

Galaxy cluster MS0735.6+7421  
blue(X-ray) + yellow(optical) + red(radio) image  
(credit : chandra photo album)

# COCOA

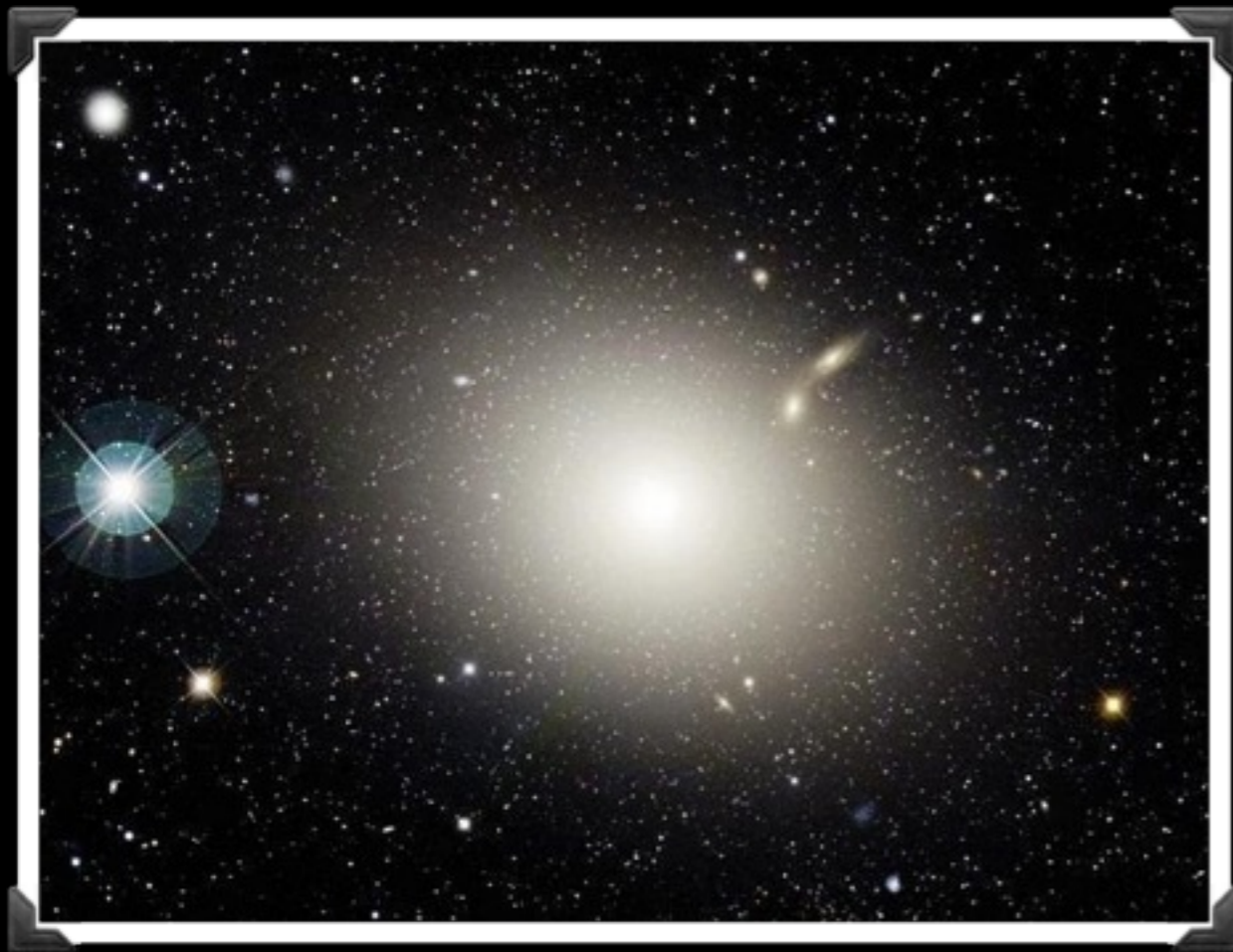
CO-evolution of cluster  
COres and the central  
AGNs

Junhyun Baek  
(Yonsei University)

Co-authors: Aeree Chung (Yonsei),  
Evangelia Tremou (MSU), Bongwon Sohn,  
Taehyun Jung, Hyunwook Ro(KASI)

Q1. Which galaxy usually hosts radio-bright AGN?

Elliptical galaxy



Spiral galaxy



Q1. Which galaxy usually hosts radio-bright AGN?

Elliptical galaxy



Spiral galaxy



AGNs hosted by giant elliptical galaxies can be about  $10^3$  times radio louder than AGNs hosted by disk galaxies (Sikora et al. 2007)

Q2. Which environment usually contain  
radio-bright AGN?

Cluster



Field



Q2. Which environment usually contain radio-bright AGN?



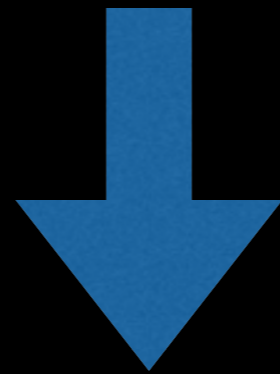
Radio-loud AGNs are more frequently found in central group and cluster galaxies when compared to galaxies of similar stellar mass (Best et al. 2007)

Elliptical galaxies do not contain a lot of cold gas

Then.. how the \*fuel\* of AGNs in cluster ellipticals can be supplied?

Elliptical galaxies do not contain a lot of cold gas

Then.. how the \*fuel\* of AGNs in cluster ellipticals can be supplied?



One of possible explanation is cooling flow of galaxy clusters!

# COCOA: CO-evolution of cluster COres and the central AGNs

Study 1: Identifying parsec-scale AGN properties in CC/NCC clusters using VLBI

➔ CC AGNs are more recently re-activate compared with NCC AGNs (Baek et al. 2015)

Study 2: Studying cold molecular gas contents of cD galaxy in CC/NCC clusters

➔ On-going LMT / JCMT observations