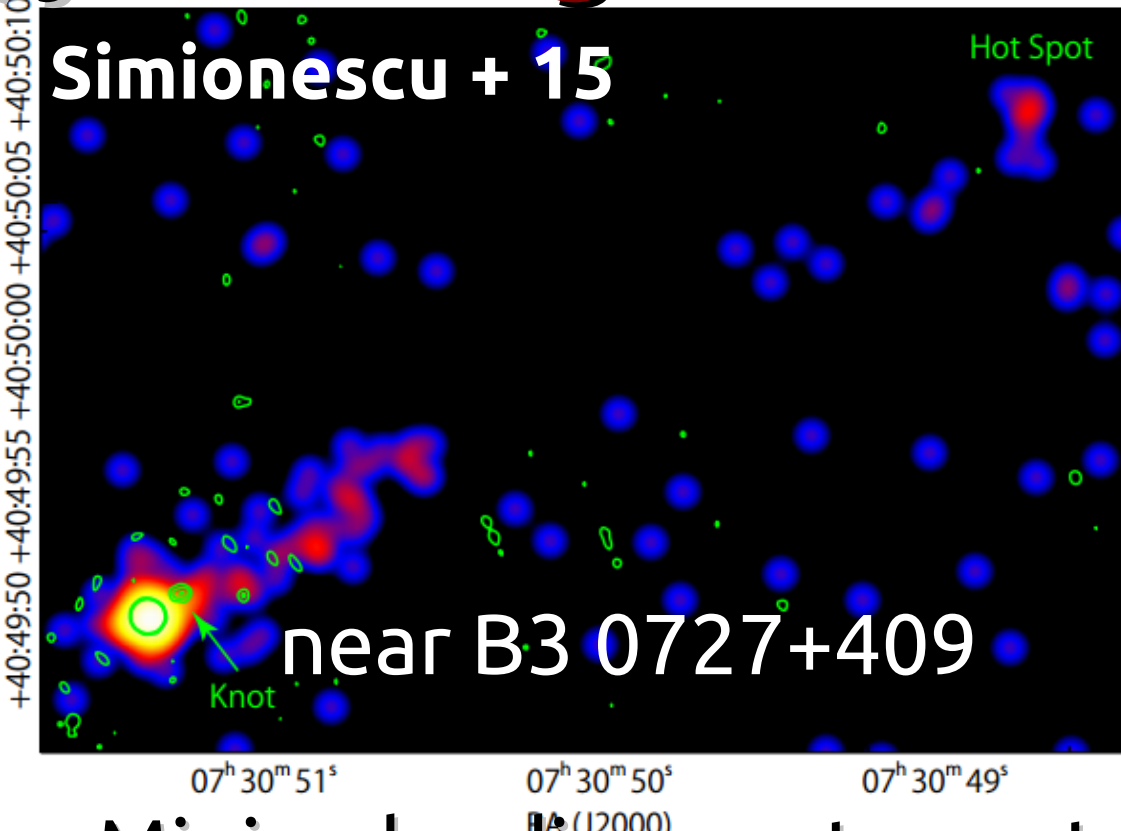


Xray, radio-faint, jets at high z





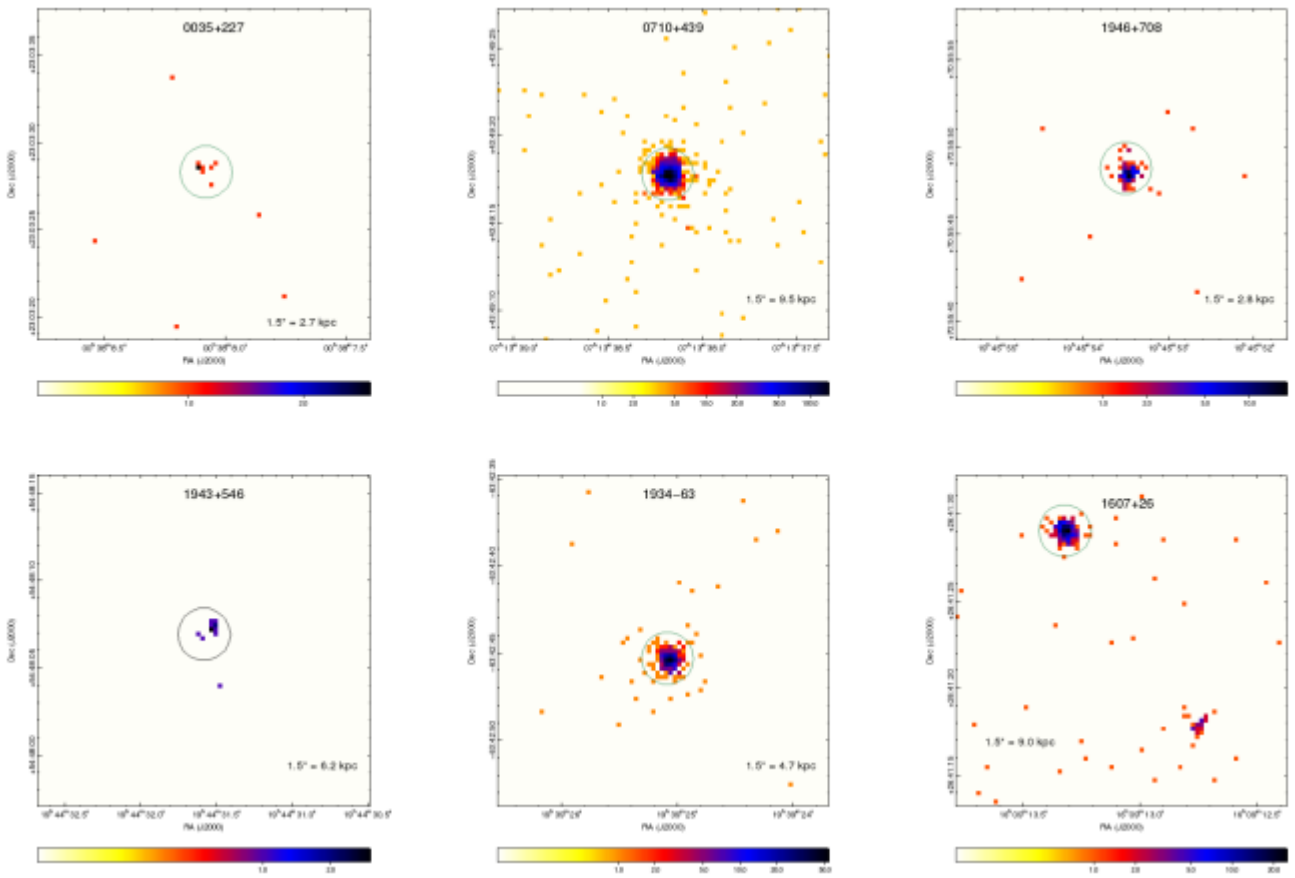
- ~70 kpc scale, **z = 4.72**
- small (200 pc) radio knot

- Minimal radio counterpart
- Near radio-loud QSO in Abell585, **z = 2.5**

L_X >~ 10^{45} erg/s (CMB/IC model)

Powerful bursty AGN in a **gas-rich kpc-scale ISM** at high z!

Xray, radio-faint, jets at low z



16 young radio AGN
(or frustrated jets)

kinematic age
few 100 – 3000 y

2-100 kpc

$L_{2\text{-}10\ keV} = 10^{41\text{-}45}$ erg/s

Siemiginowska + 16

Compact Symmetric Objects (CSOs)

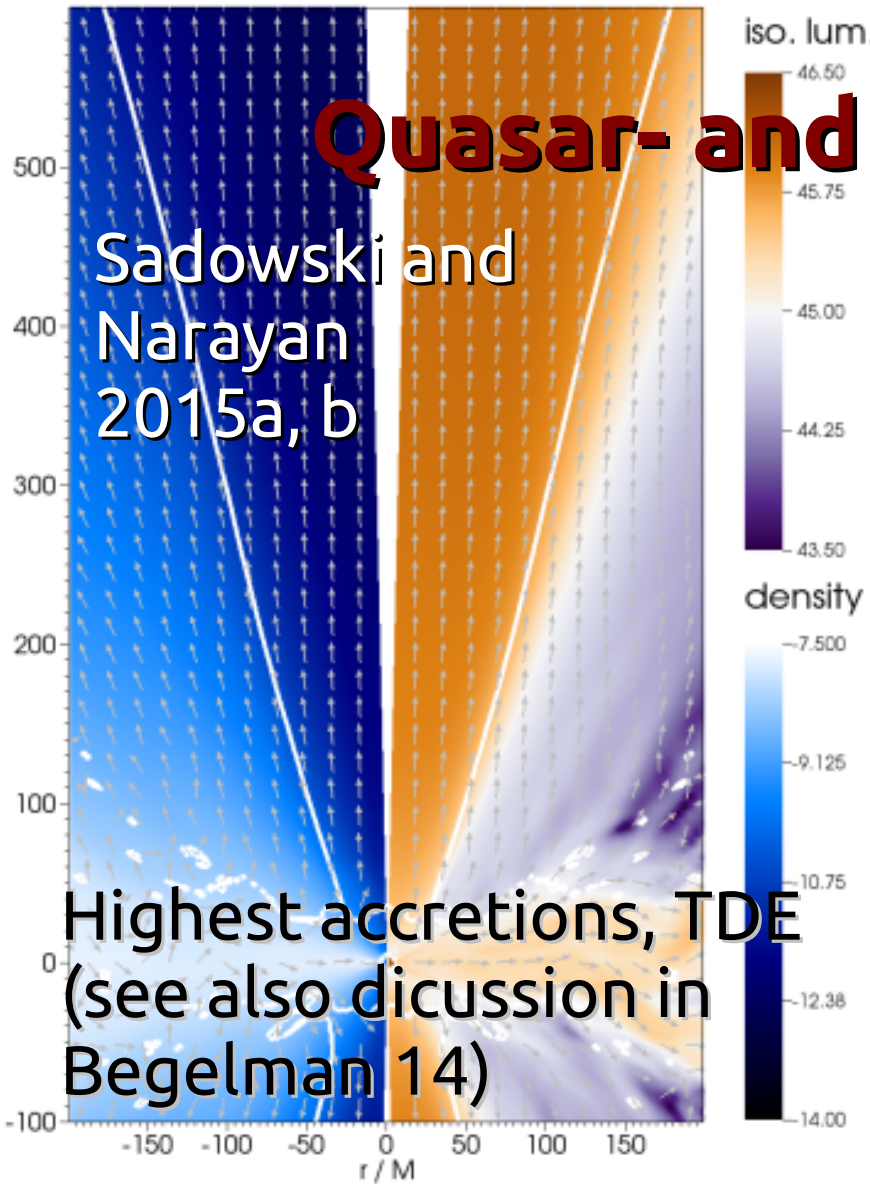
Xray emission from

AGN corona or pc-scale ISM or shocks

What about feedback?

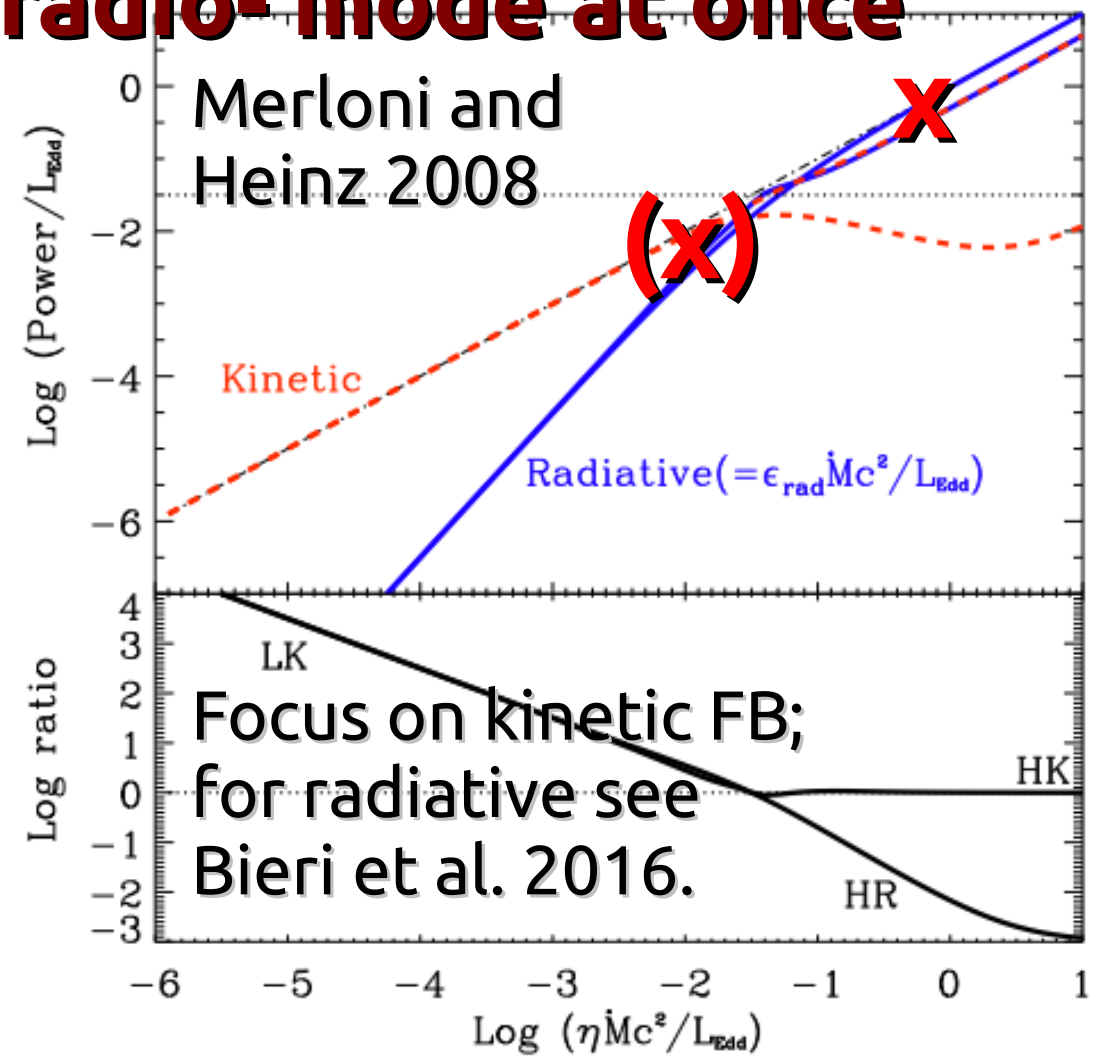
High (super!) Eddington Jets gxy → effective feedback!

Quasar- and radio- mode at once x



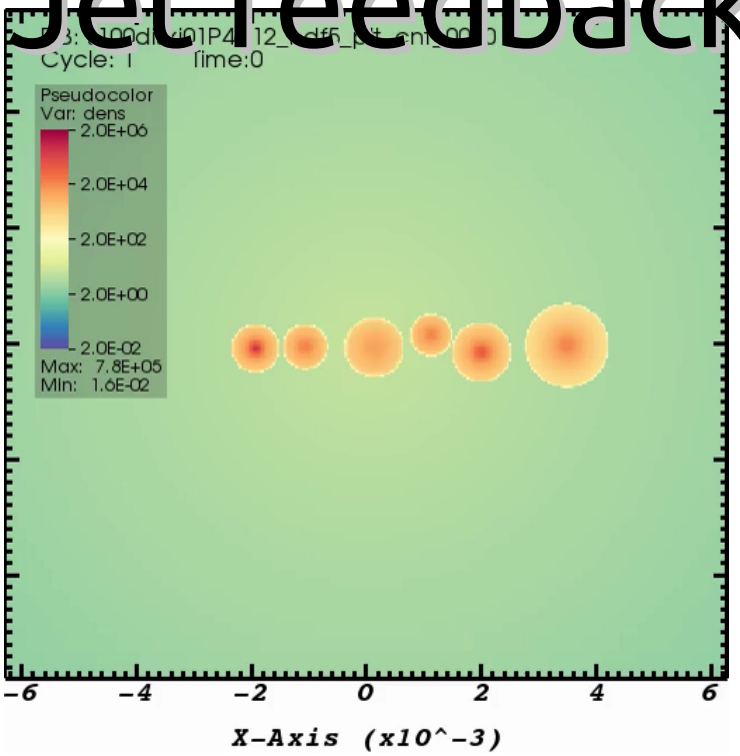
Sadowski and Narayan 2015a, b

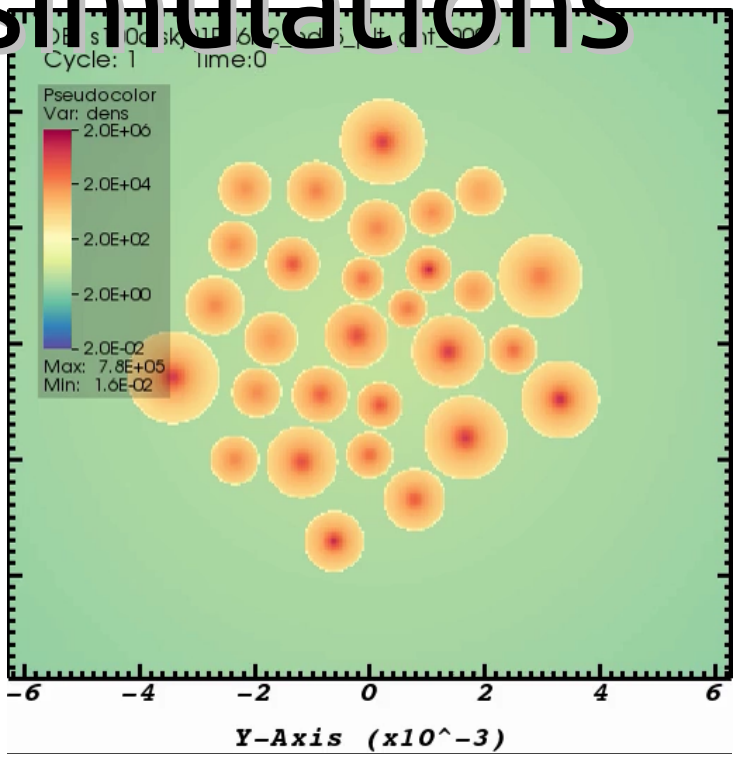
Highest accretions, TDE (see also dicussion in Begelman 14)



Focus on kinetic FB; for radiative see Bieri et al. 2016.

Jet feedback simulations





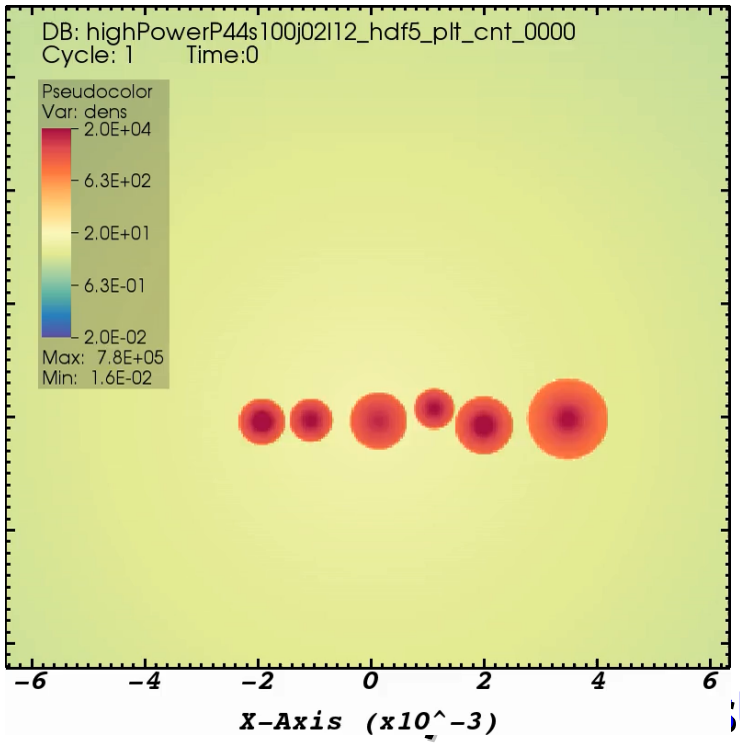
Grid, AMR with FLASH

$M_{halo} = 10^{11}\ M_\odot$

$T >\sim T_{vir} \sim 10^6$ K

$M_{gas} = 5.E8\ M_\odot$

$M_{BH} \sim 10^6\ M_\odot$



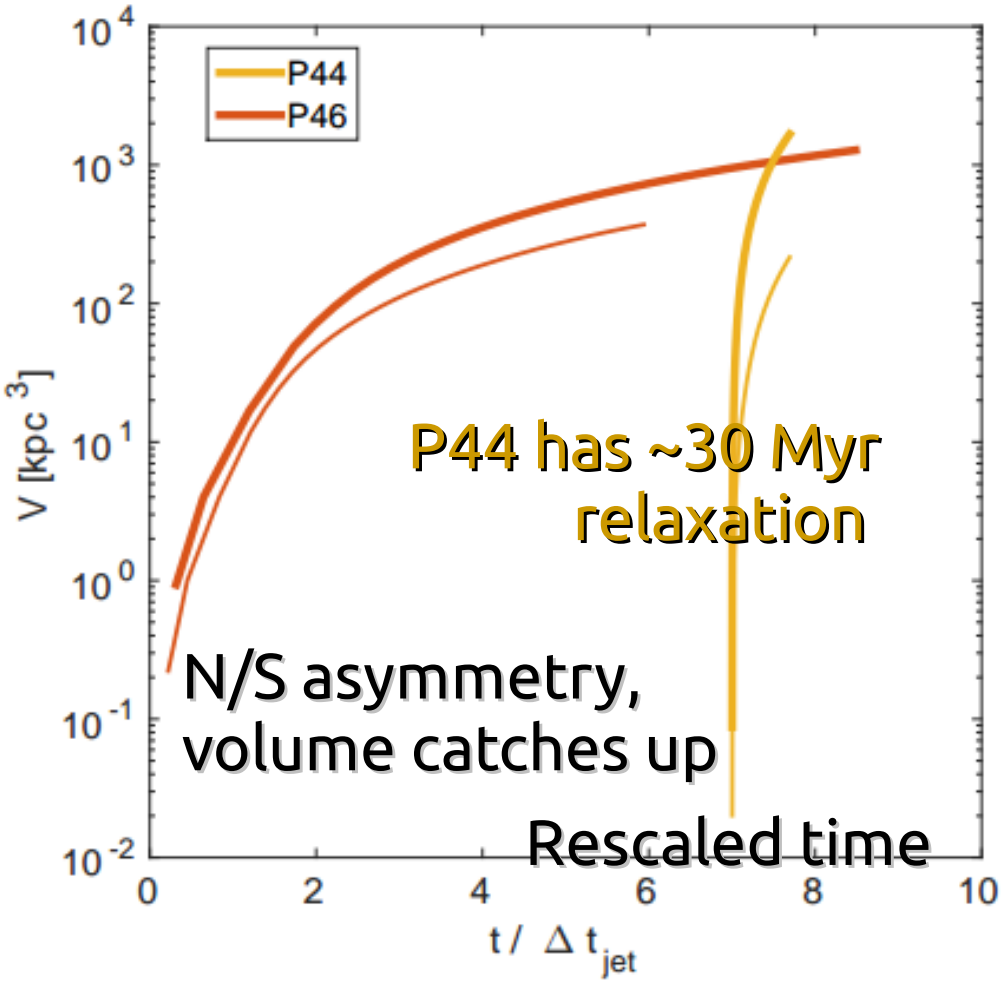
- $f_{Edd} \sim 100 \rightarrow$ extreme
  10^{46} erg/s for 20 kyr

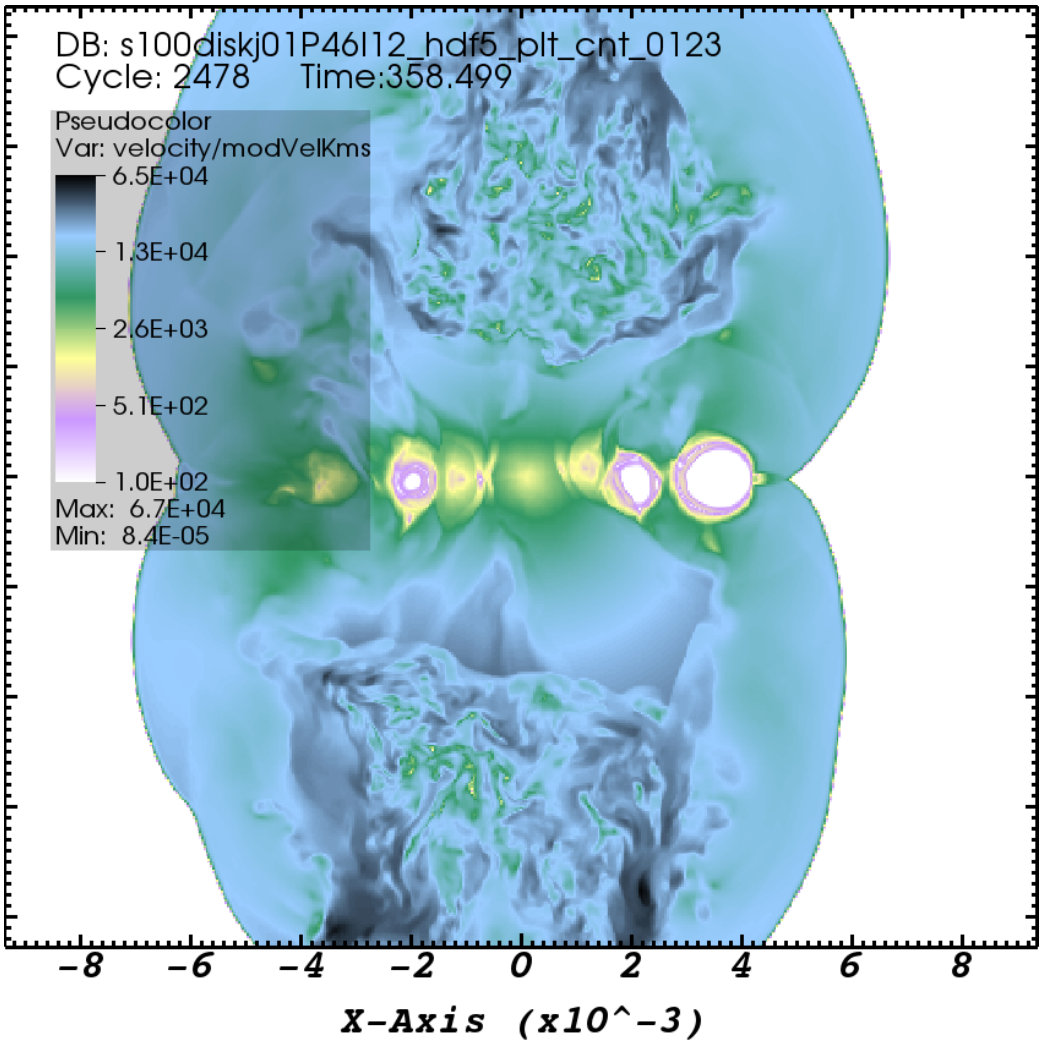
self-gravitating TIS (Shapiro + 99) in eq. at few 1000s K.

$f_{Edd} \sim 1 \rightarrow$ "normal" AGN
10^{44} erg/s for 4 Myr

ty AGN @ Breaking the Limits

Hot cavity: volume, velocity

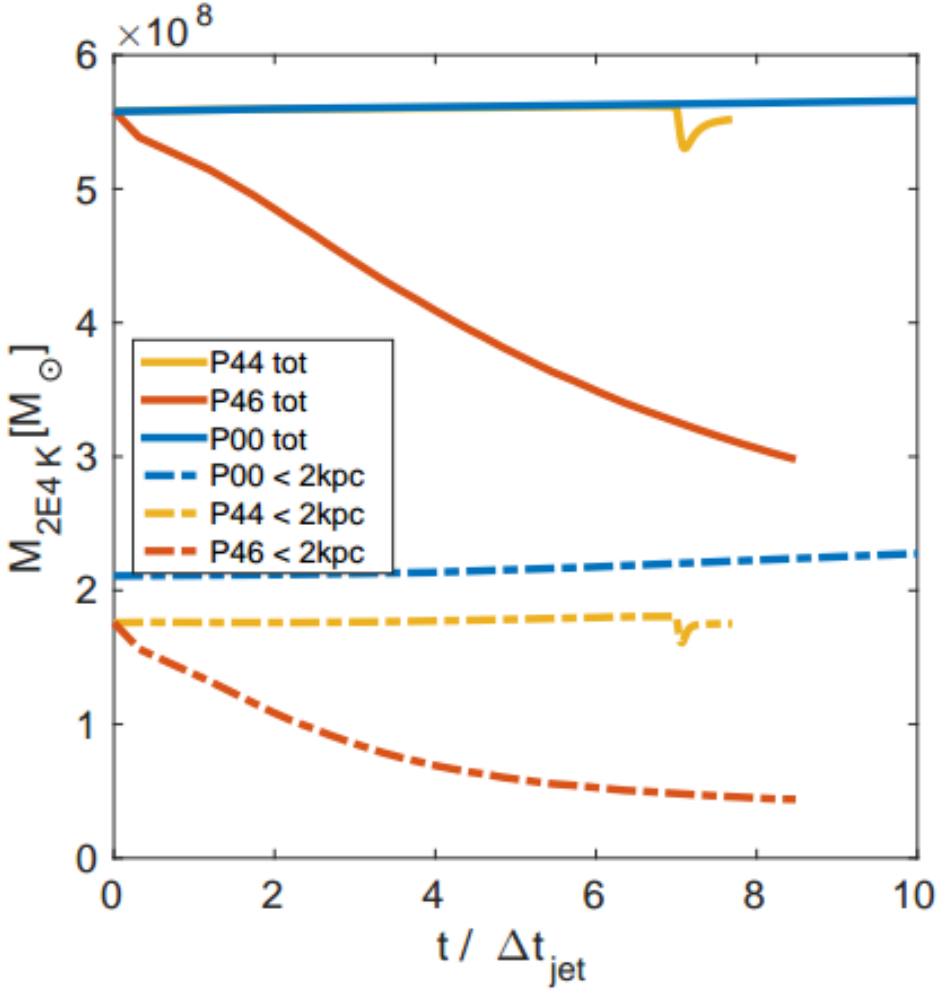


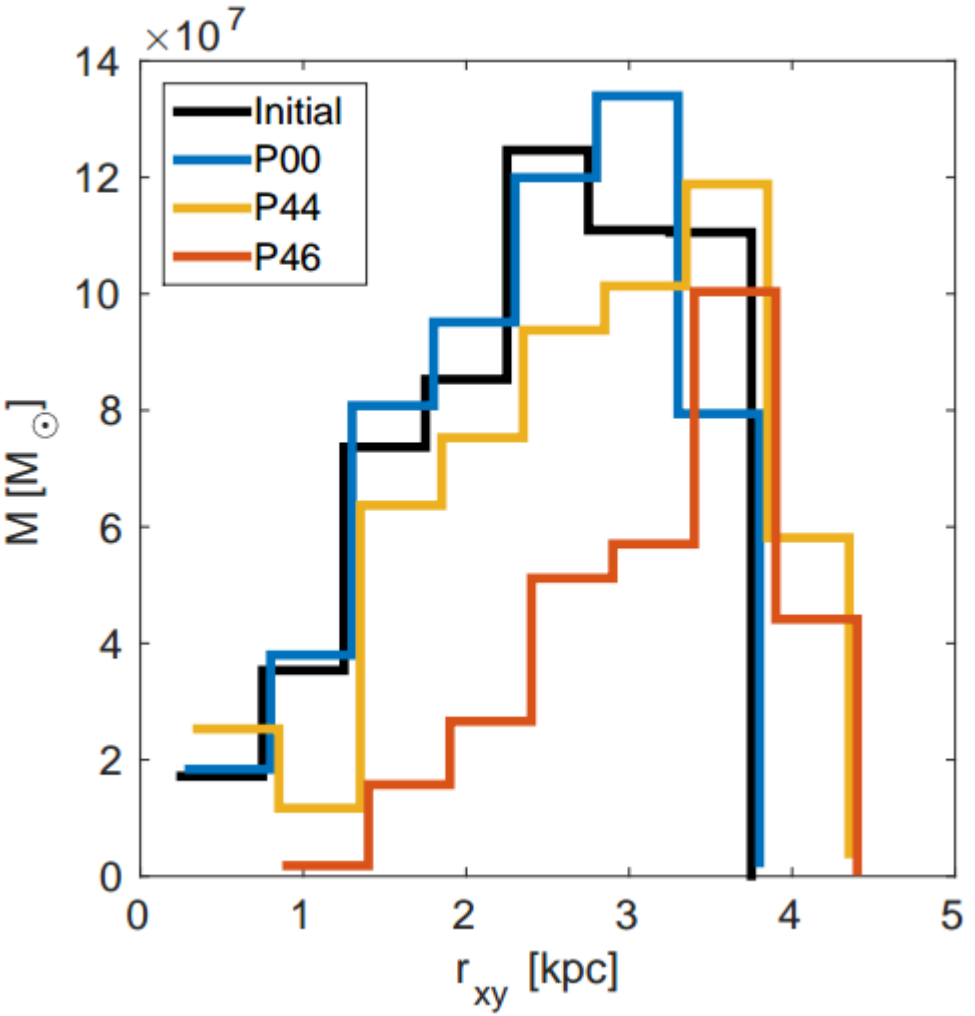


Cavity engulfs all disk in 1 or 2 jet lifetimes.

Fast **outflows** velocities up to **50.000 km/s**.

Cold gas



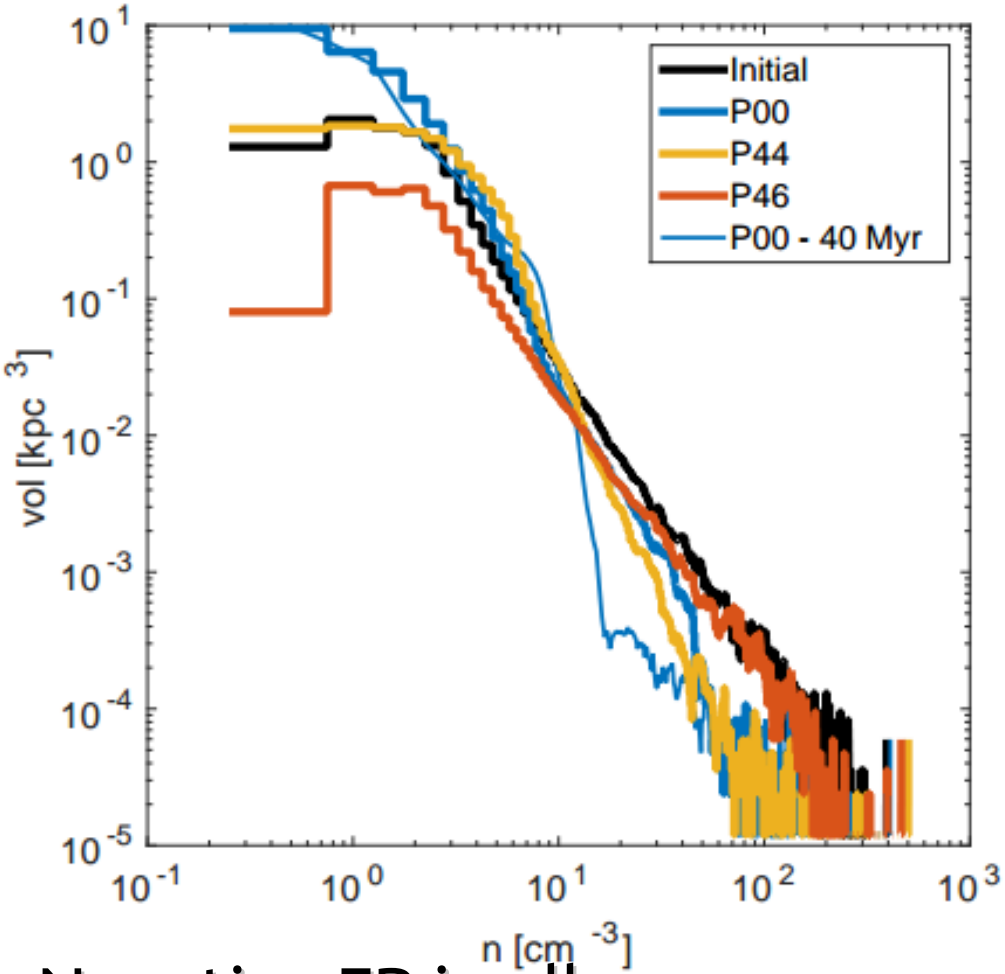


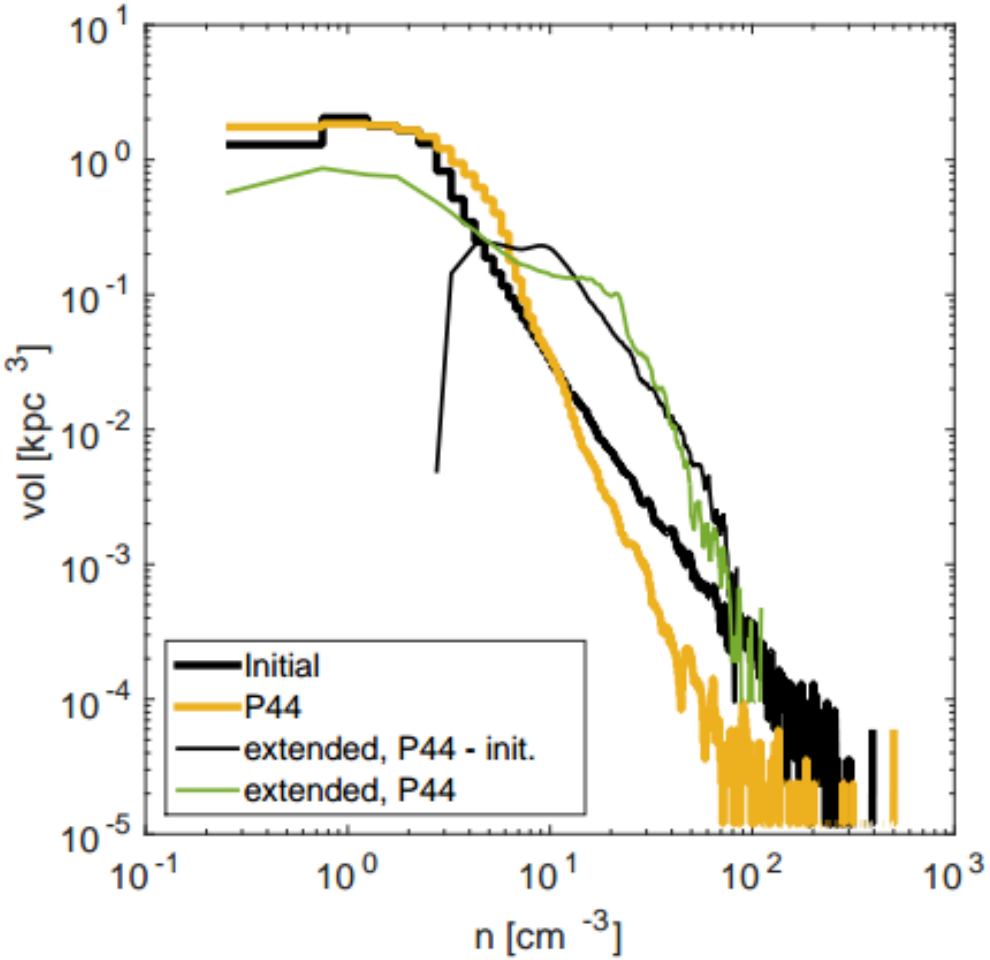
Cold gas mass

P46: decreases, negative feedback

P44: little change, almost no net feedback

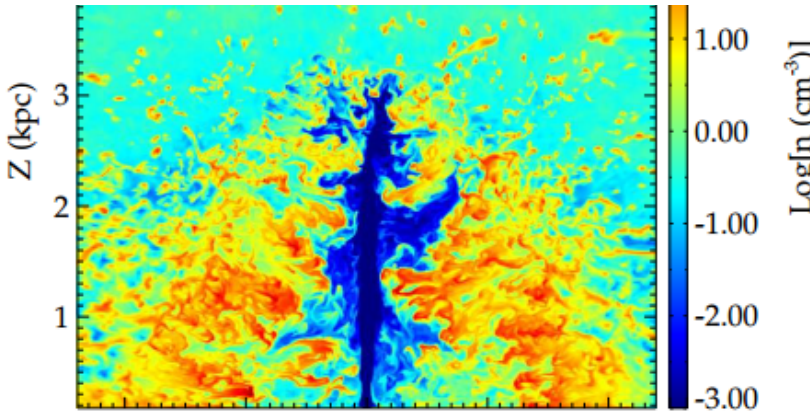
Cold gas PDF





Negative FB in all cases,
unlike a z~0 P44 extended gxy

BUT **Results geometry dependent!**
(eg. Gaibler + 11, Bieri + 16)



Conclusions
Bursty AGN

- The active, powerful jets we observe in Xray can provide the most effective AGN mechanical feedback.
- This feedback is netly negative at all times, unlike “regular” AGNs
- Caveat: results depend on volume covering