Stellar and Total Baryon Mass Fractions in Groups and Clusters since Redshift 1

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+ the COSMOS collaboration

“Stellar and total baryon fractions in groups and clusters since redshift 1” by S. Giodini et al. arXiv:0904.0448

WHAT?

Investigate the **dependence of the stellar/total baryon fraction from the cluster/group mass and evolution** with a large sample of groups ($2\times10^{13}<M<3\times10^{14}\ M_{sun}$)

WHY?

are the groups closed system?
importance of non-grav processes?

HOW?

X-ray IR

$$f_b = f^{stars} + f^{gas} = \frac{M_{gas}}{M_{tot}} + \frac{M_{stars}}{M_{tot}}$$

X-ray

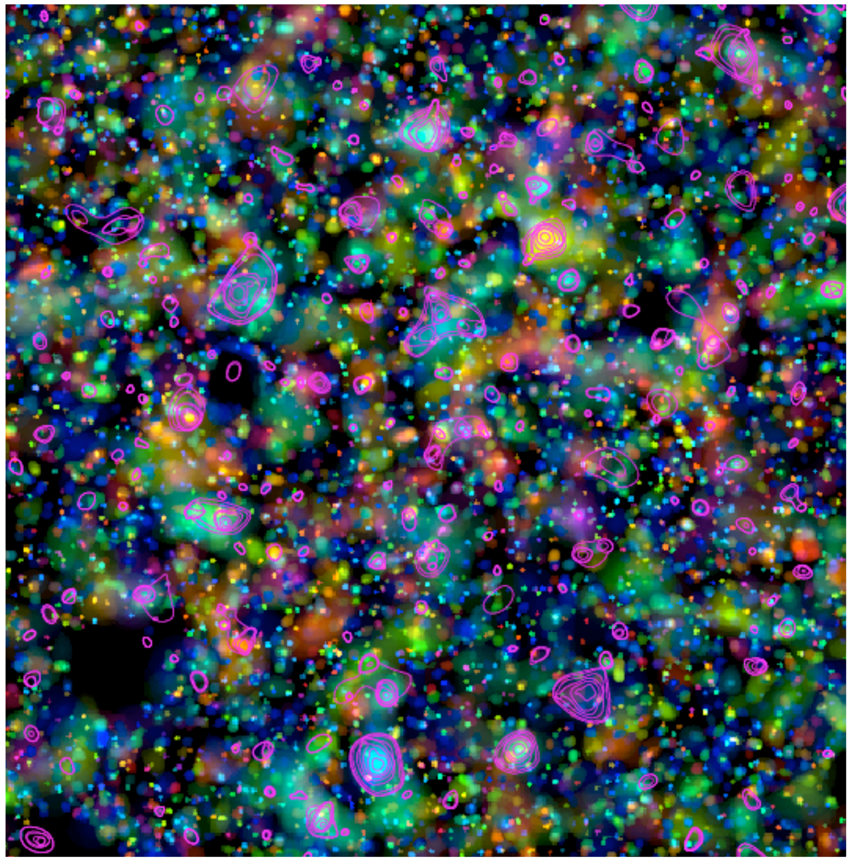
DATA

- ✓ 91 COSMOS X-ray detected groups at 0.1<z<1.0:

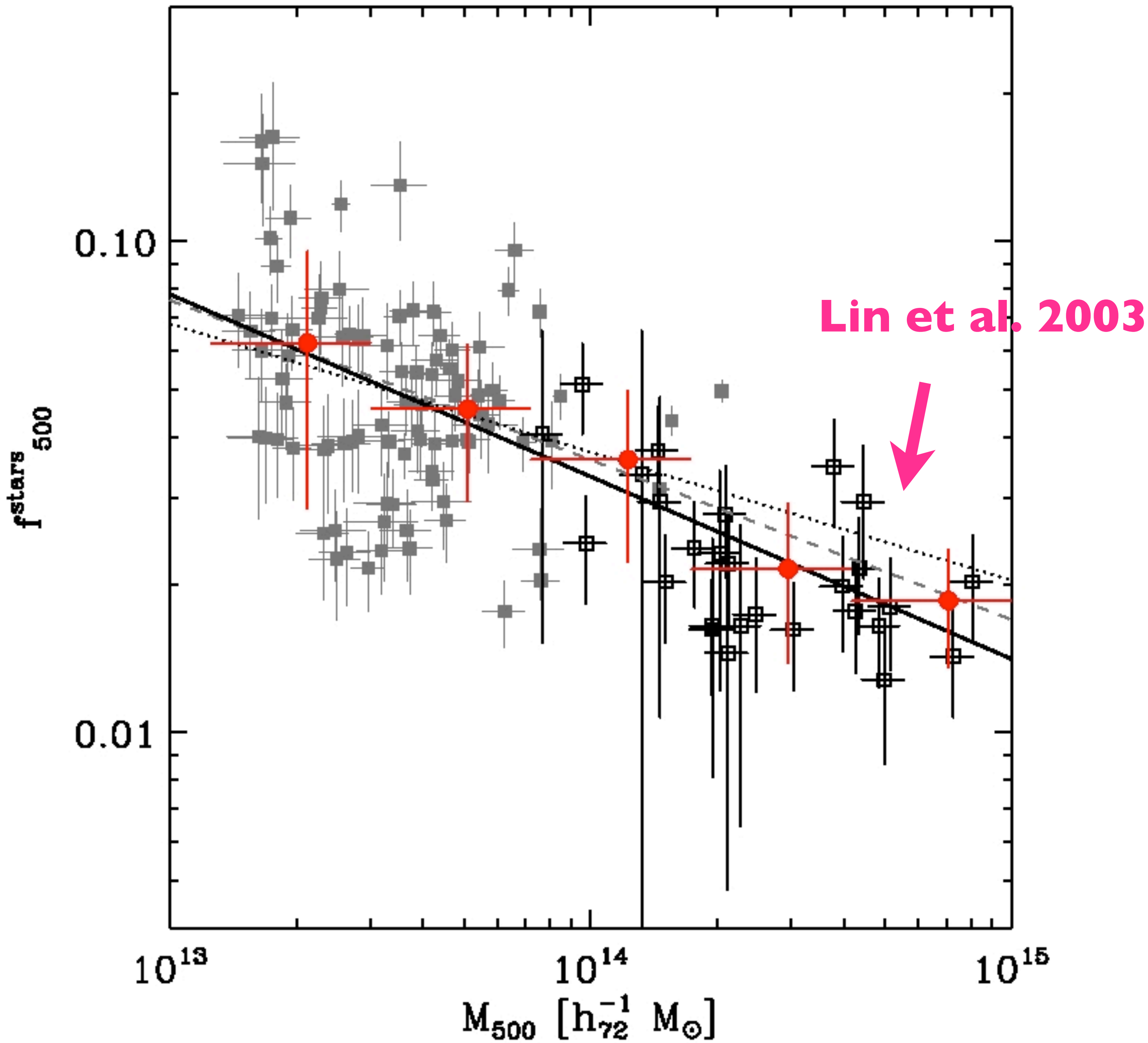
  <u>THE LARGEST SAMPLE OF X-SELECTED GROUPS UP TO NOW</u>

- ✓ Stellar masses bound to galaxies (K-COSMOS)
- ✓ Total masses from scaling relations (WL-COSMOS)
- ✓ Clusters (10^{14}-$10^{15}\ M_{sun}$) — 27 from Lin+03
- ✓ Gas masses — Pratt+09
- ✓ Diffuse star component — Zibetti+05

COSMOS 2 deg² z~0.2 ------> z~ 1



The f_{star} vs. M_{500} relation



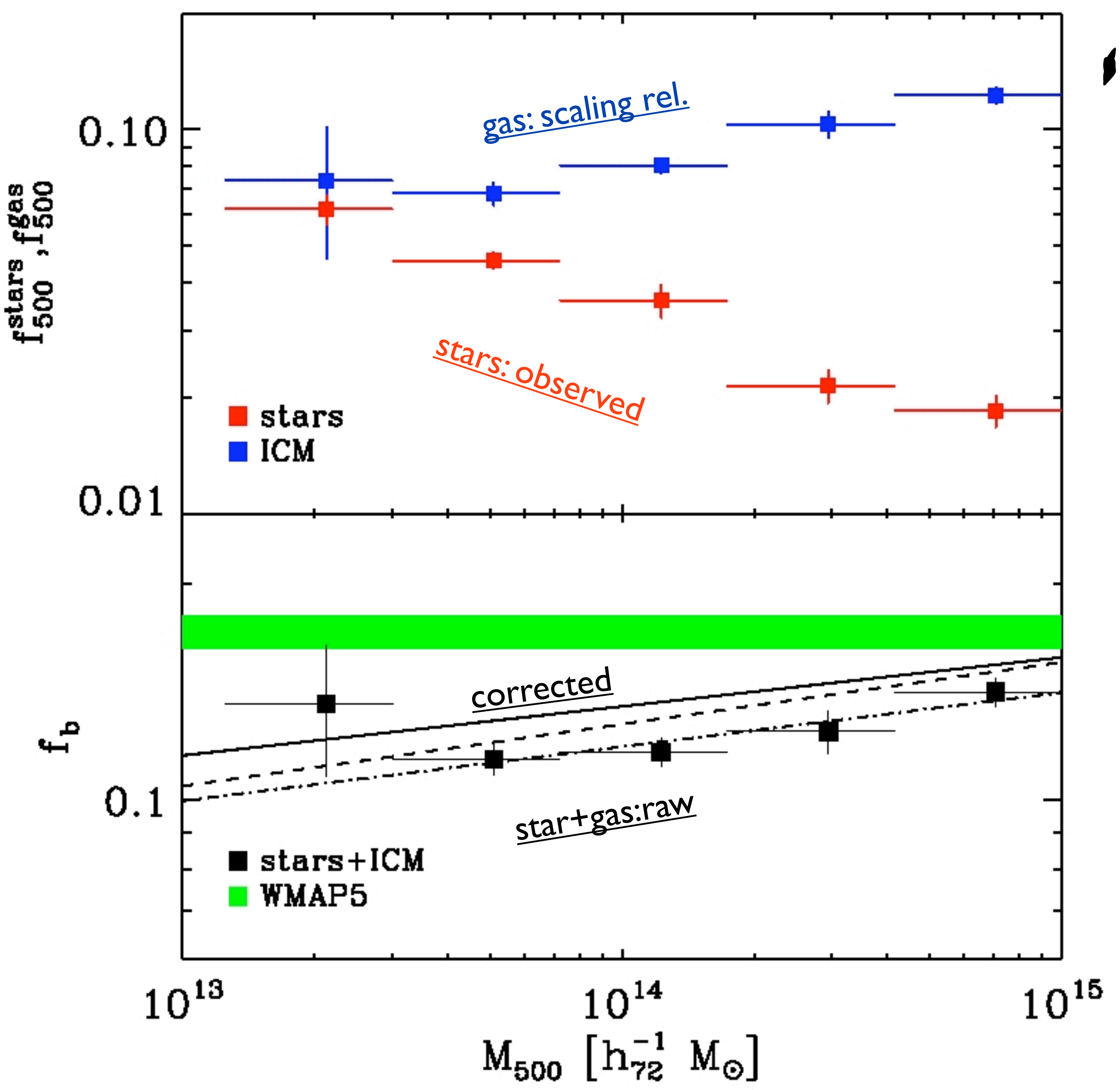
The binning used is designed to minimize the influence of the difference methods used to derive total masses (WL, X-ray..)

The trends of each subsample are consistent with the total trend within 1σ.
Our analysis suggests the absence of a strong evolution in f_{star}

$$f_{500}^{stars} = \frac{M_{500}^{stars}}{M_{500}}$$

$$f_{star} \propto (M_{500})^{-0.37\pm0.04}$$

Results



1.

$f^{stars} \propto (M_{500})^{0.37\pm0.04}$

➥ more efficient star formation in groups

2.

No significant evolution with redshift of the relation between f^{stars} and M_{500} is observed.

➥ groups have already assembled their stellar content at z=1

3.

Adding f_{gas} by Pratt+09:

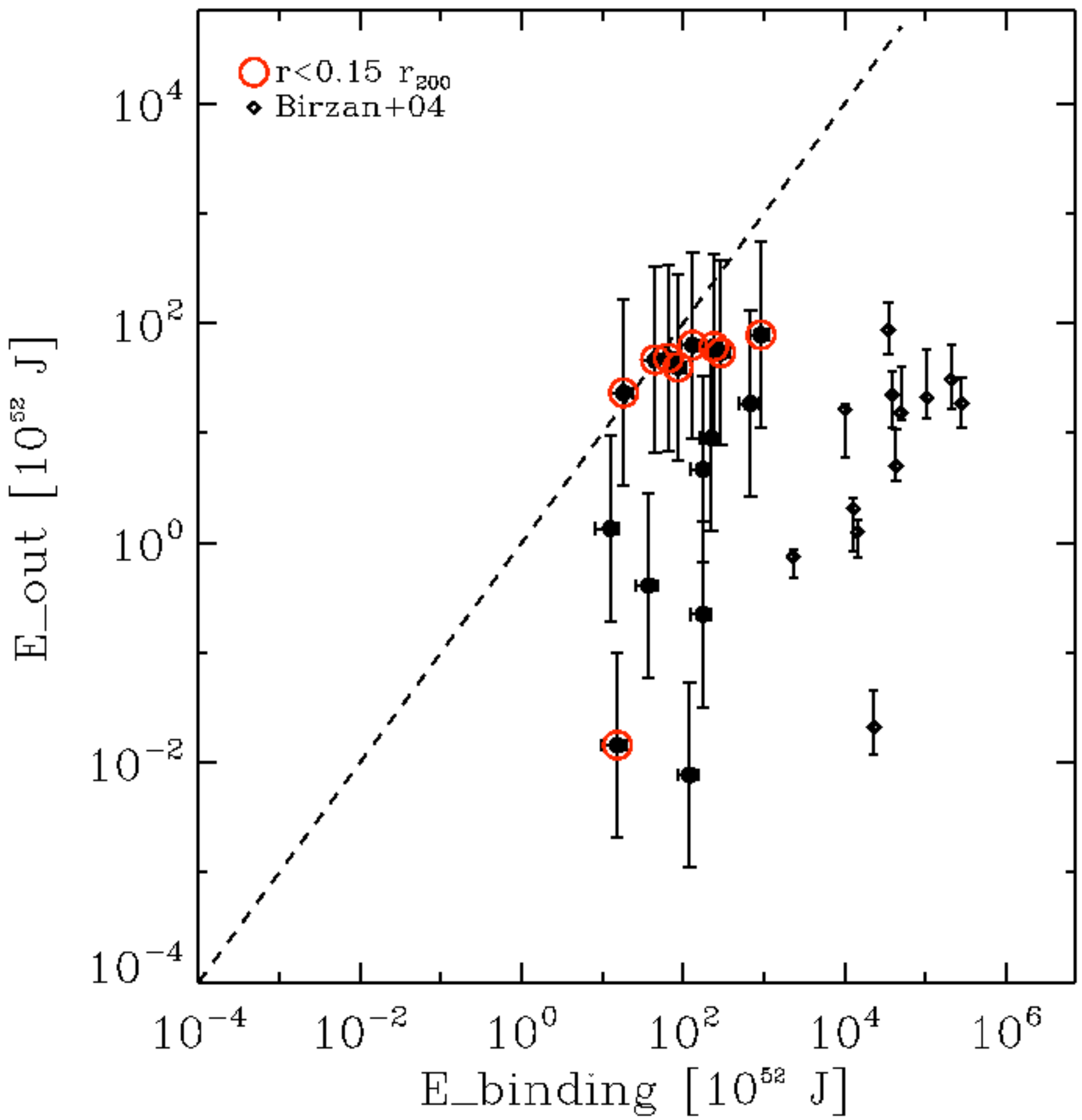
f_b for groups is lower than WMAP

➥ 30% of the gas missing

POSSIBLE SOLUTIONS:

- AGN feedback
- Filamentary heating

What’s next?
RADIO-AGN IN GROUPS OF GALAXIES: THE EFFECT ON THE ICM



Giodini S., Smolcic V. , H. Boehringer et al. in preparation

Contact me if you would like to join this project!

16 radio galaxies inside groups

✓quantify the importance of the mechanical energy input by radio–AGN inside galaxy groups

✓compute from a scaling relation the mechanical energy released for 16 radio sources inside X–ray detected groups from the COSMOS survey: **we compare this output energy with the group binding energy**

➡We assess that the **mechanical input by radio–AGN may be enough to unbind a fraction of the ICM from the group potential well.**

➡This effect would be **negligible in massive galaxy clusters.**

..thank you!