

# Witnessing the Formation of a Brightest Cluster Galaxy



Jesper Rasmussen, Carnegie Observatories

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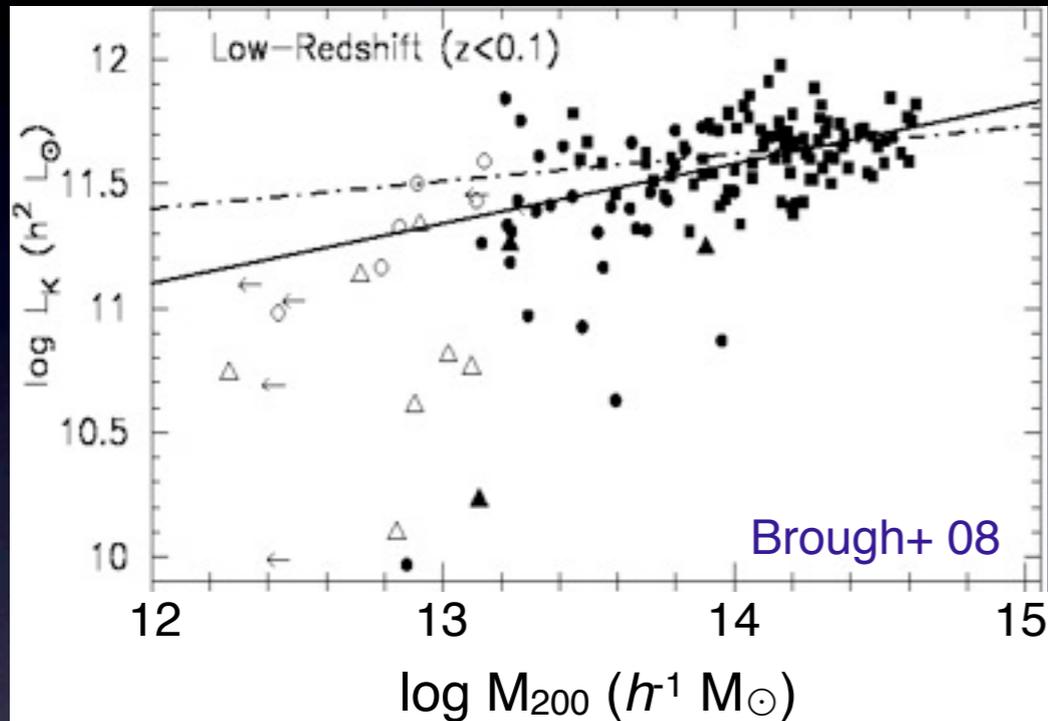
# What Are Brightest Cluster Galaxies?



## BCGs:

- Most luminous + massive galaxies in Universe
- Contain substantial fraction of all cluster light
- Often at center of host cluster (peak of X-ray emission)

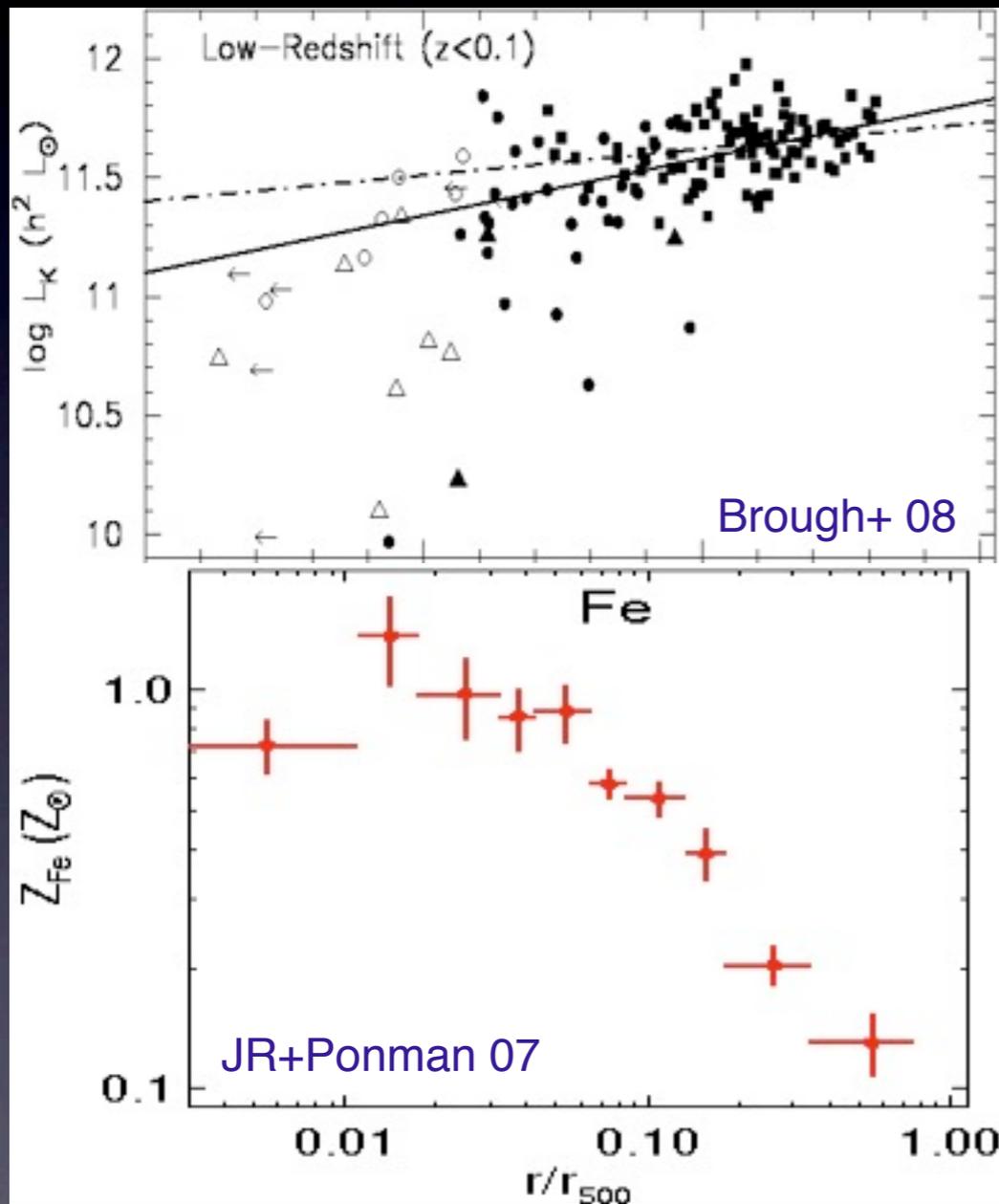
# ...And Why Are They Interesting?



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- Properties linked to those of host cluster
- Regulate central properties of intracluster medium
- Formed at (very?) high  $z$

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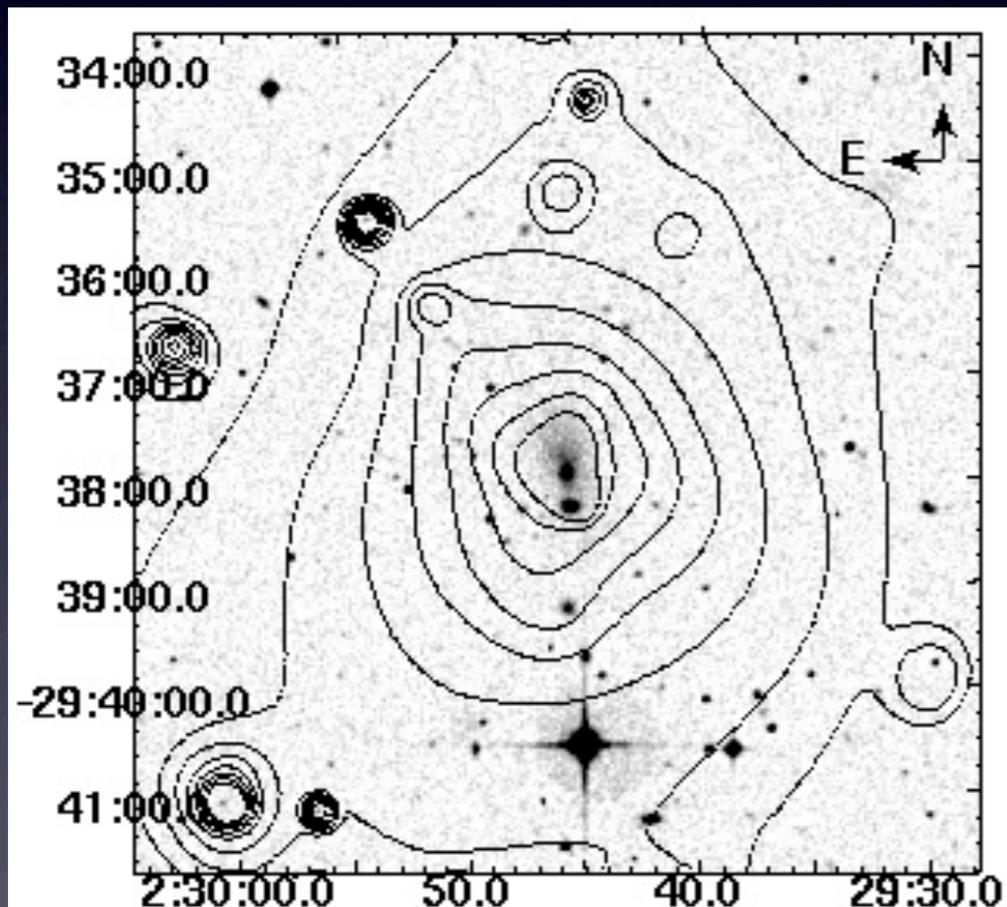
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# MZ 10451: A Unique (?) Nearby Merger

## XI Groups Survey:

Multi- $\lambda$  survey of 25 statistically representative galaxy groups at  $z=0.06$  (Rasmussen+ 06)

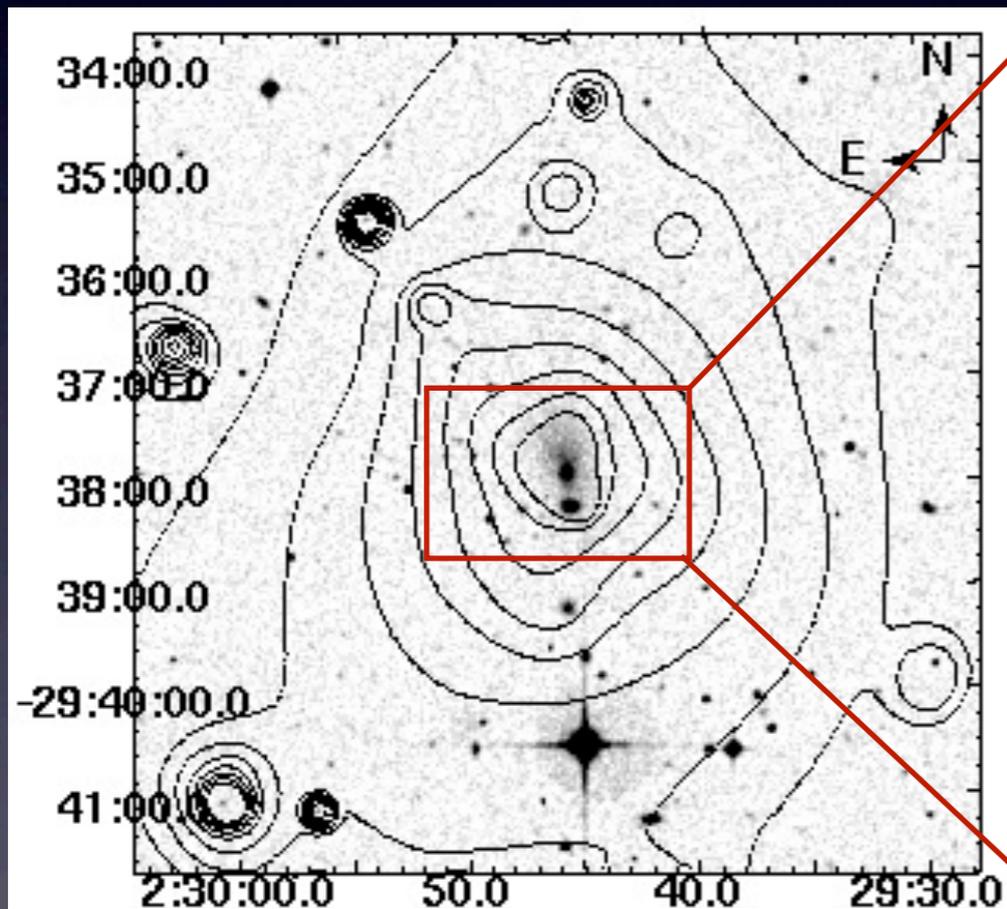


$kT \approx 1$  keV,  $\sigma = 500 \pm 60$  km/s

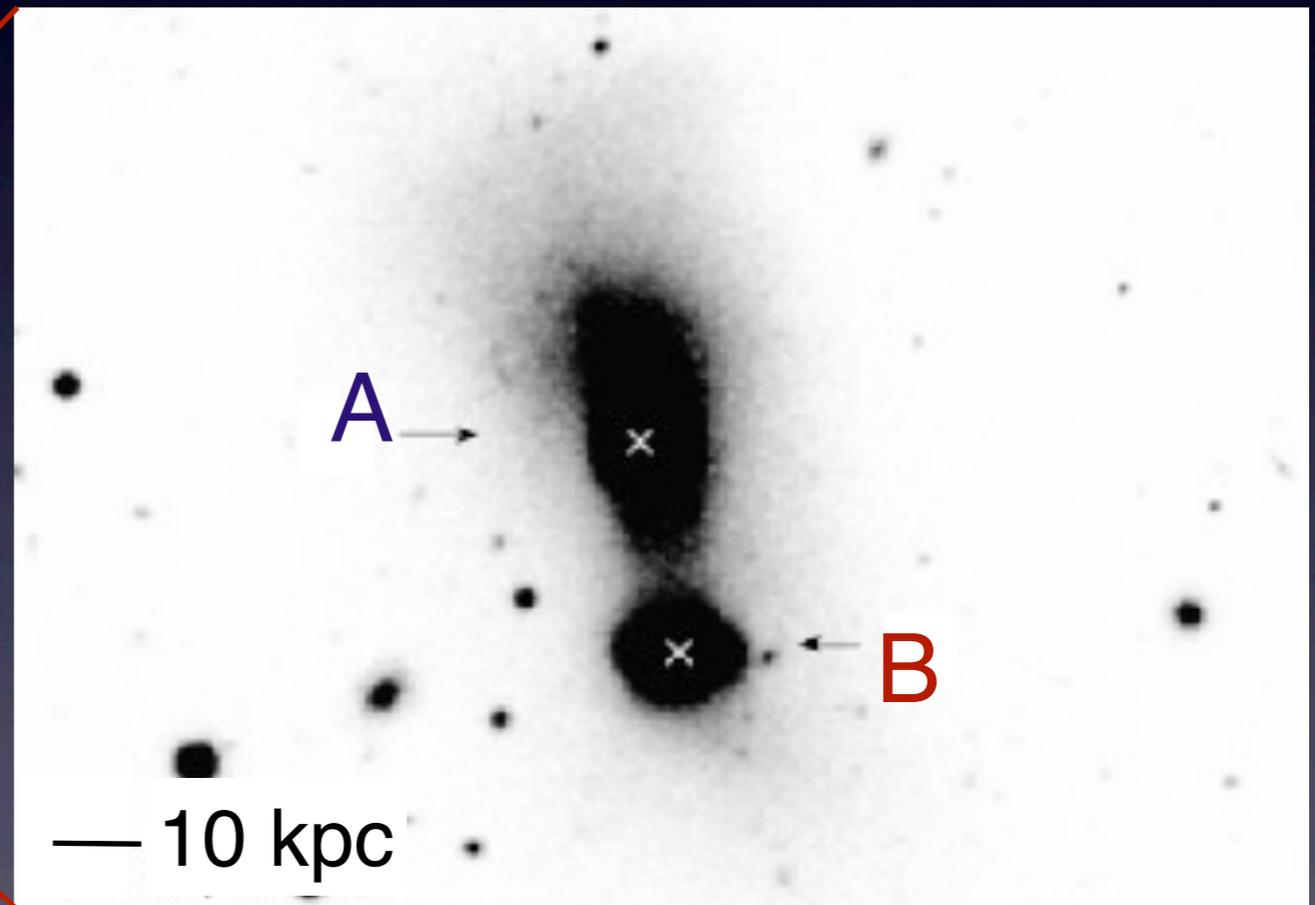
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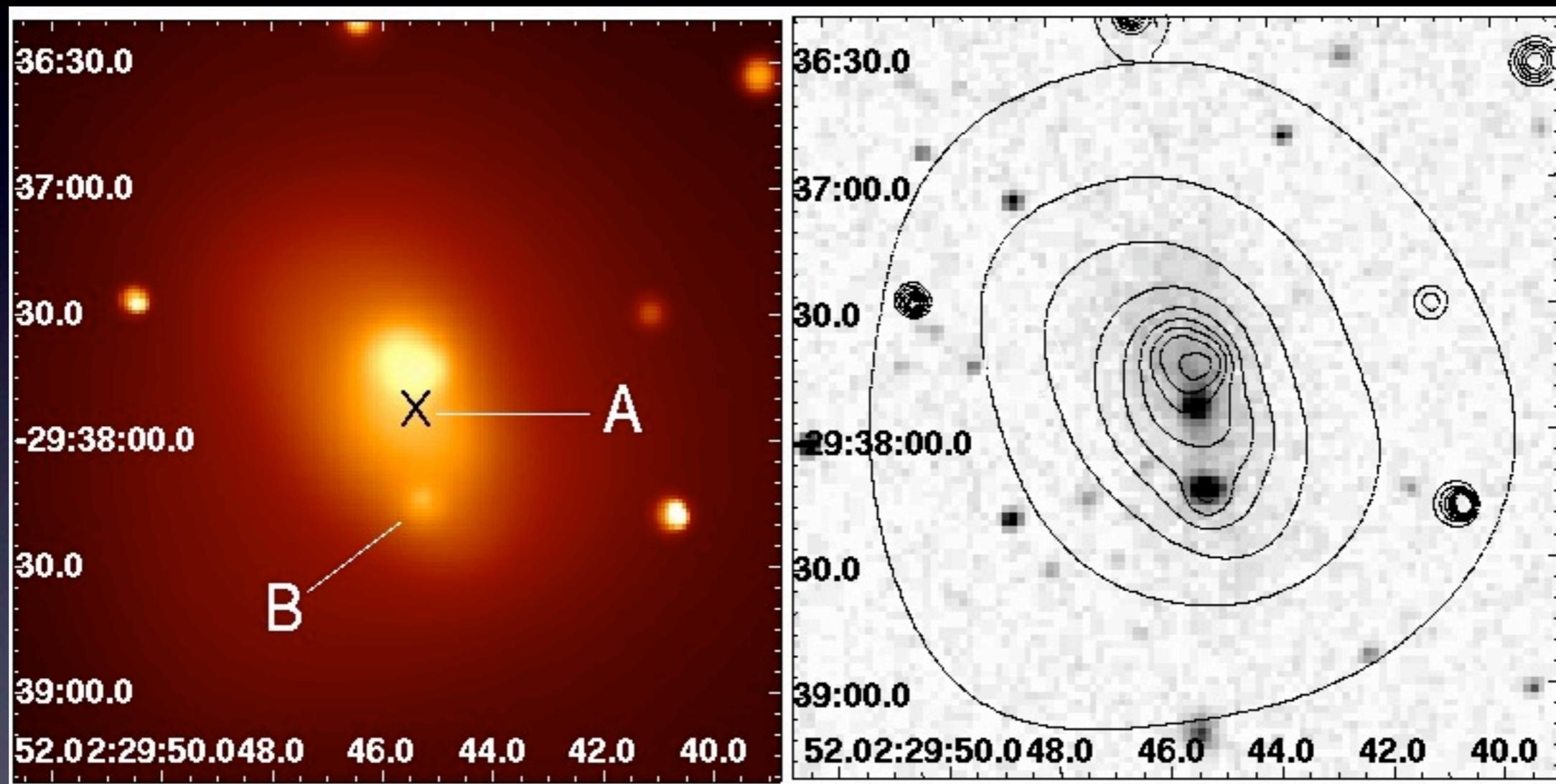
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$\Delta r \sim 20$  kpc,  $\Delta v \sim 35$  km/s

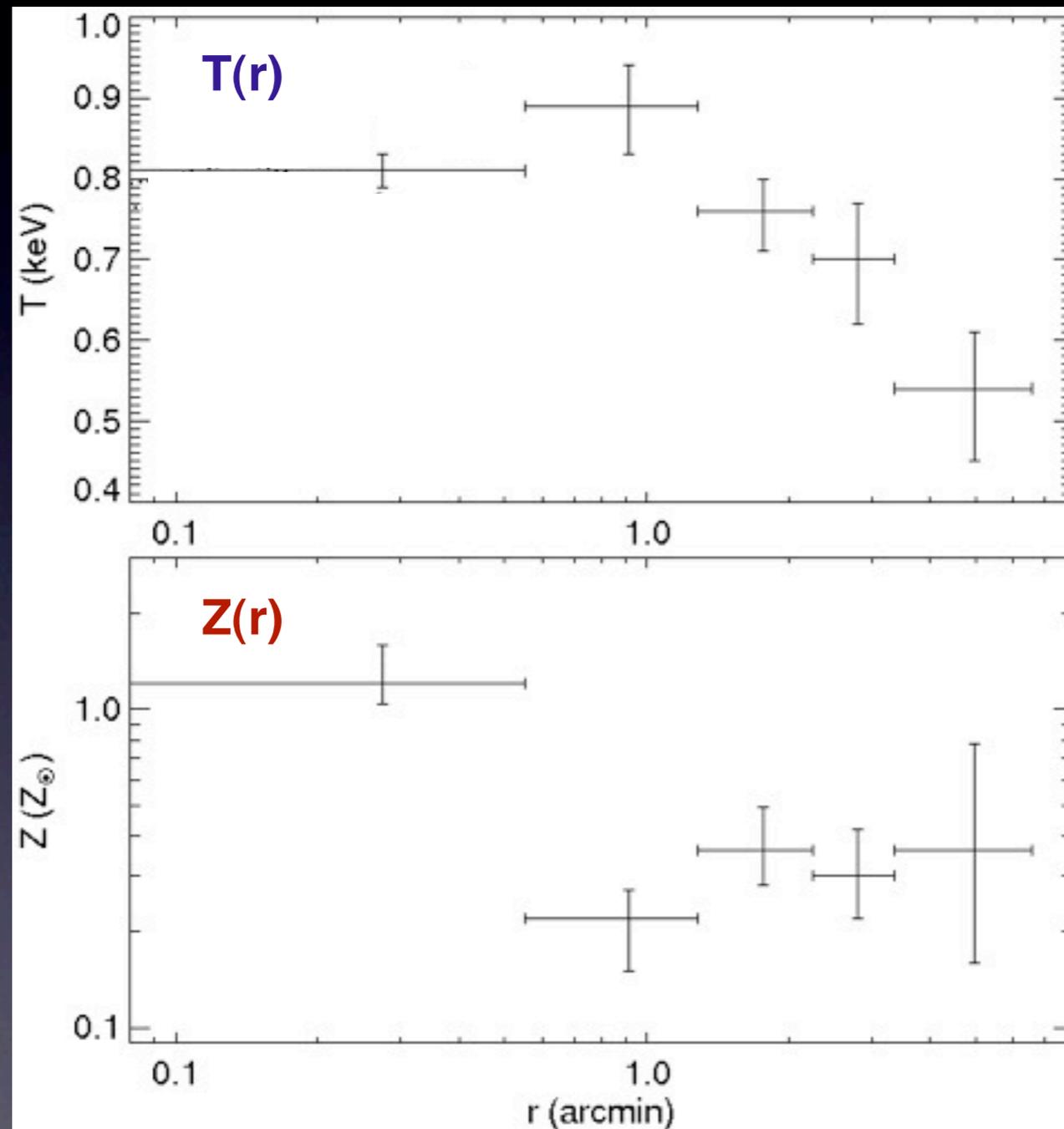
# Chandra Observations of MZ 10451

0.3-2 keV (80 ks):



← 200 kpc →

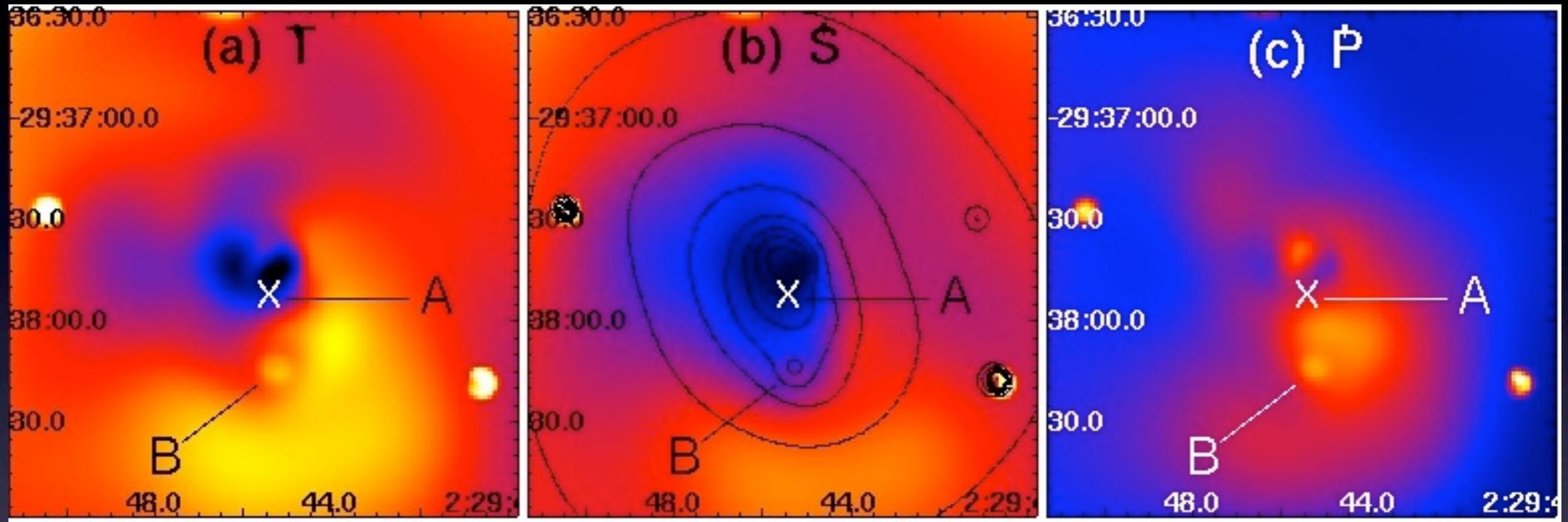
# Impact on the Intracluster Medium



Cool core retained...

...but strong central Fe excess present.

# Impact on ICM: 2-D “Spectral” Mapping



Temperature:

$$T \sim HR = 1-2/0.5-1 \text{ keV}$$

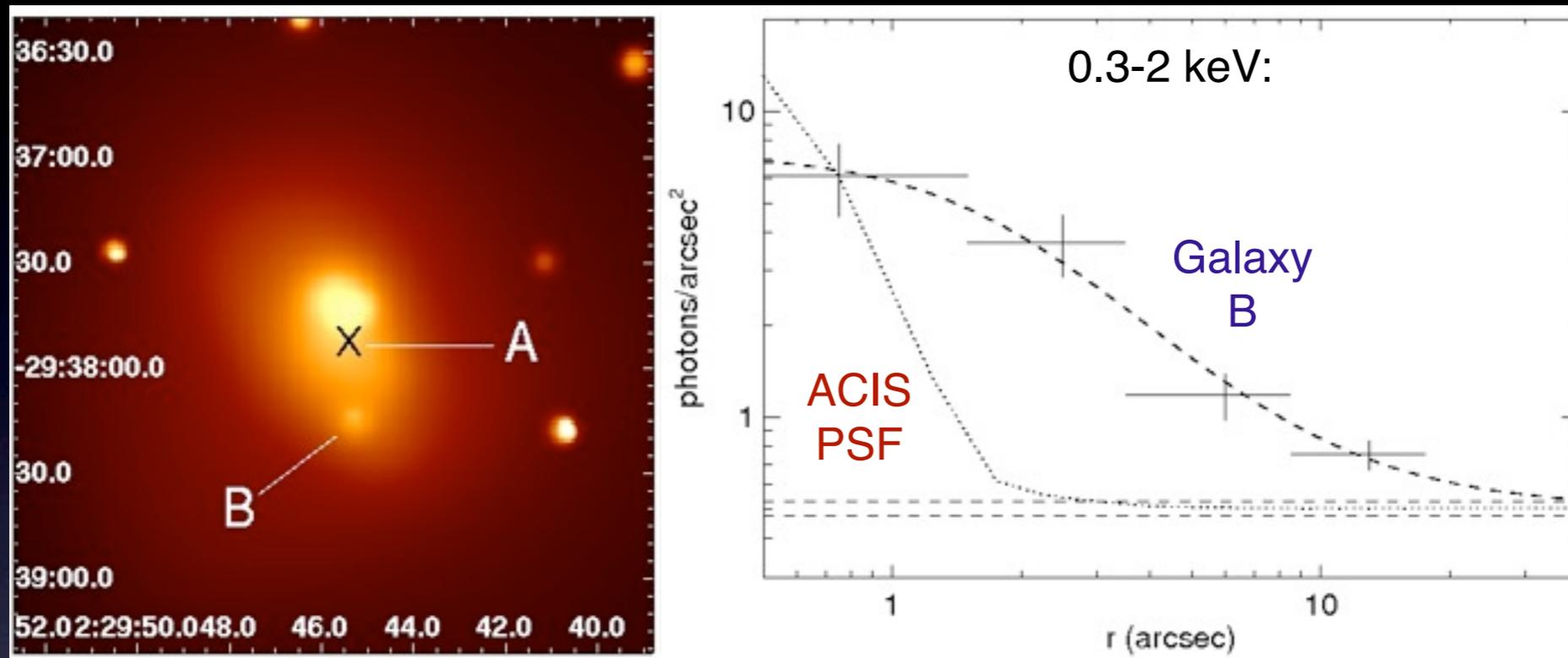
Entropy:

$$S = T/n^{2/3} \sim HR/l_e^{1/3}$$

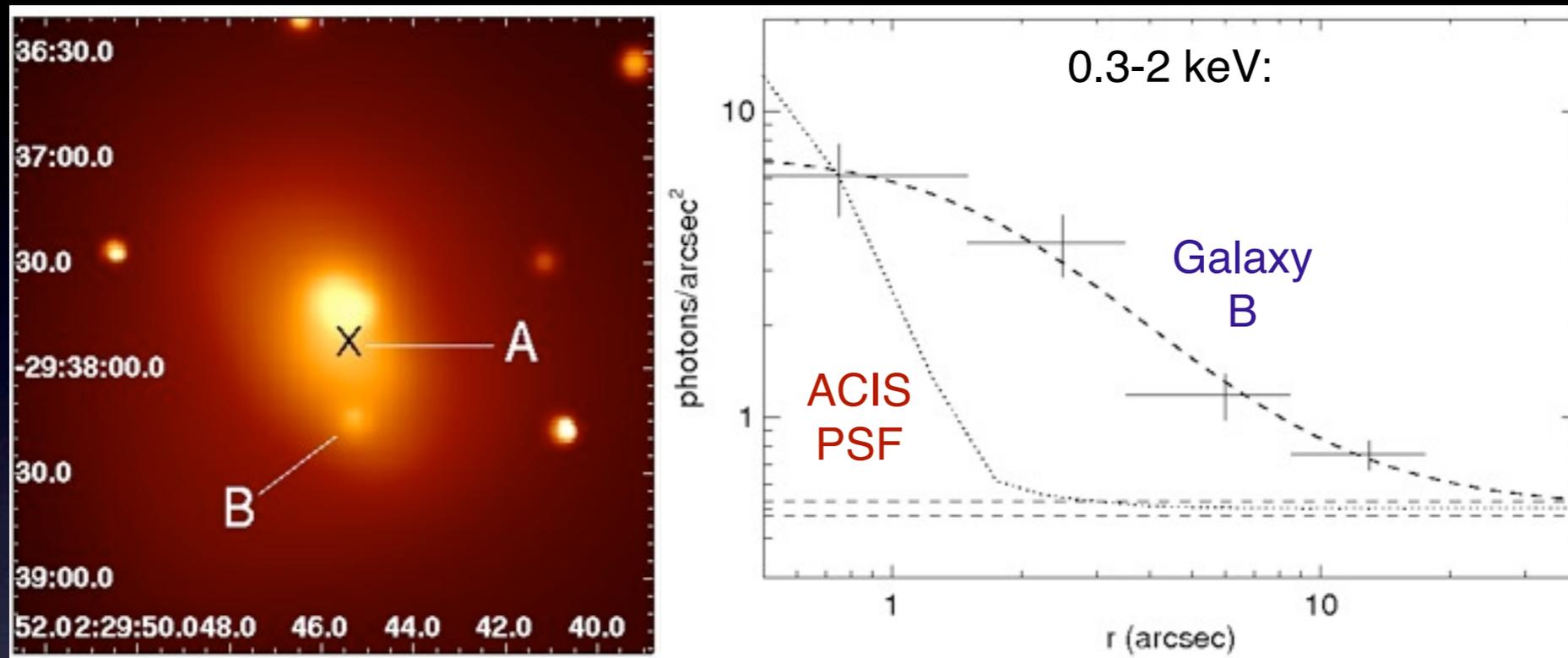
Pressure:

$$P \sim nT \sim HR * l_e^{1/2}$$

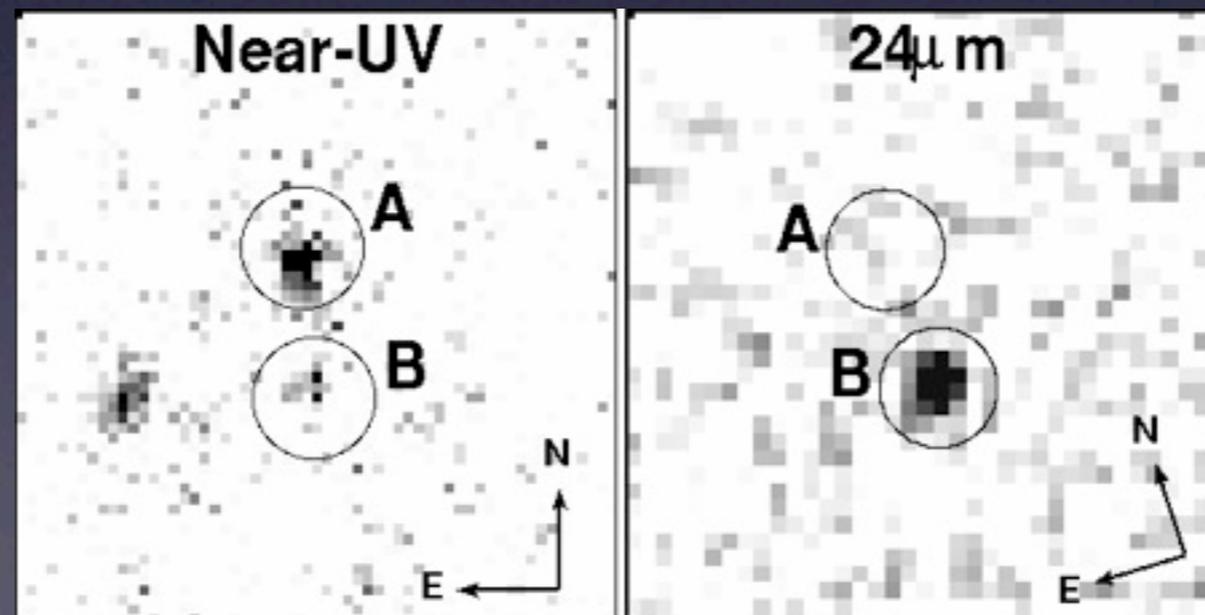
# The Nature of the Central Merger



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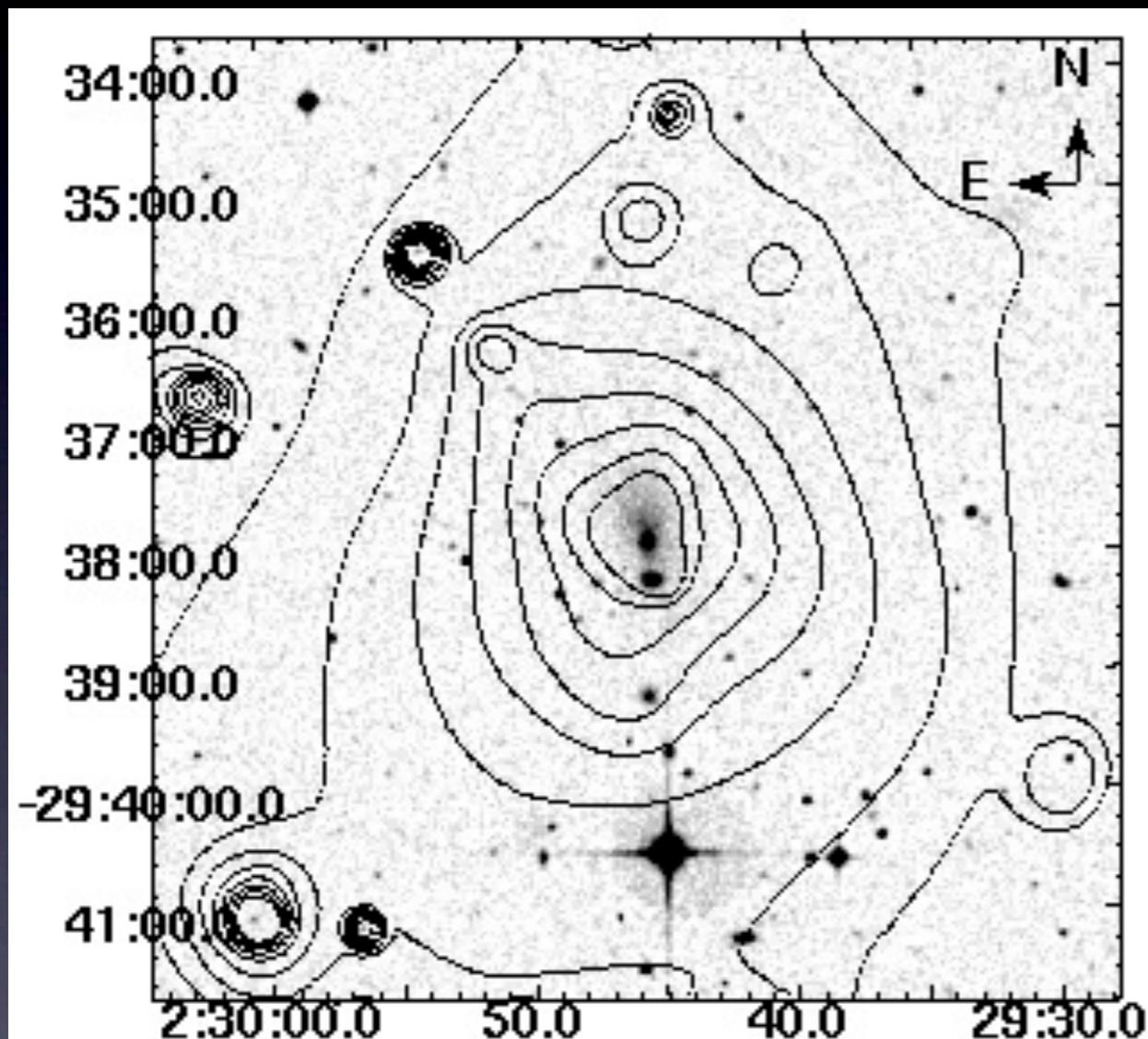


*GALEX*



*Spitzer*

# Implications for BCG Formation



## BCGs:

built up hierarchically  
by mergers near  
cluster cores.

## Progenitors:

Galaxies infalling along  
accreting filaments  
(De Lucia+ 07)

# Summary

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## **BCGs form through mergers in cluster cores**

by galaxies infalling along “feeder” filaments