How to start an AGN: the role of host galaxy environment

or stop

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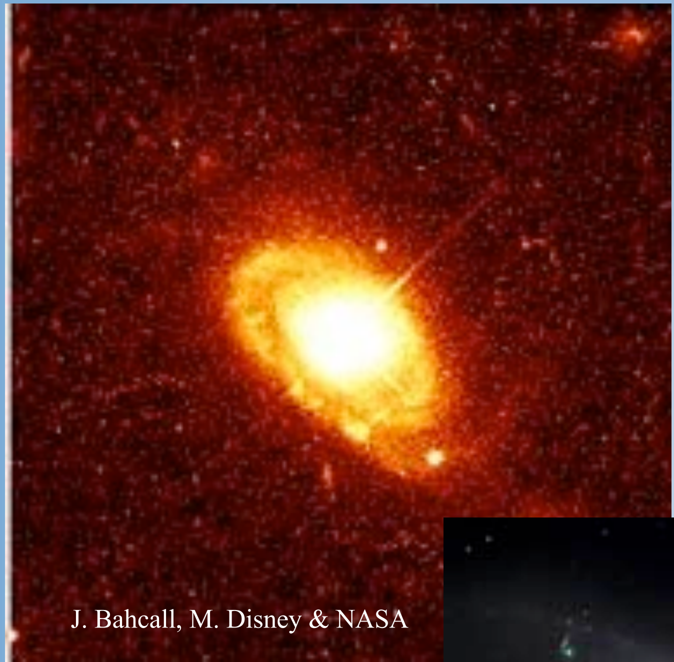
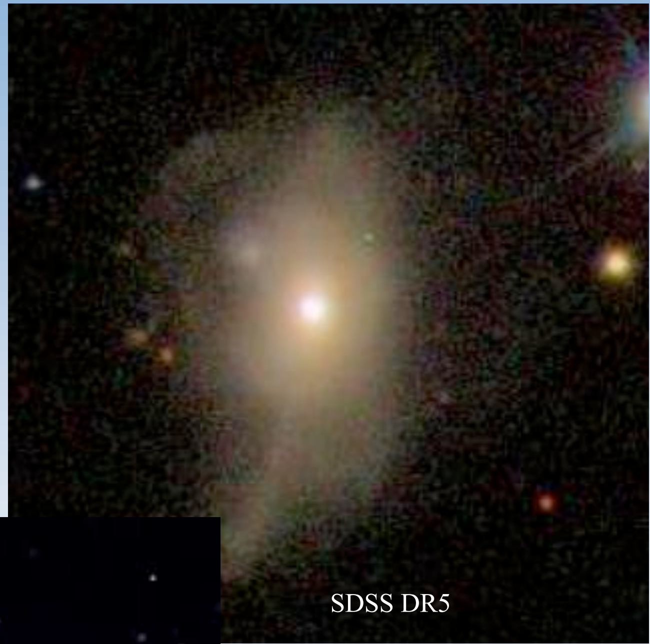
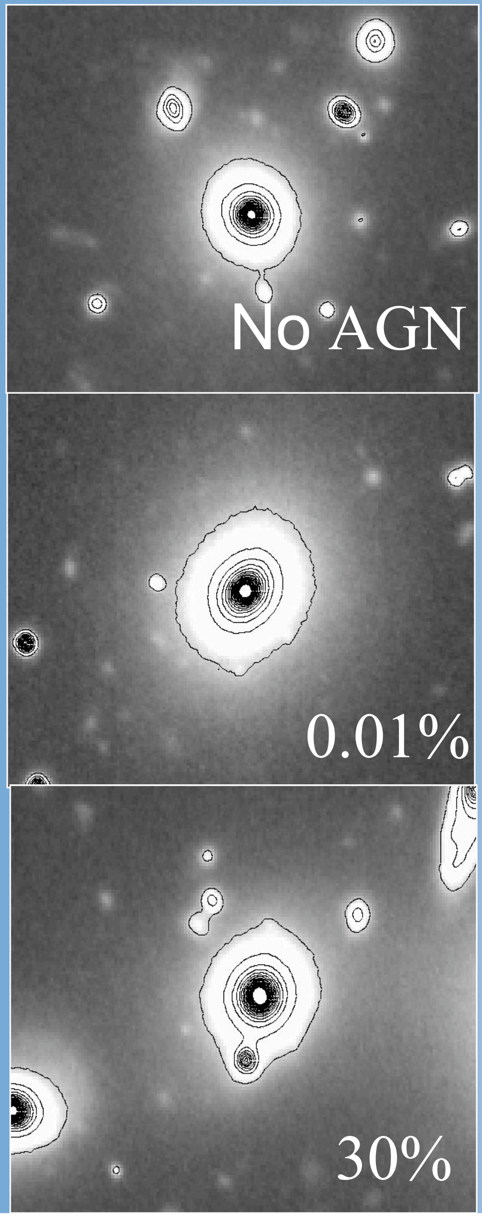
Pretty pictures





Why do some galaxies have AGN?



Gas -> black hole = AGN

Internal:

composition, size, morphology, star-formation

Historical:
(age), previous activity -- depletion, feedback

External:

mergers, close encounters, tidal field, strangulation, ram-pressure stripping

Why look at clusters?

1. Lots of galaxies / AGN.

2. Clusters affect galaxies:

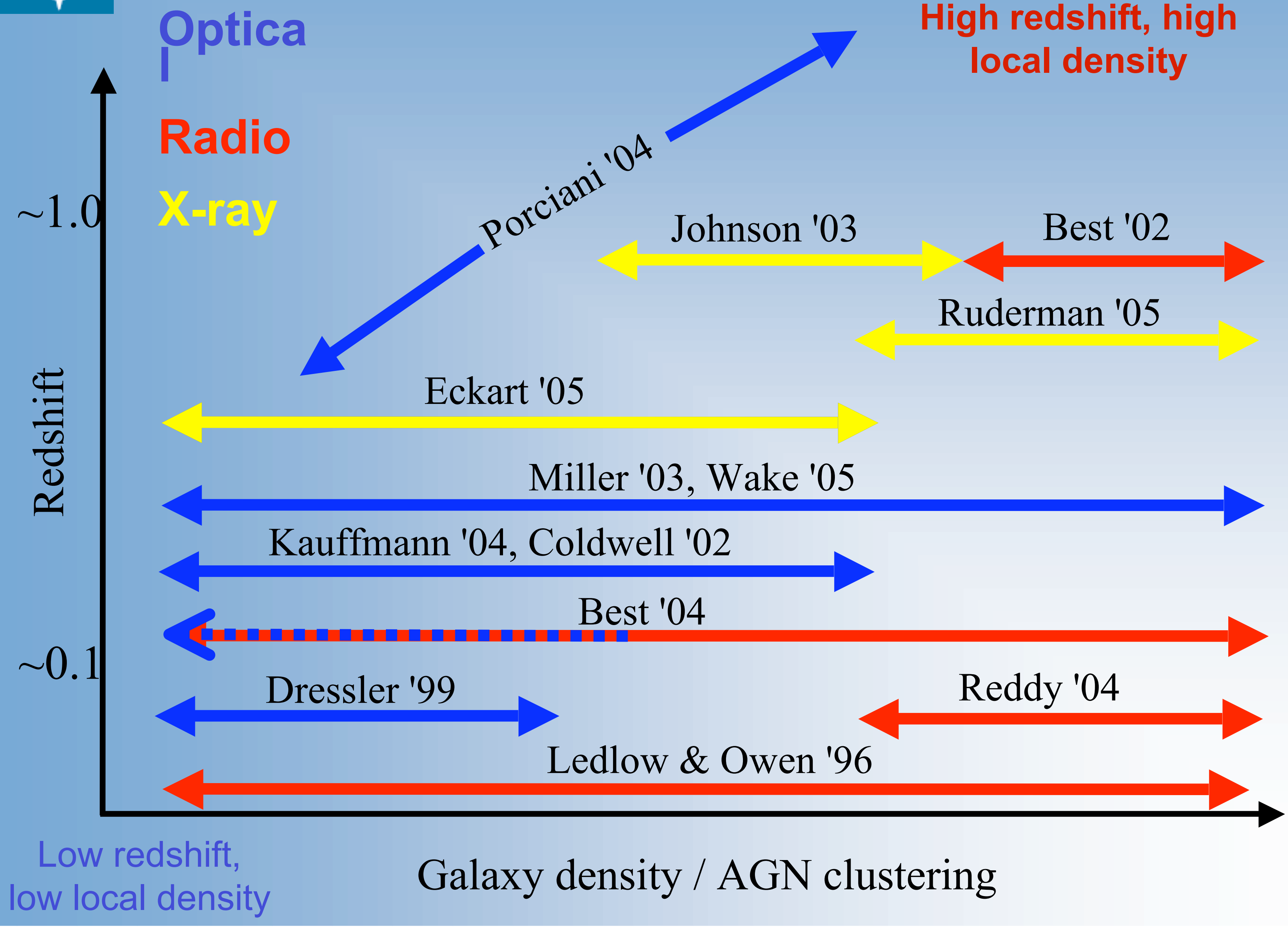
   Morphology: spirals -> S0s

   Star-formation rate: high -> low

Q1 – Do the frequency and properties of AGN depend on the external environment?

Q2 – Can this be explained by the changes in the type of host galaxies?

Where are AGN found?



My projects

1. X-ray AGN in the A901/2 supercluster

(Gilmour et al. 2007)

- One supercluster
- Multi-wavelength
- Many types of environment

2. Statistical survey of X-ray AGN in > 100 galaxy clusters

(Gilmour et al. 2007++++)

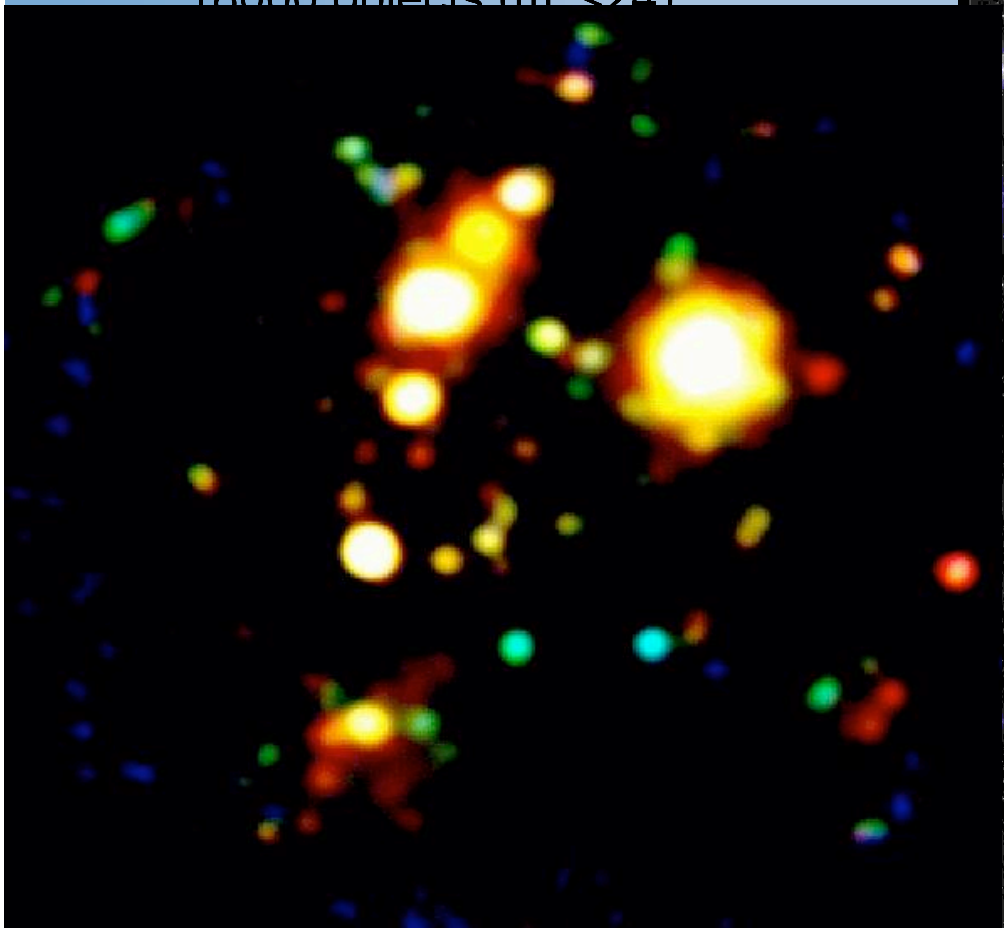
- X-ray only
- Many clusters
- Different redshifts and cluster properties

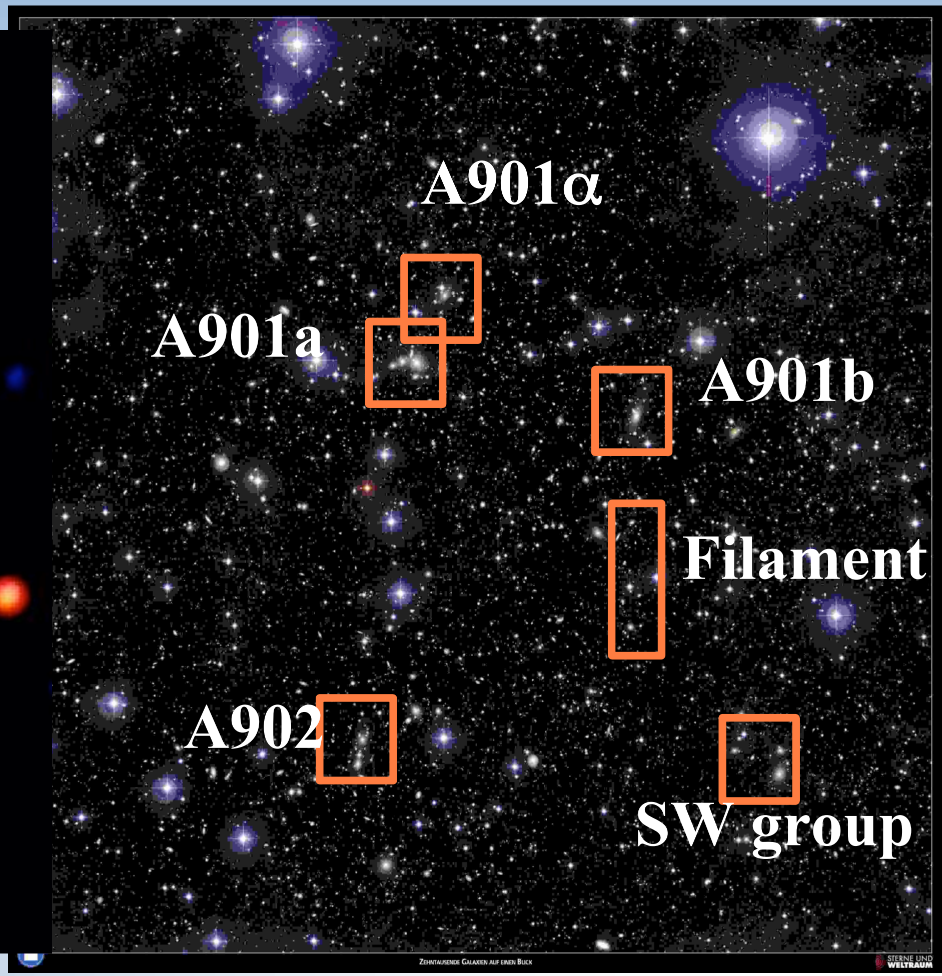
The A901/2 supercluster (z=0.17)

Optical data (from COMBO-17 team)

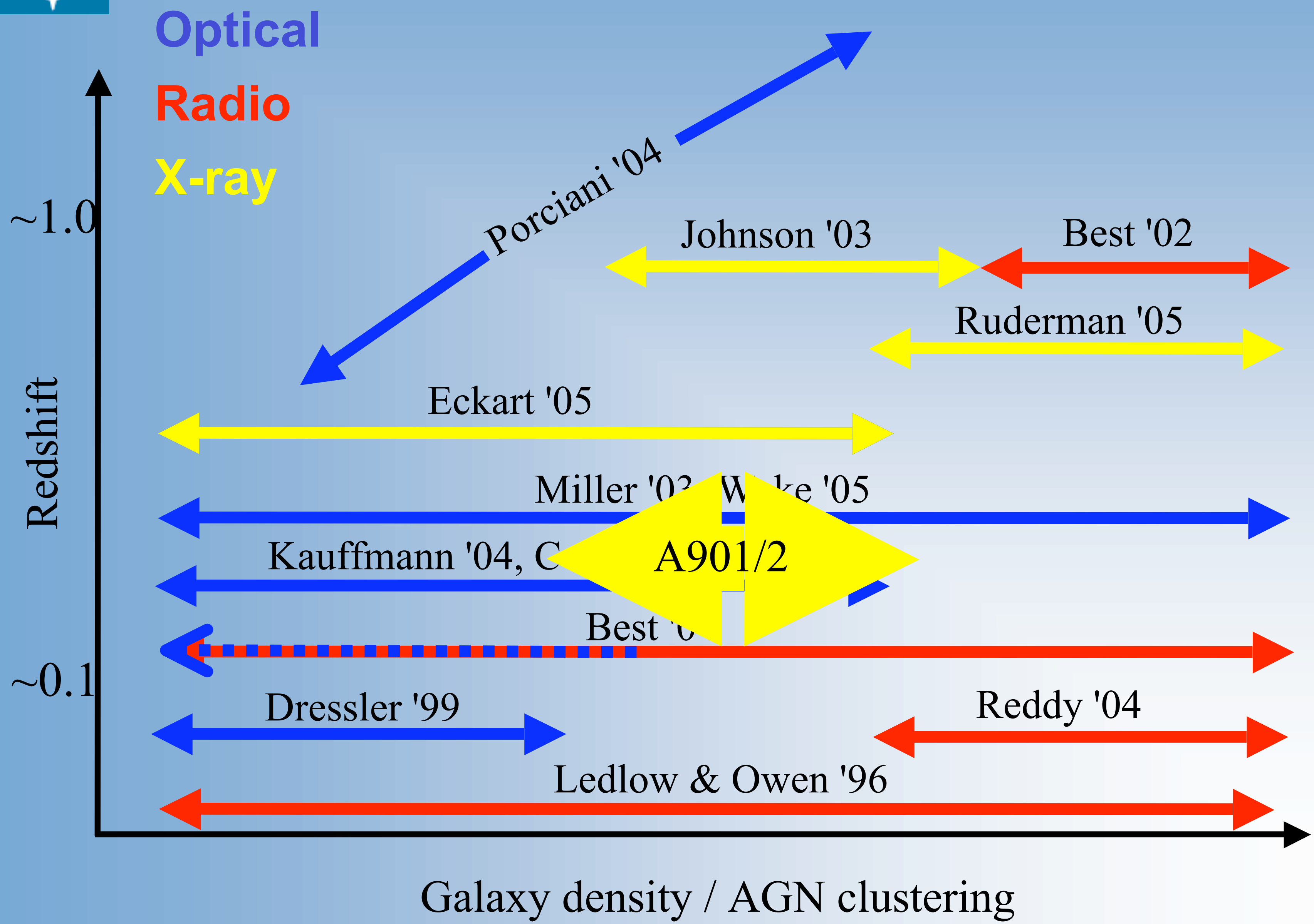
- 17-band photometric redshifts for ~18000 objects (m <24)

People: Meghan Gray, Chris Wolf + COMBO-17 team, Bell and Papovich, Andy Taylor.



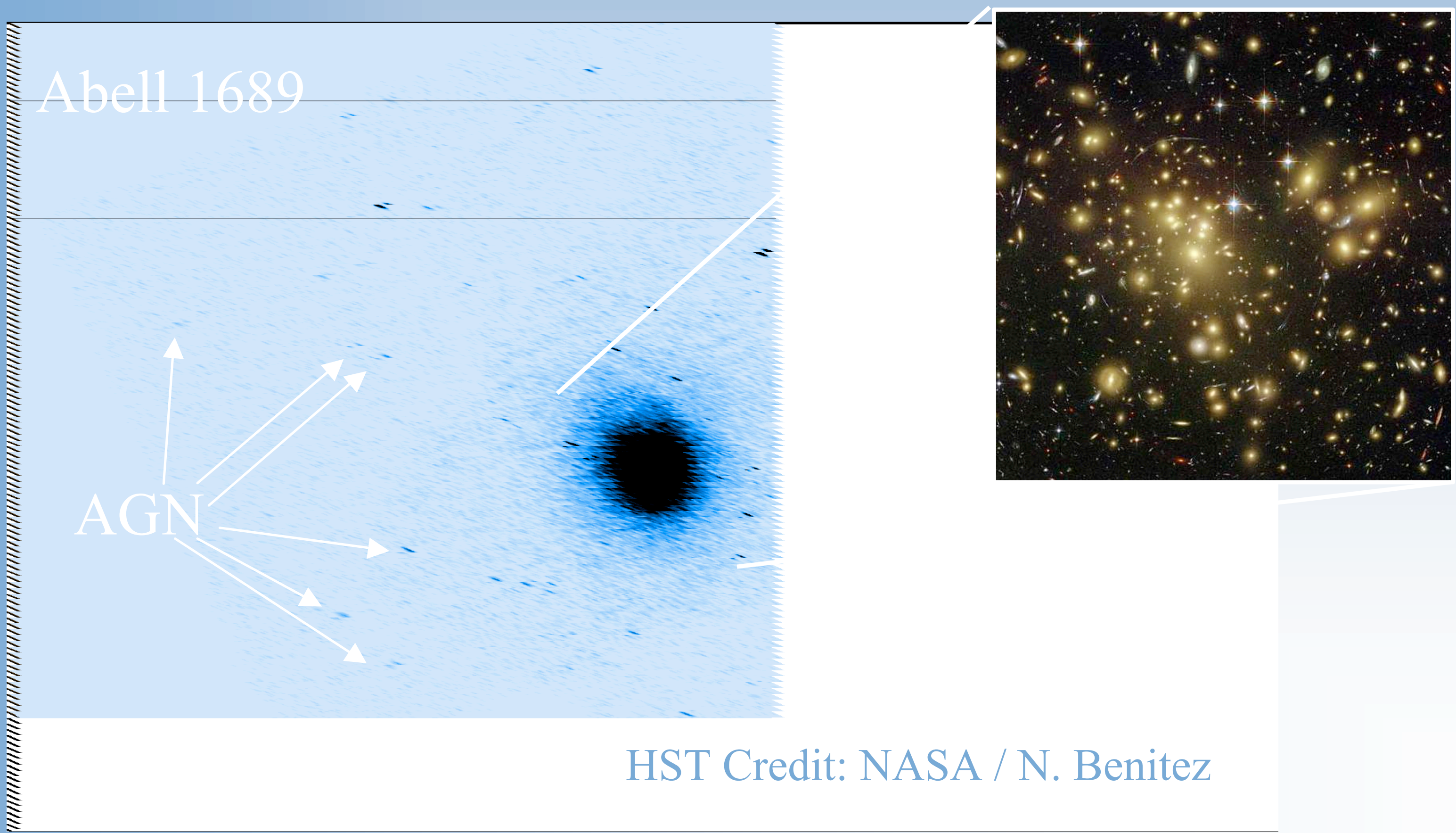


Where are AGN found?



Chandra Clusters: Method

A. Count the dots
B. Predict the number of background dots
C. Calculate A-B. Easy!



HST Credit: NASA / N. Benitez

Chandra Clusters: The sample

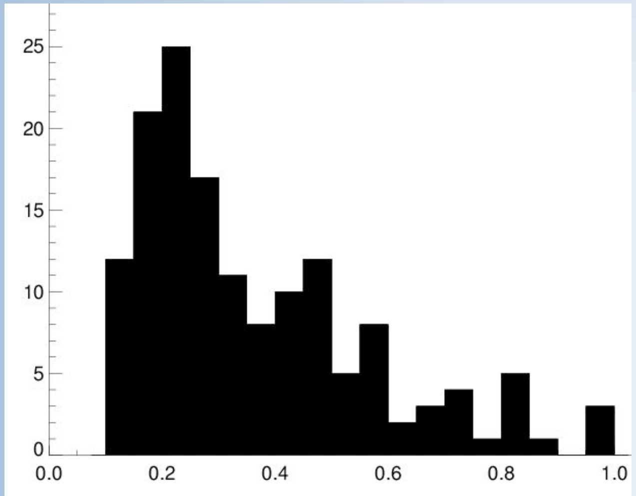
Secure redshift and z > 0.1
Exposure > 10 ksec
X-ray detected cluster (after data reduction)

=== 150 good cluster fields ===

Morphology

~80% relaxed
~10% slightly disturbed
~5% very disturbed
~5% major mergers

Redshift distribution



+ 8 with z > 1

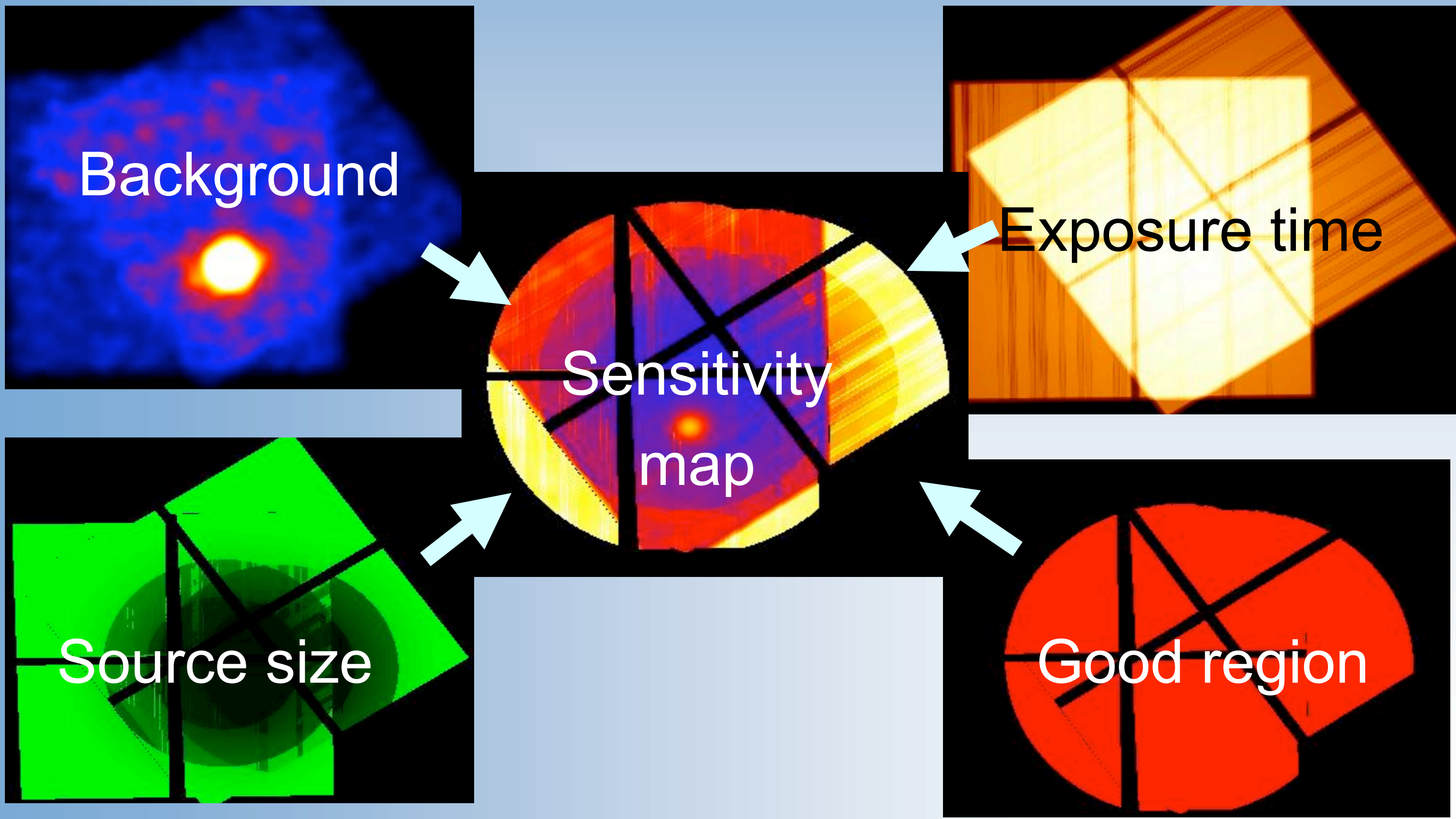
Luminosity

0.1 – 70 x 10^{44} erg/sec

Chandra Clusters: Prediction

Blank fields – deep surveys (22) and high redshift QSOs (22)

Sensitivity map – background, size, exposure, accuracy + errors



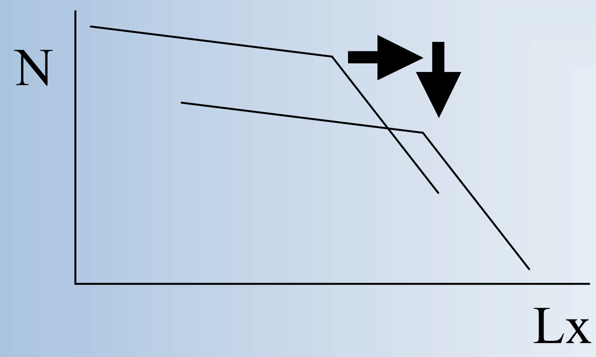
Chandra Clusters: Lensing

Lensing changes background sources : flux increases

number density decreases

Net result: lensing causes ~ 10% reduction in the central 0.5 Mpc

of cluster images



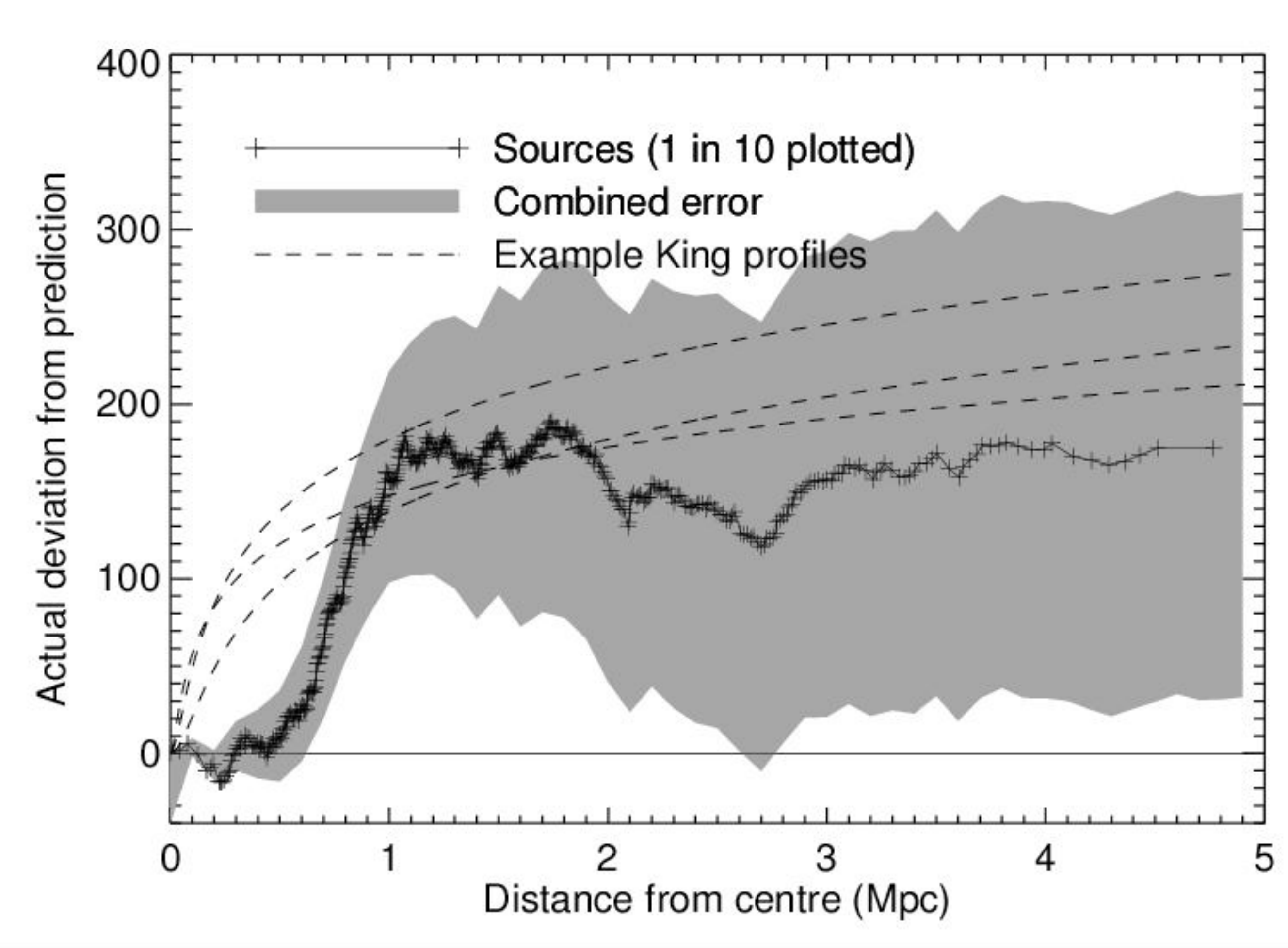
Model = Blank fields + Sensitivity map + Lensing

Chandra Clusters: Radial position

Excess of 1 or 2 sources per cluster

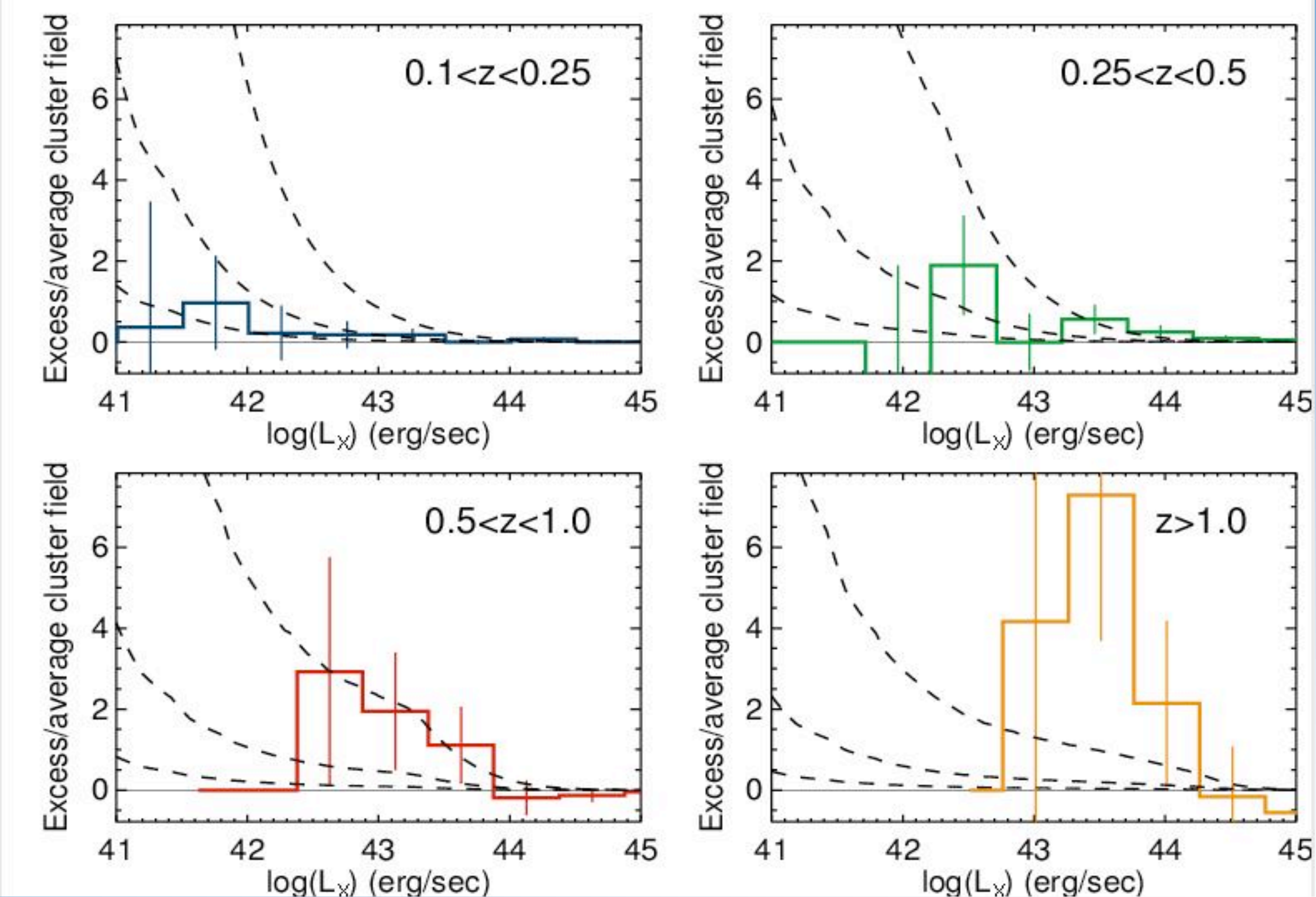
Radial trend seen in physical distance (Mpc)

Lack of AGN in central regions is not due to the intra-cluster emission



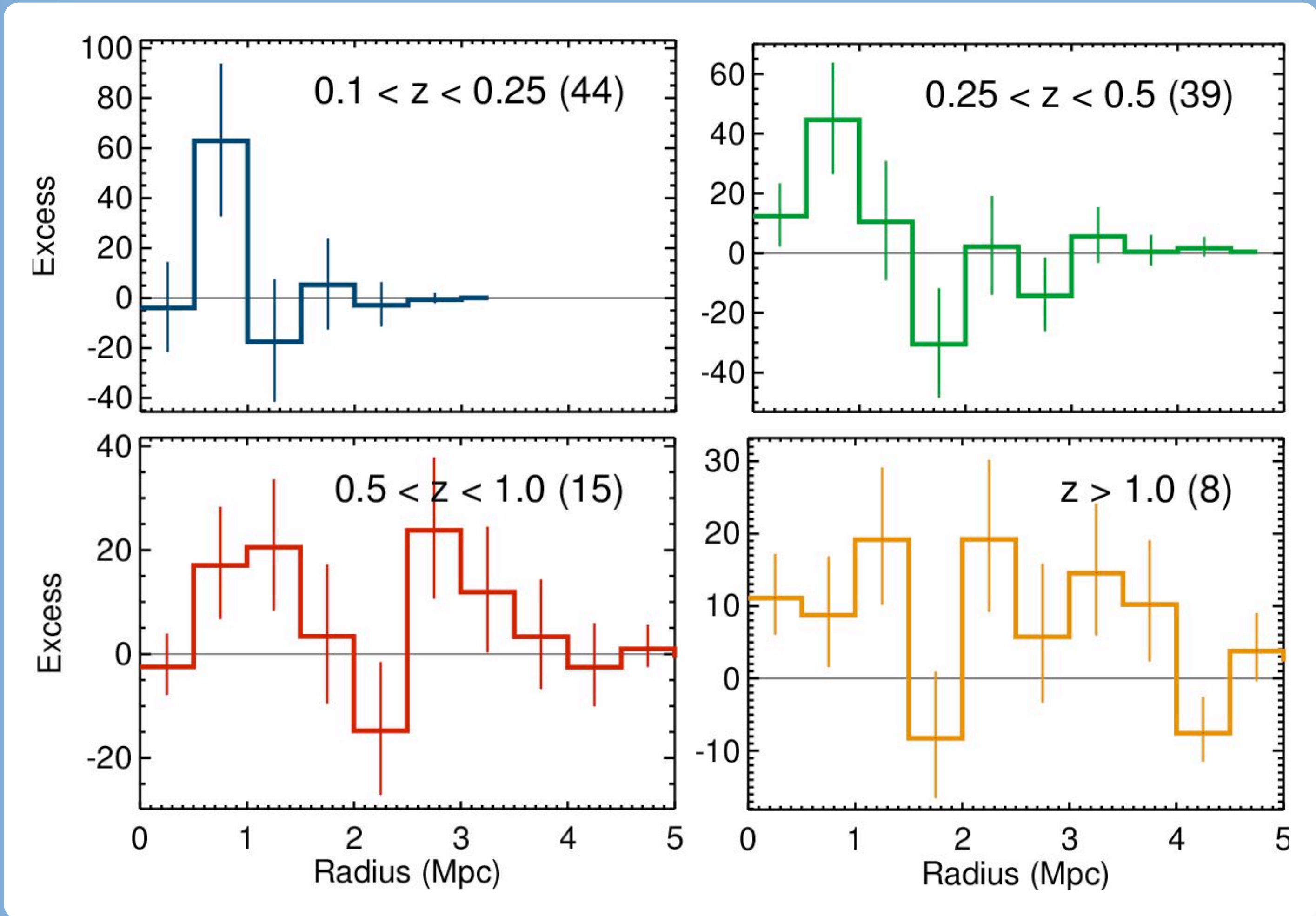
AGN lie between 0.5 and 1 Mpc from the cluster centre.

Chandra Clusters: Evolution



The evolution of AGN in clusters is faster than in the field

Chandra Clusters: Radial Evolution



High redshift clusters have more AGN at larger radii

Chandra Clusters: Results

1. AGN lie between 0.5 and 1 Mpc from the cluster centre.

2. AGN appear to be suppressed in moderate redshift clusters.

3. The evolution of AGN in clusters is faster than in the field.

4. High redshift clusters have more AGN at larger radii.

Where are AGN found?