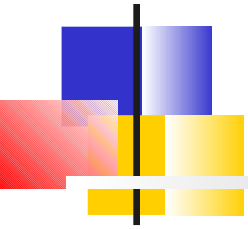
IXO and study of warm baryons



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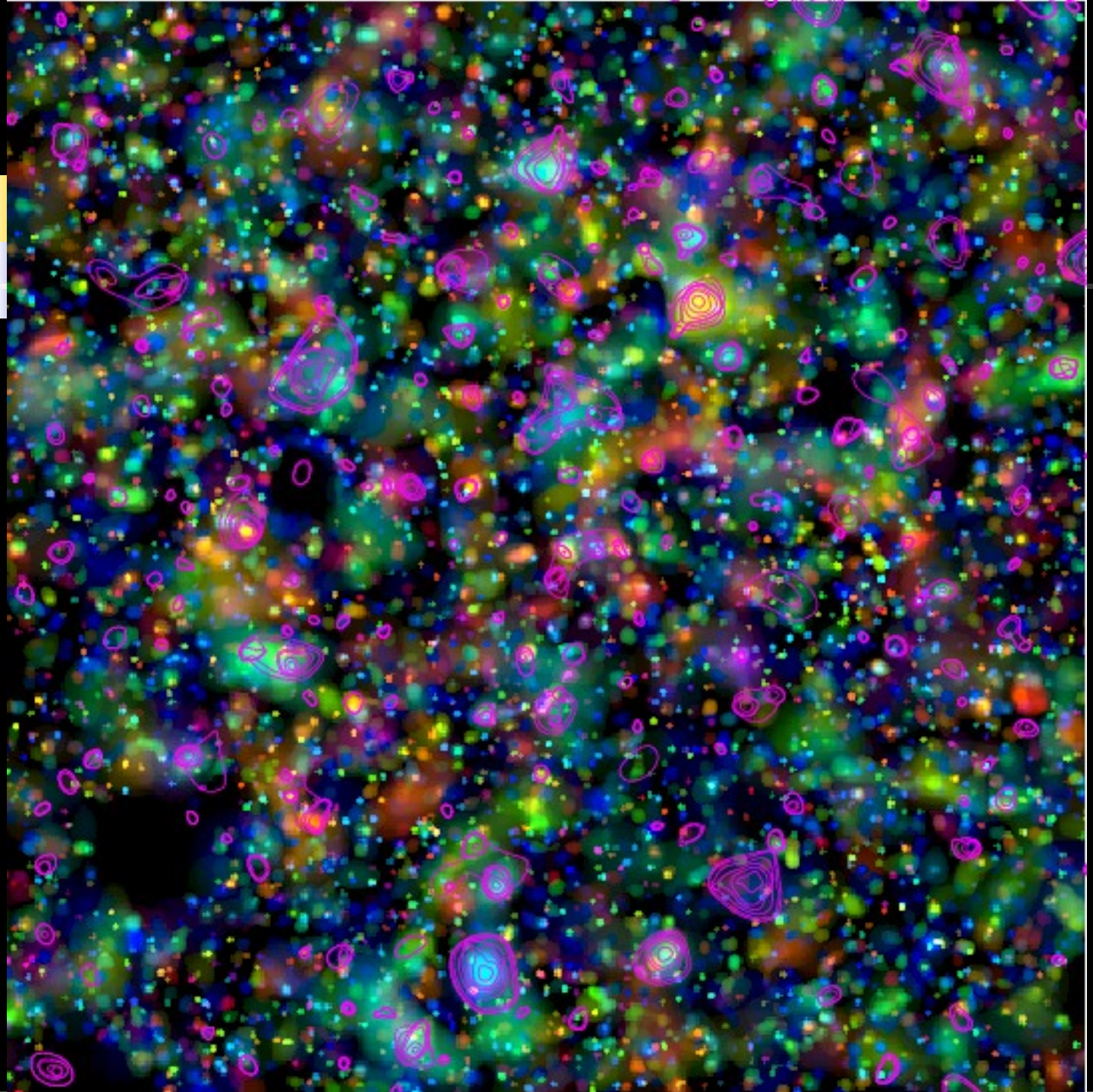
MPE/UMBC

& the COSMOS team



COSMOS

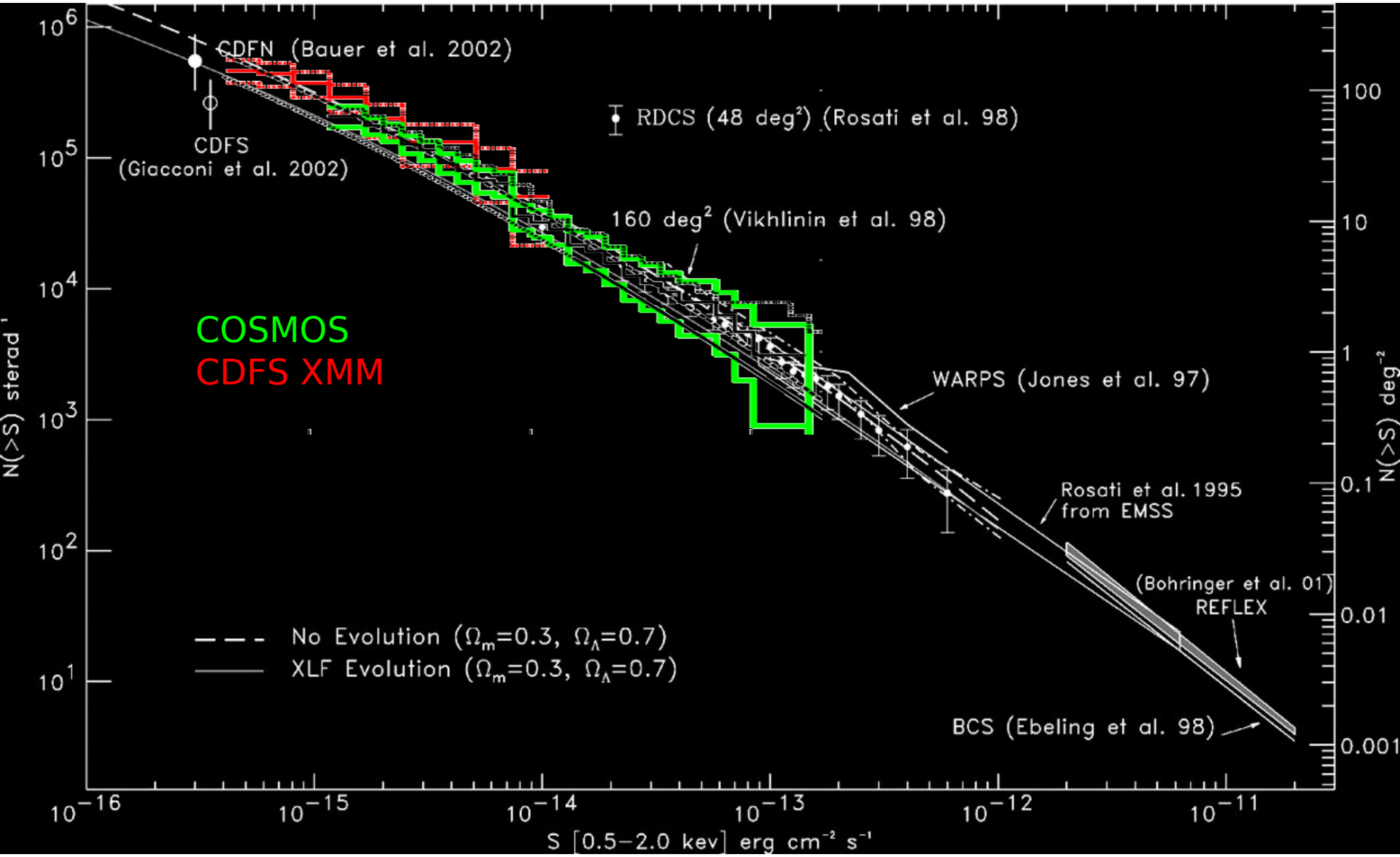
Photoz
z=0.8
z=0.6
z=0.4
z=0.2

I_{AB}<25

1.4Mio galaxies

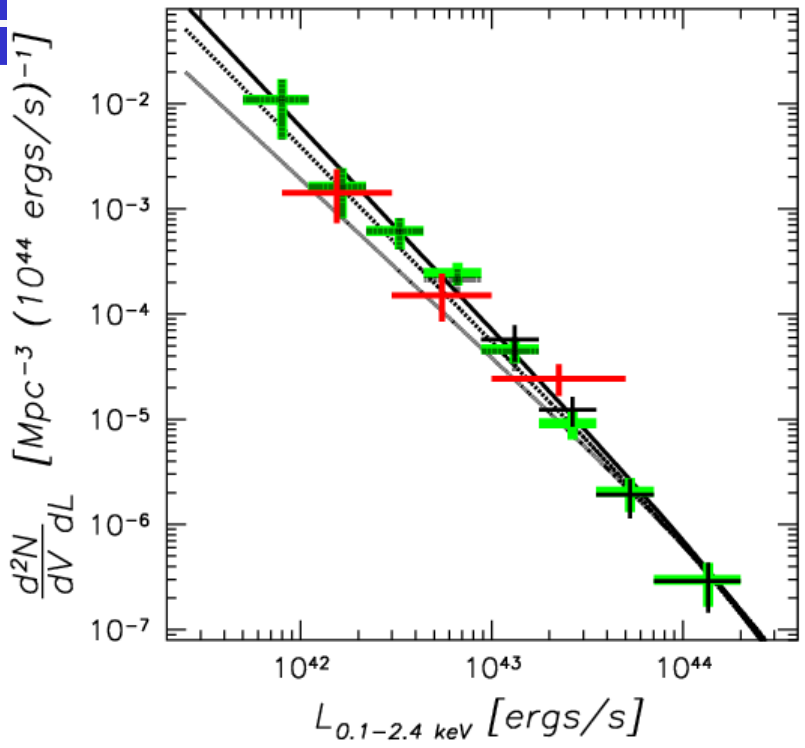
X-ray contours

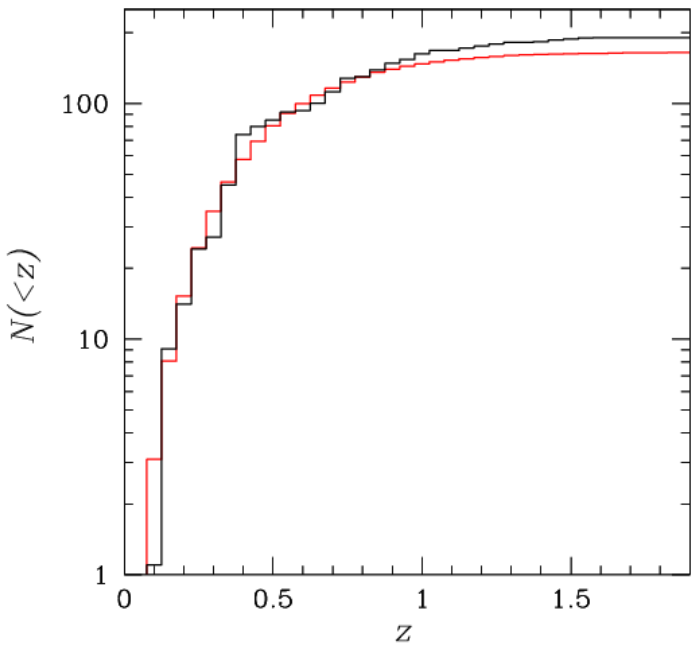
counts



Rosati, Borgani & Norman, ARAA

Cluster statistics: COSMOS & CDFS

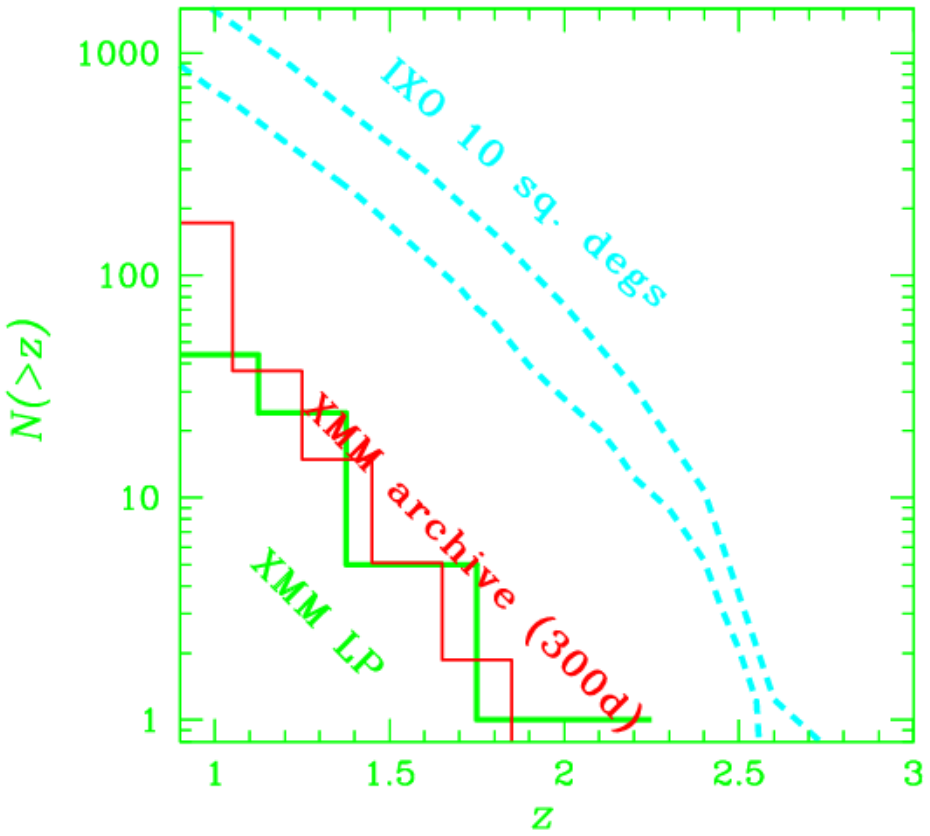




No evolution is seen (AF et al. 2007, COSMOS Special Issue)

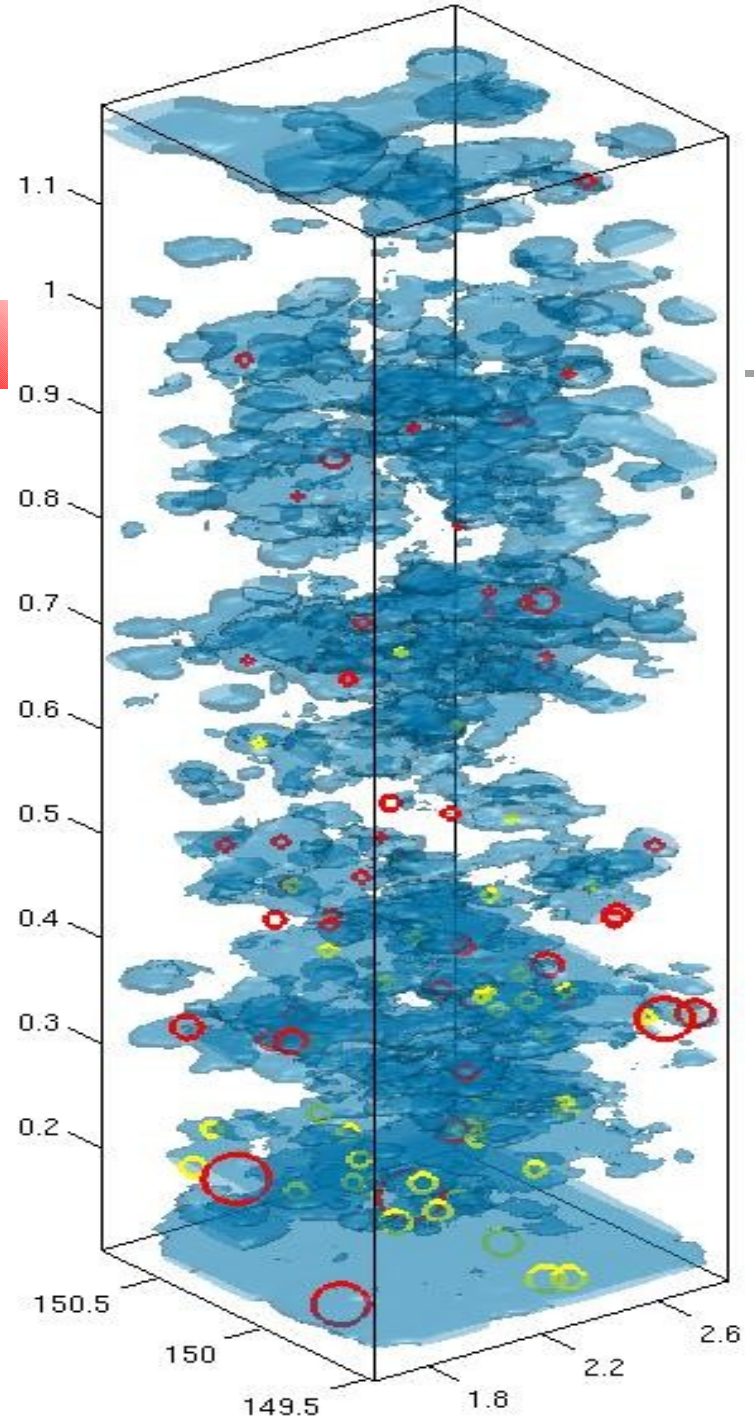
Cluster number counts + plus calibration of the scaling relations using our own weak lensing data agrees well with the WMAP-5 cosmology at z<1

IXO will contribute to cosmology studies in the redshift range 1-2.5

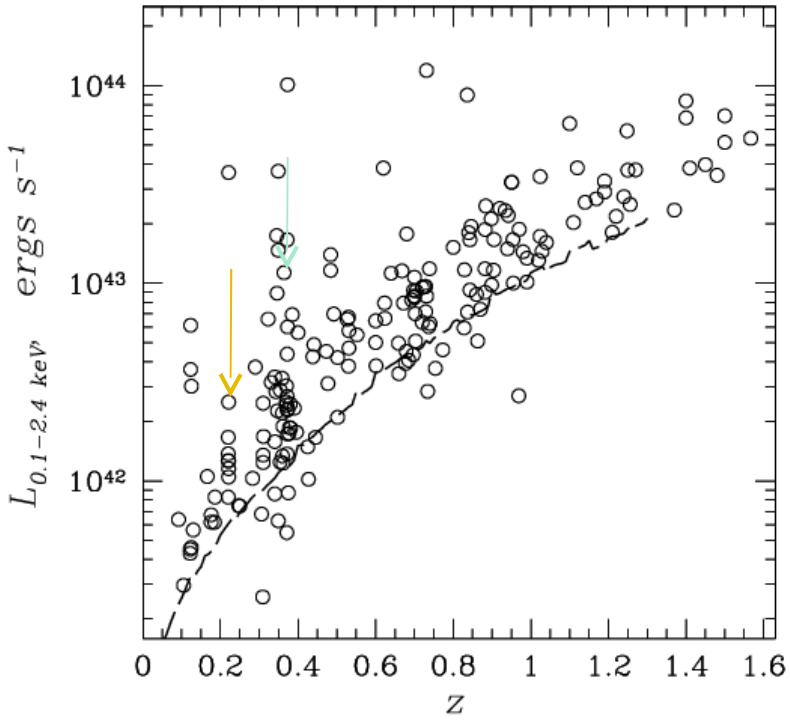


- 1000 clusters in 10 sq. degrees with z>1
- Scaling relations can be calibrated using WL (currently already extending to z of 1.2)

Identified: 200clusters in COSMOS

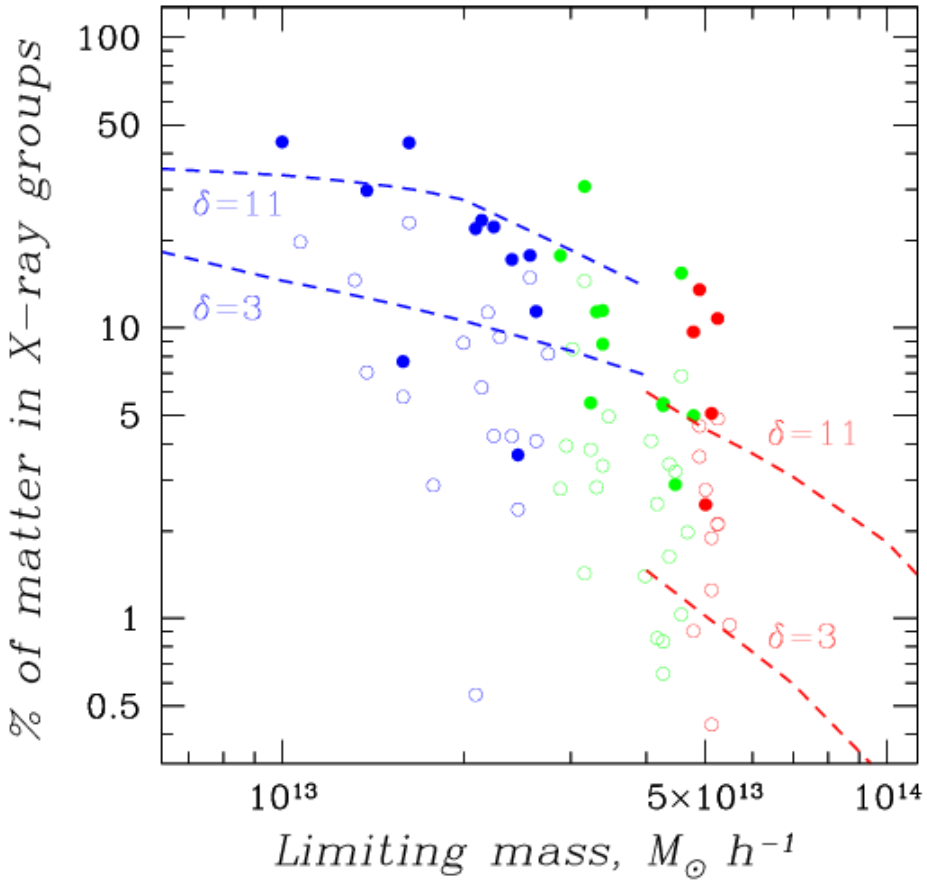


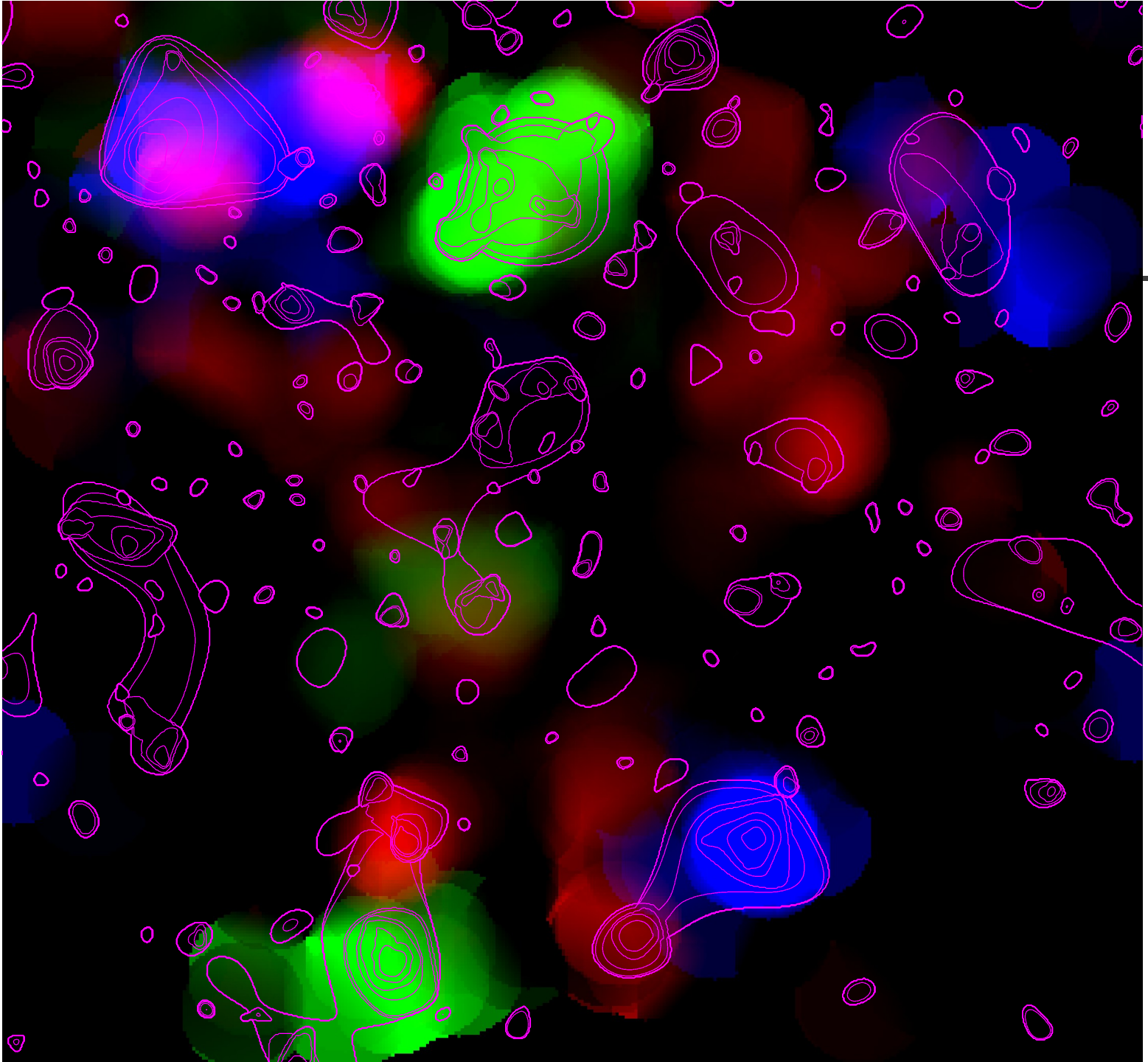
K.Kovac



LSS at 0.12, 0.22, 0.34, 0.37, 0.51, 0.73, 0.89 (Optical groups:0.22,0.36,0.38)

Resolving LSS with X-ray groups

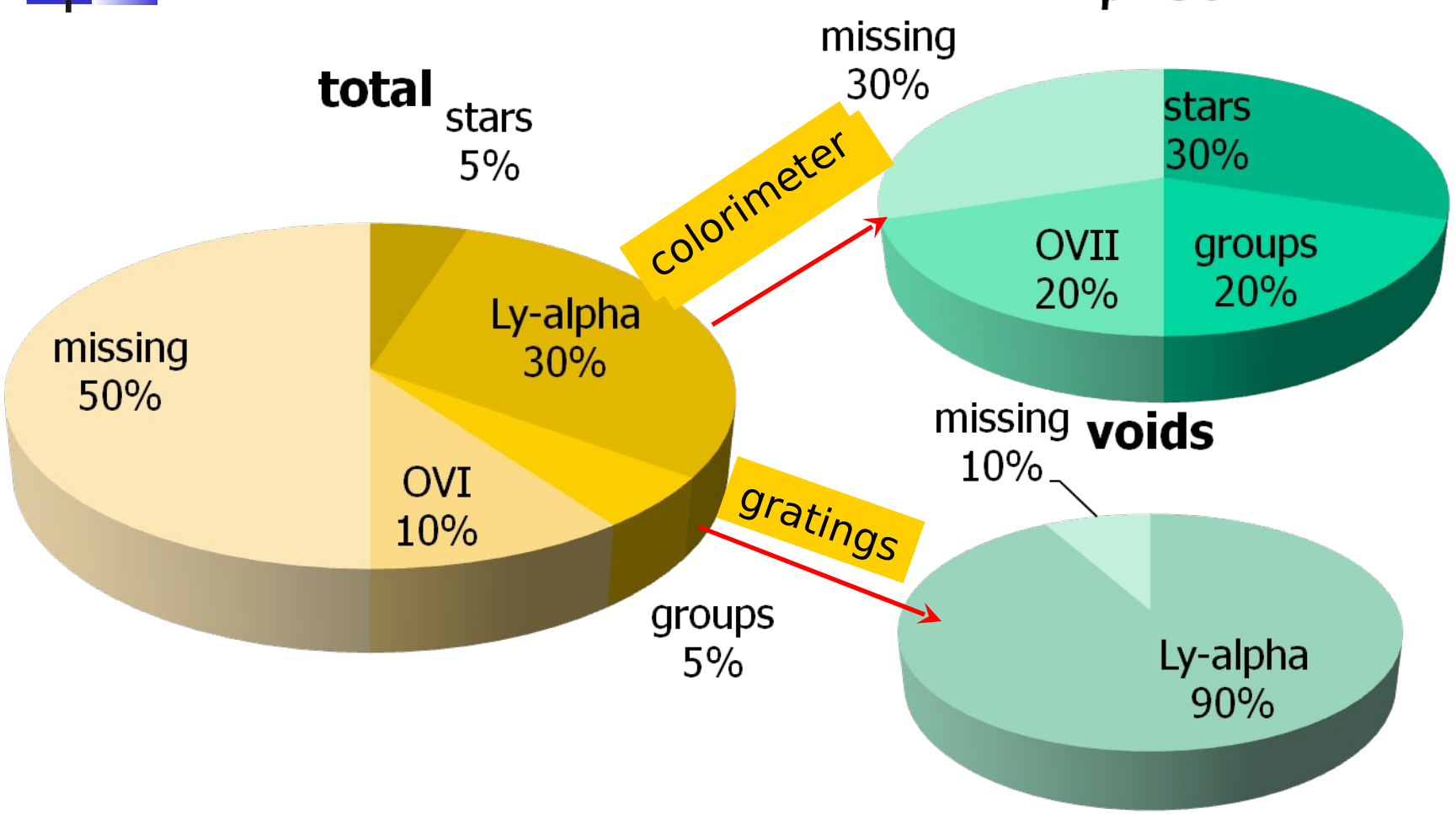




zCOSMOS

LSS shown:
0.12
0.22
0.34+0.37

chart of missing baryons



Imaging vs spectroscopy of missing baryons

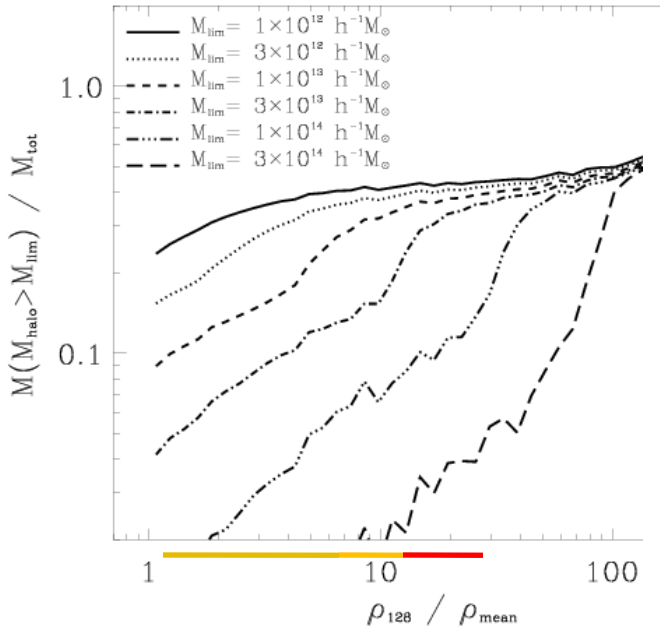
- Do not uses bright AGNs and can be done on much wider area +
- Actually sees missing baryons, rather than Oxygen or Neon lines and can combine the two +
- Sensitive to the background and foreground emission –
- Typical size of emitting regions is 2’-4’ but need the 5” resolution to remove point sources and galaxy groups

IXO approach to imaging the missing baryons

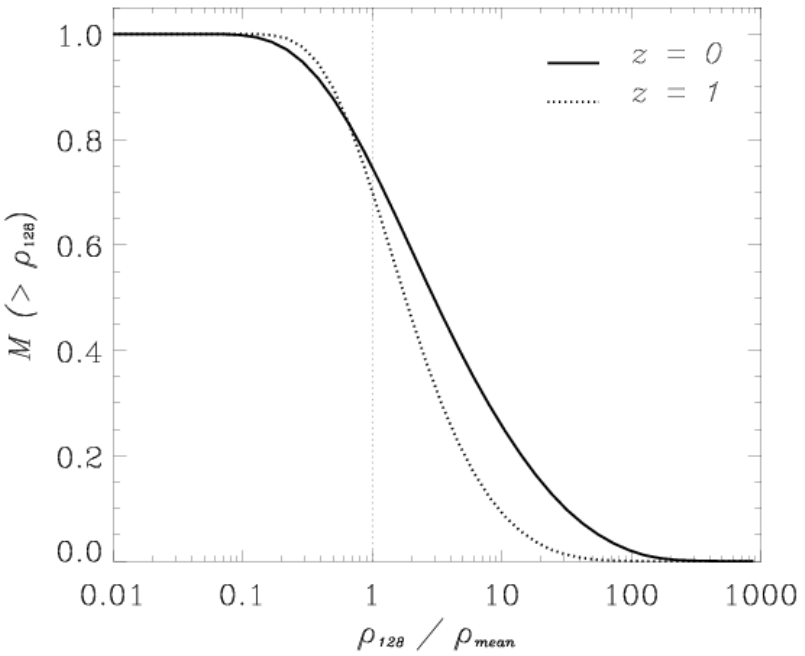
- 1Msec time allocation on 1 square degree fields, such as zCOSMOS (z range 0.1 to 0.9) – zUDS (z range 0.9-1.2) - DEEP2 (z range 0.7-1.1) – similar exposures are required for studies of black hole growth experiments and those two programs are usually done together (1000 counts at 100ksec exposure)
- Using WFI to detect filaments and NFI to study selected filaments in detail. This part is very dependent on the sensitivity of the calorimeter at energies 0.3-0.6 keV (OVII, OVIII, NeIX), but not so much on the background (100s of counts at 1Msec exposure)

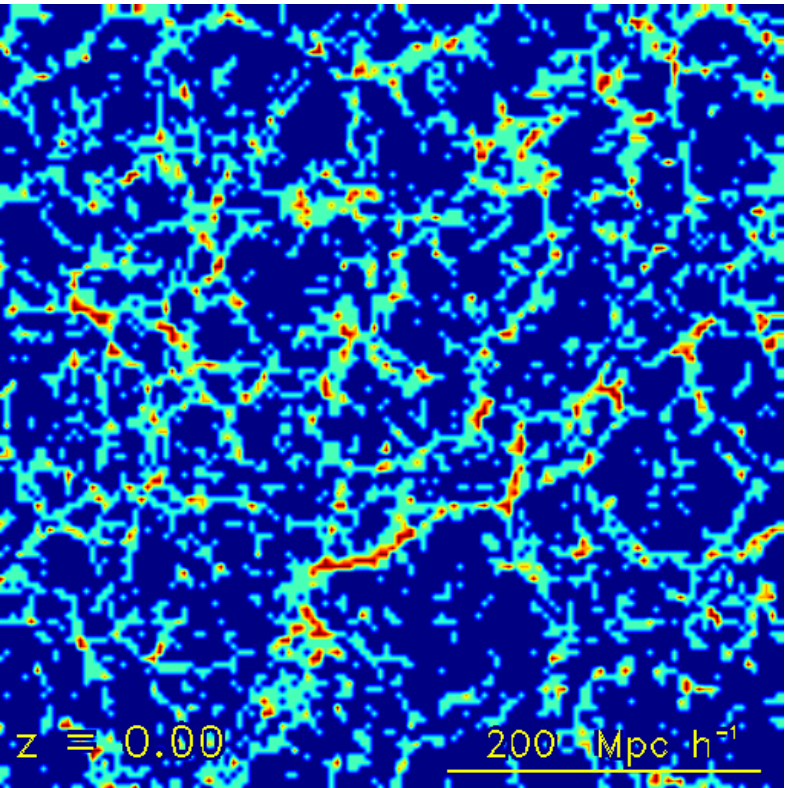
Conclusions

- Our understanding of the state of baryons in dense environments have sharpened, which allows a more reliable observational planning
- IXO will contribute to studies of warm baryons to a redshift of 2.5.
- The percentage of missing baryons in a hot phase is not evolving so much inside LSS, what evolves is the abundance of LSS structures
- Need information on density fields, as available from redshift surveys to calculate accurate fractions



Fraction of matter resolved in groups

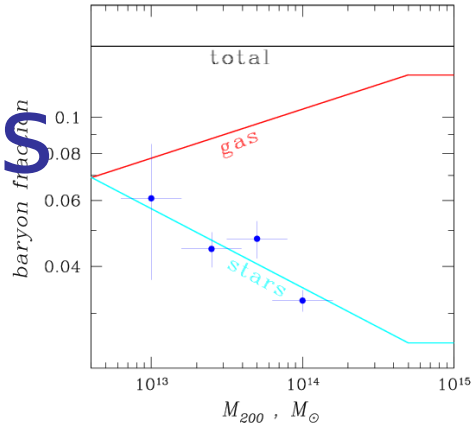




Simulations...

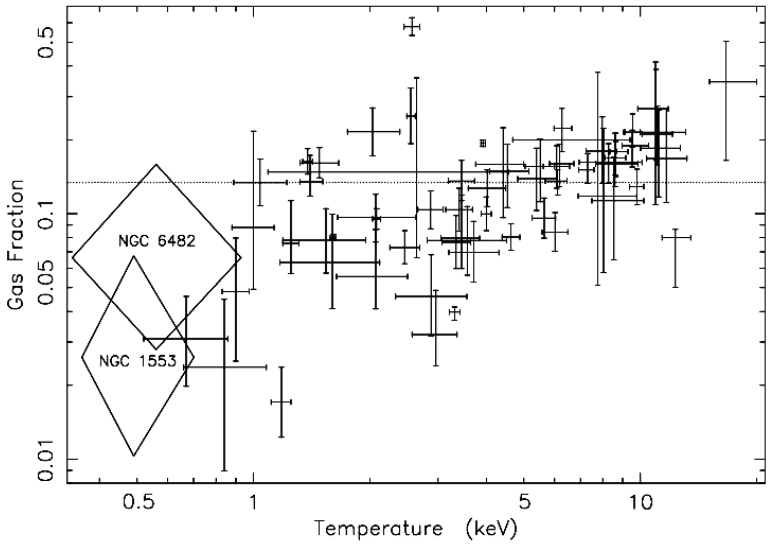
A. Faltenbacher, AF in prep.

Baryons inside groups

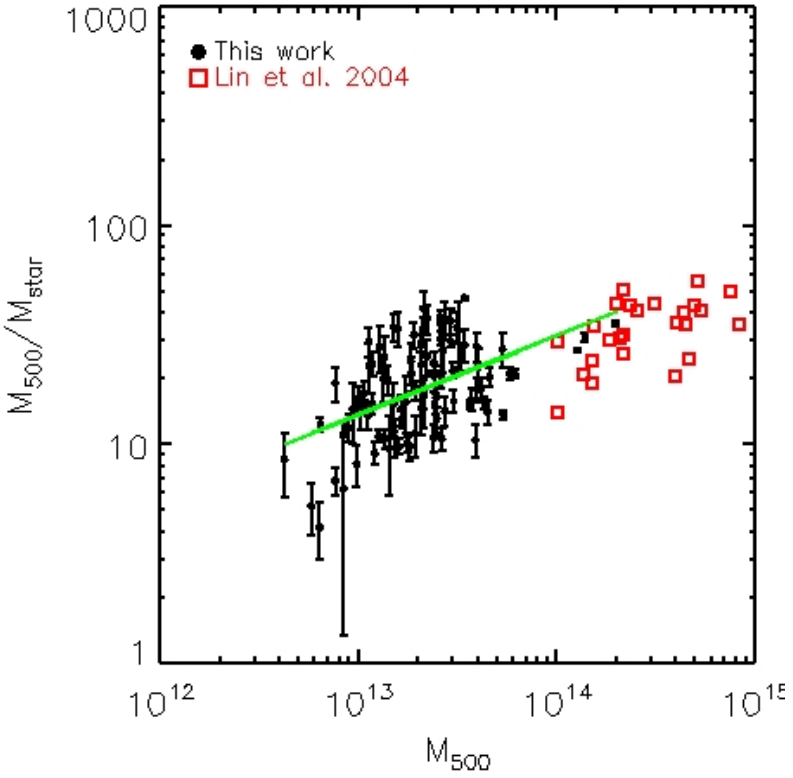


Less gas in groups

More stellar mass in groups



Sanderson, AF, et al. 2003



Giodini, AF, et al. 2008