

THE RARITY OF STAR FORMATION IN LOCAL UNIVERSE BCGS

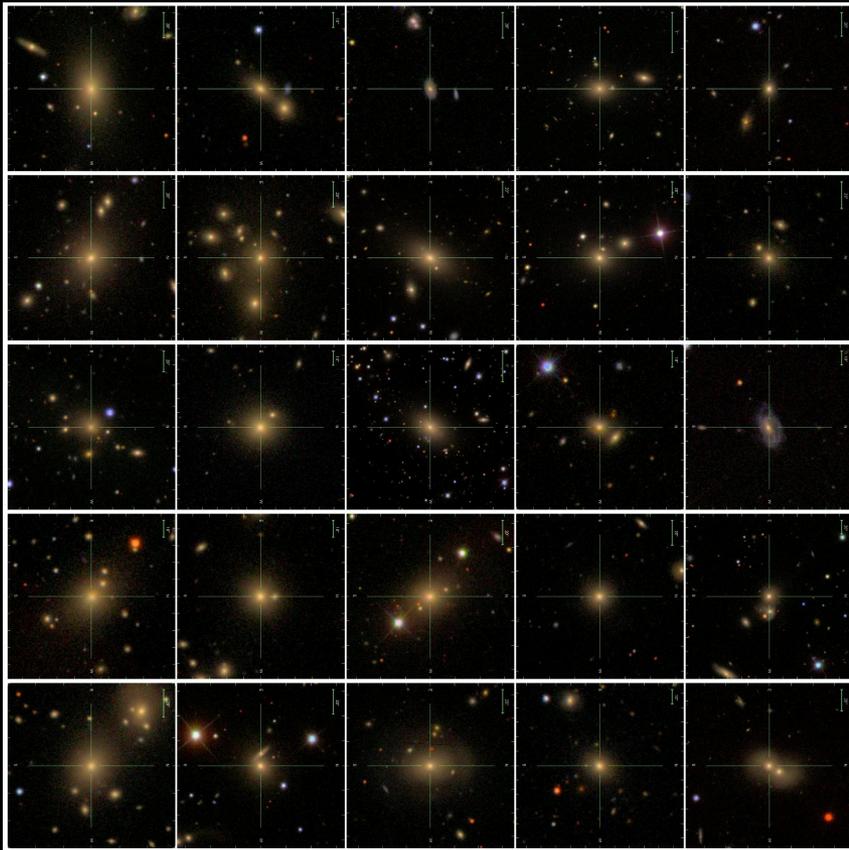


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BRIGHTEST CLUSTER GALAXIES (BCGS)



Most local Universe BCGs are
'red and dead'

At current times ($z < 0.1$),
mergers and star formation
have ceased

Von der Linden et al., 2007

STAR FORMING BCGS

Star Forming BCGs do exist: e.g. at higher z , where mergers were much more common (e.g., Brodwin et al., 2013)

At intermediate redshifts there are still some examples of starburst BCGs (e.g. Phoenix cluster, $z=0.596$, McDonald et al., 2012)

These may be the result of central cluster environment (e.g., O'Dea et al., 2008; Stott et al., 2008; Hicks et al., 2010; Hoffer et al., 2012; Rawle et al., 2012)



Phoenix cluster BCG: McDonald et al., 2012.

LOCAL STAR-FORMING BCGS

Perseus A: An odd galaxy

$z=0.0176$

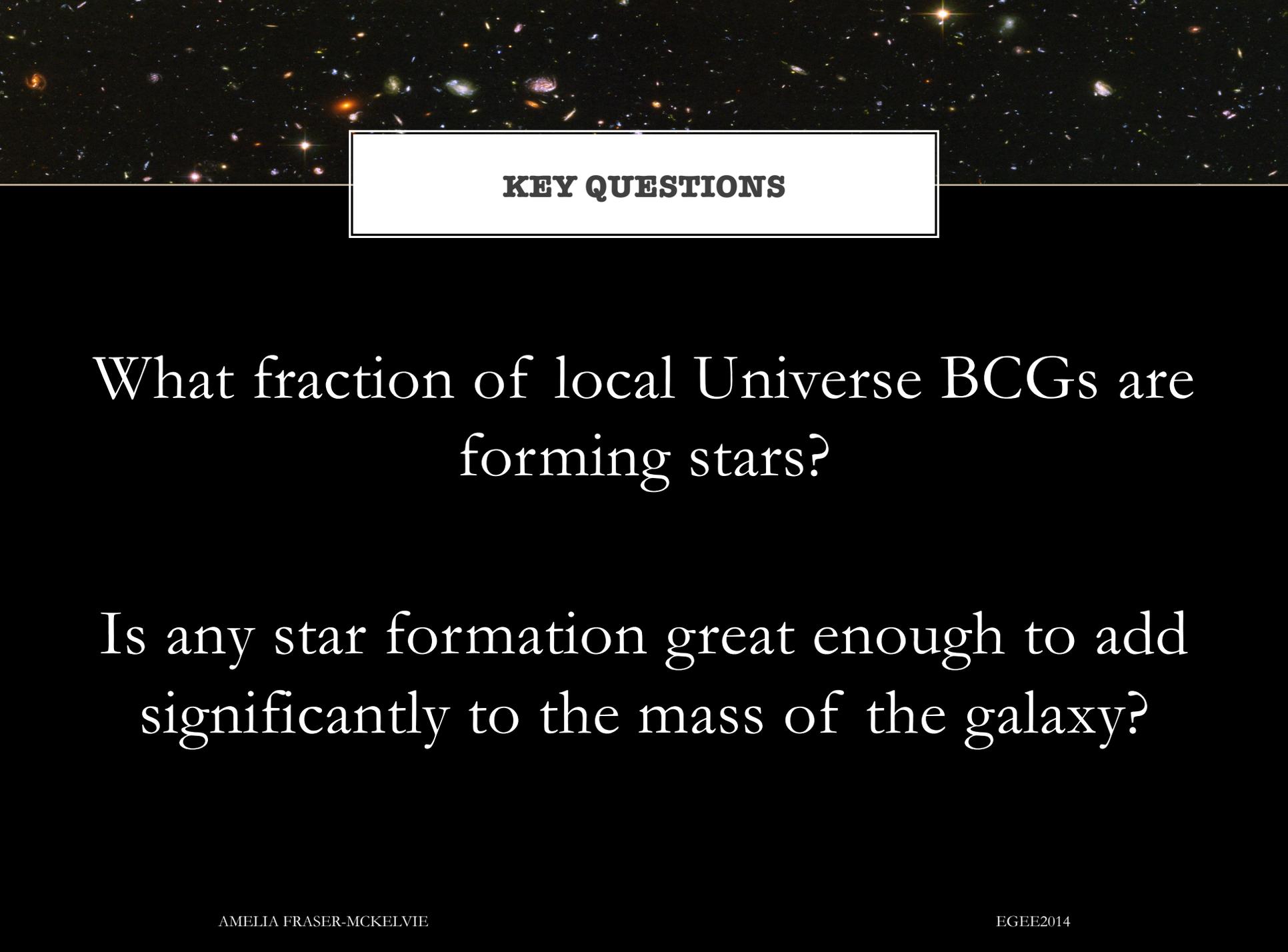
Optical emission lines

Seyfert 1 nucleus

Cold molecular gas near the core

High SFR

Archetypal example of AGN feedback

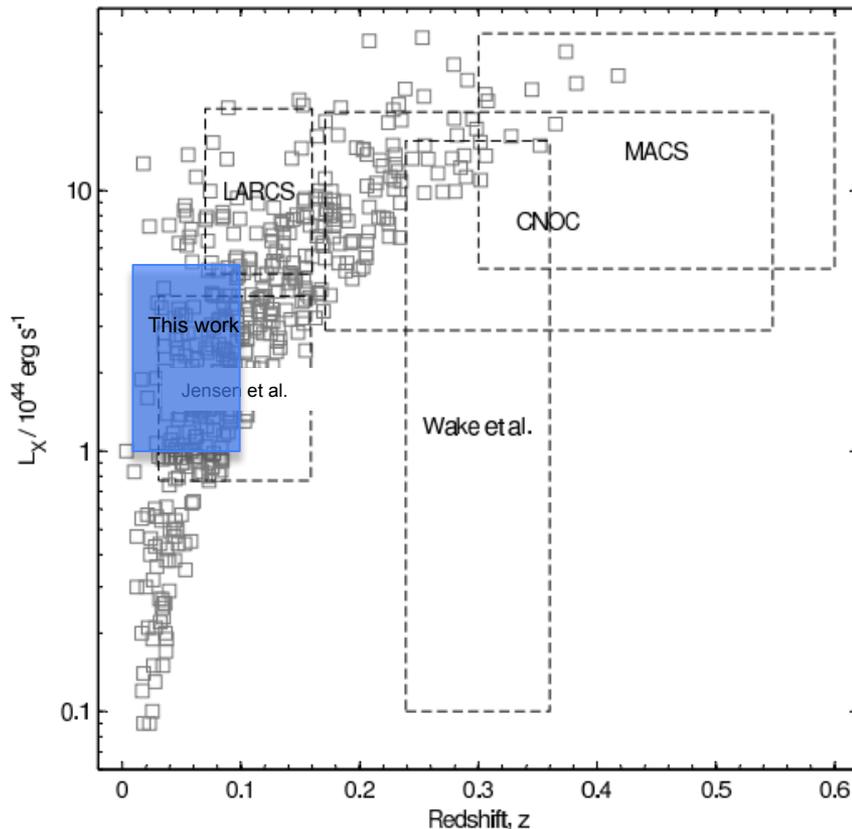


KEY QUESTIONS

What fraction of local Universe BCGs are forming stars?

Is any star formation great enough to add significantly to the mass of the galaxy?

THE BCG SAMPLE



Comprehensive catalogue of BCGs created for use in this work

All BCGs in X-ray selected clusters $L_X > 1 \times 10^{44}$ erg/s ($M_{2500} > 10^{14} M_{\odot}$)

Local sample $z < 0.1$

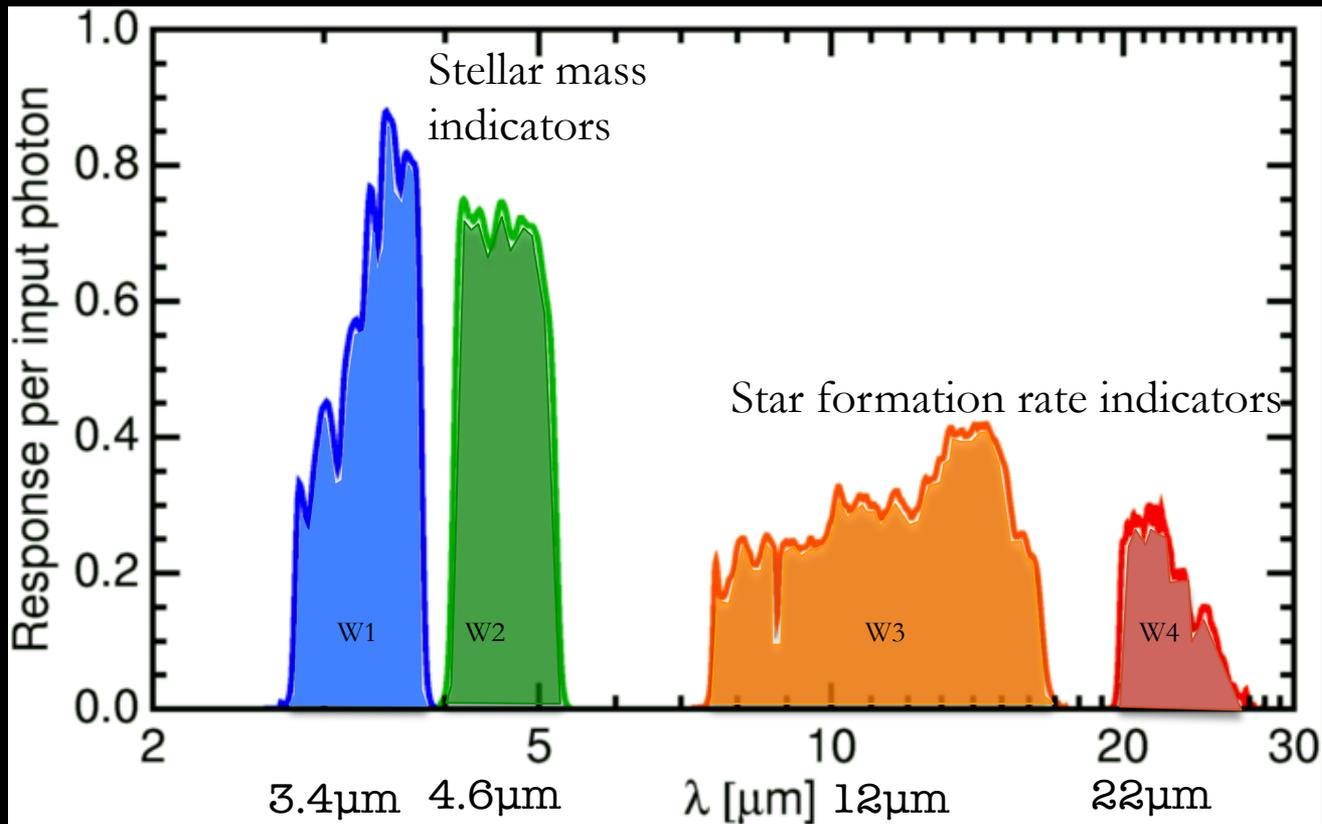
X-ray clusters queried using BAX (Sadat et al., 2004)

Jensen et al., 2012

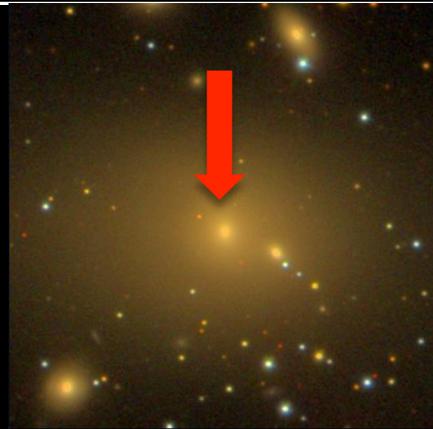
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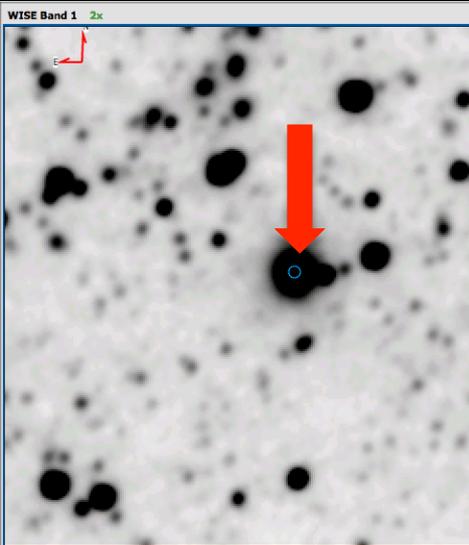
THE ALLWISE SURVEY



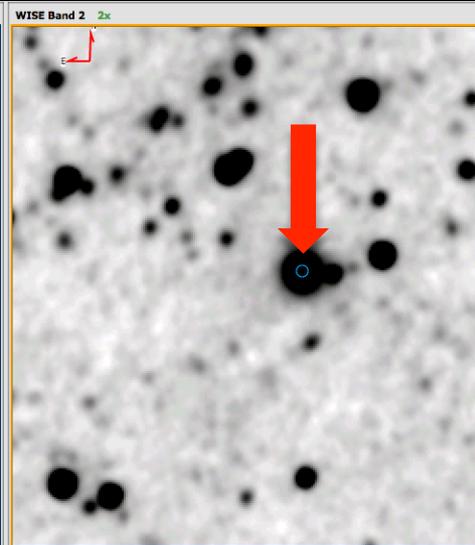
EXAMPLE CLUSTER: AWM 7



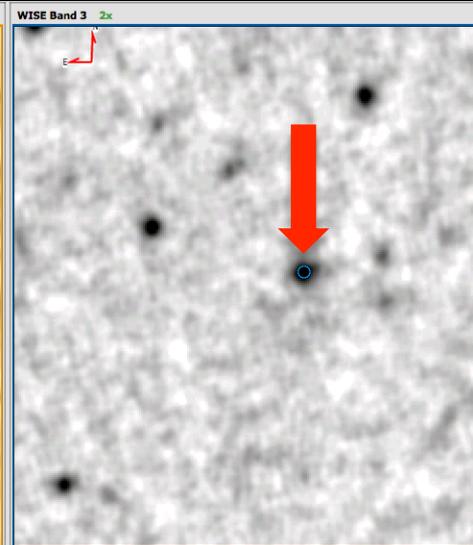
SDSS colour composite image



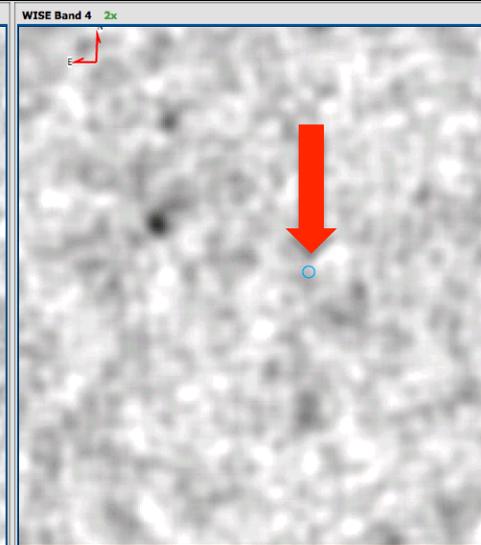
W1 3.4μm



W2 4.6μm

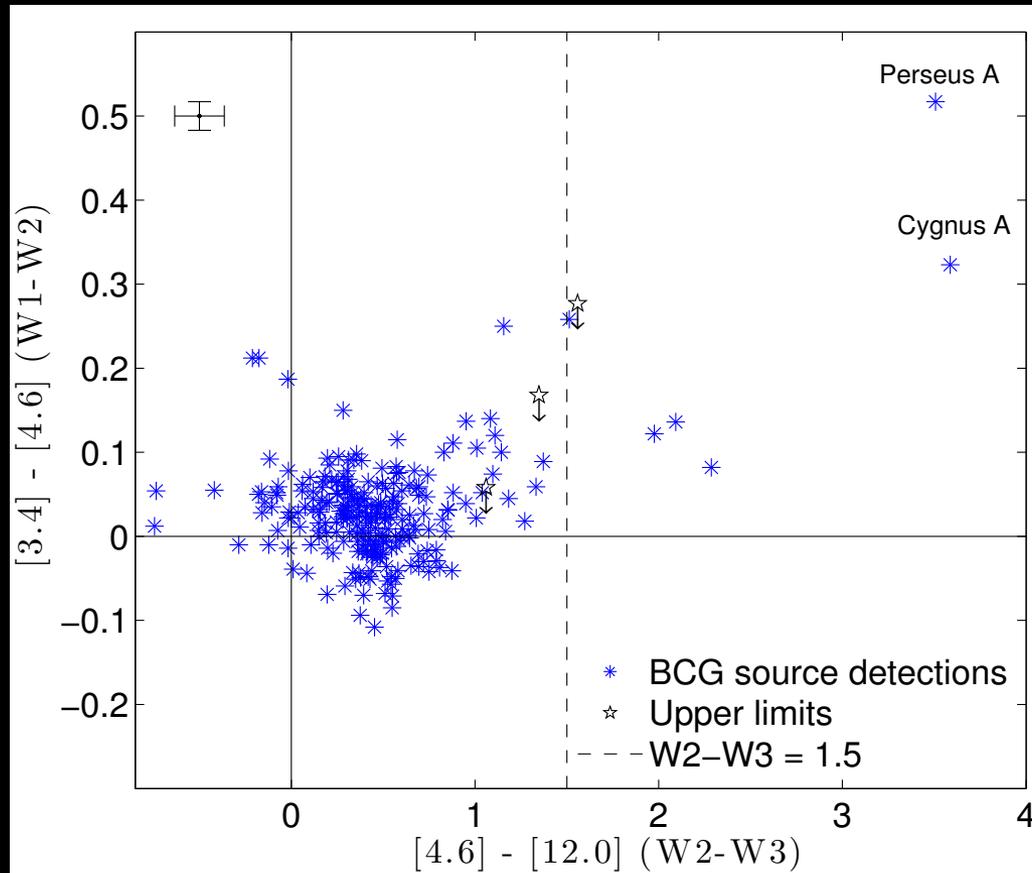


W3 12μm



W4 22μm

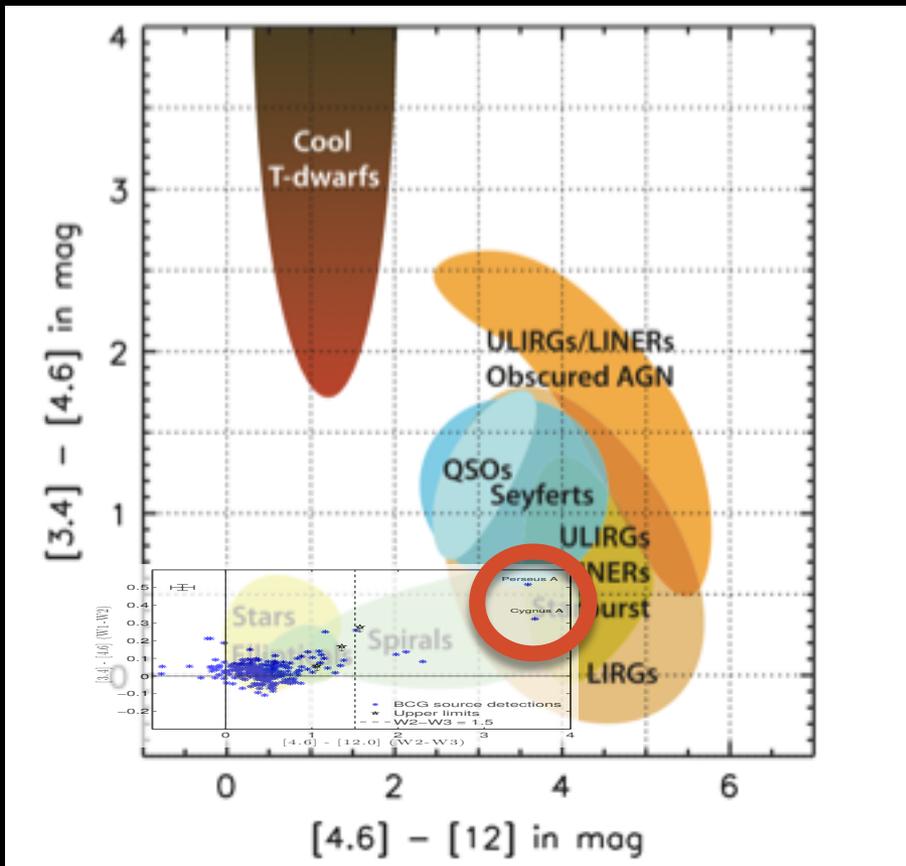
MID-IR EXCESS IN BCGS?



Fraser-McKelvie et al., 2014, MNRAS, 444, L63

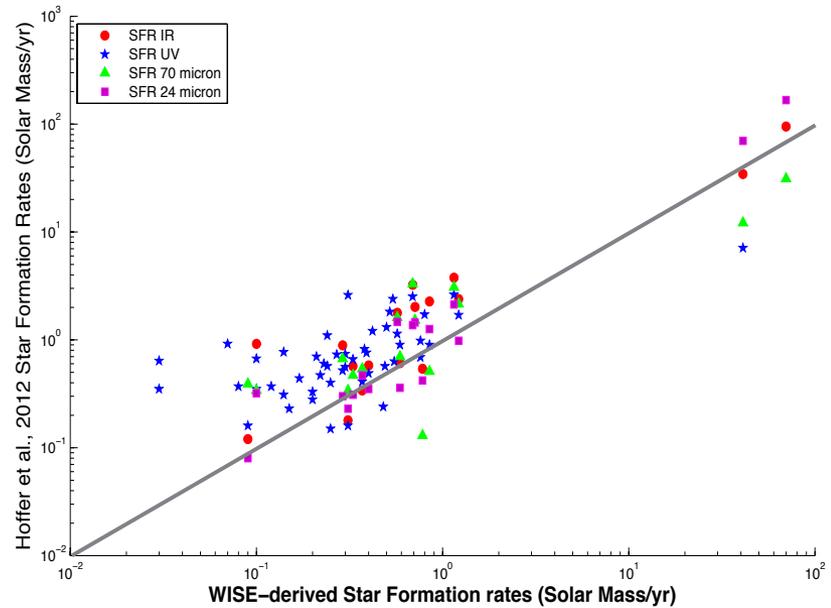
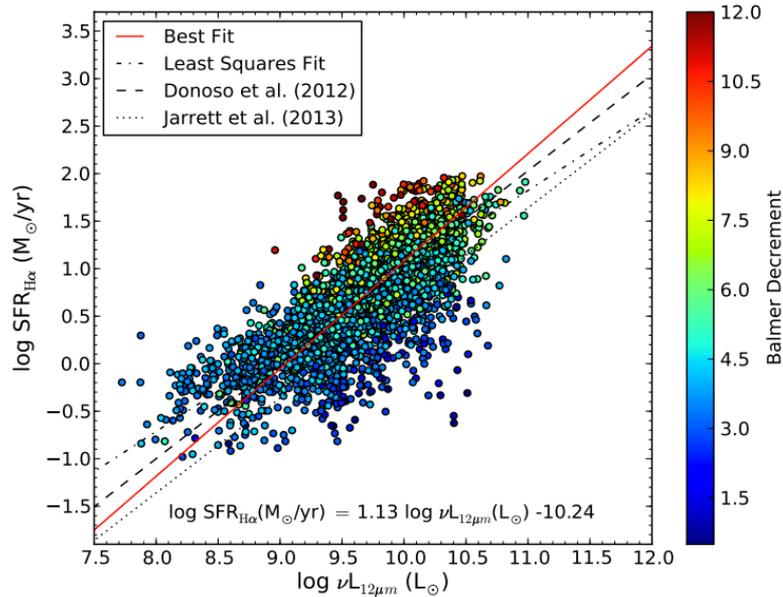
Excess of W3 emission

MID-IR EXCESS IN BCGS?



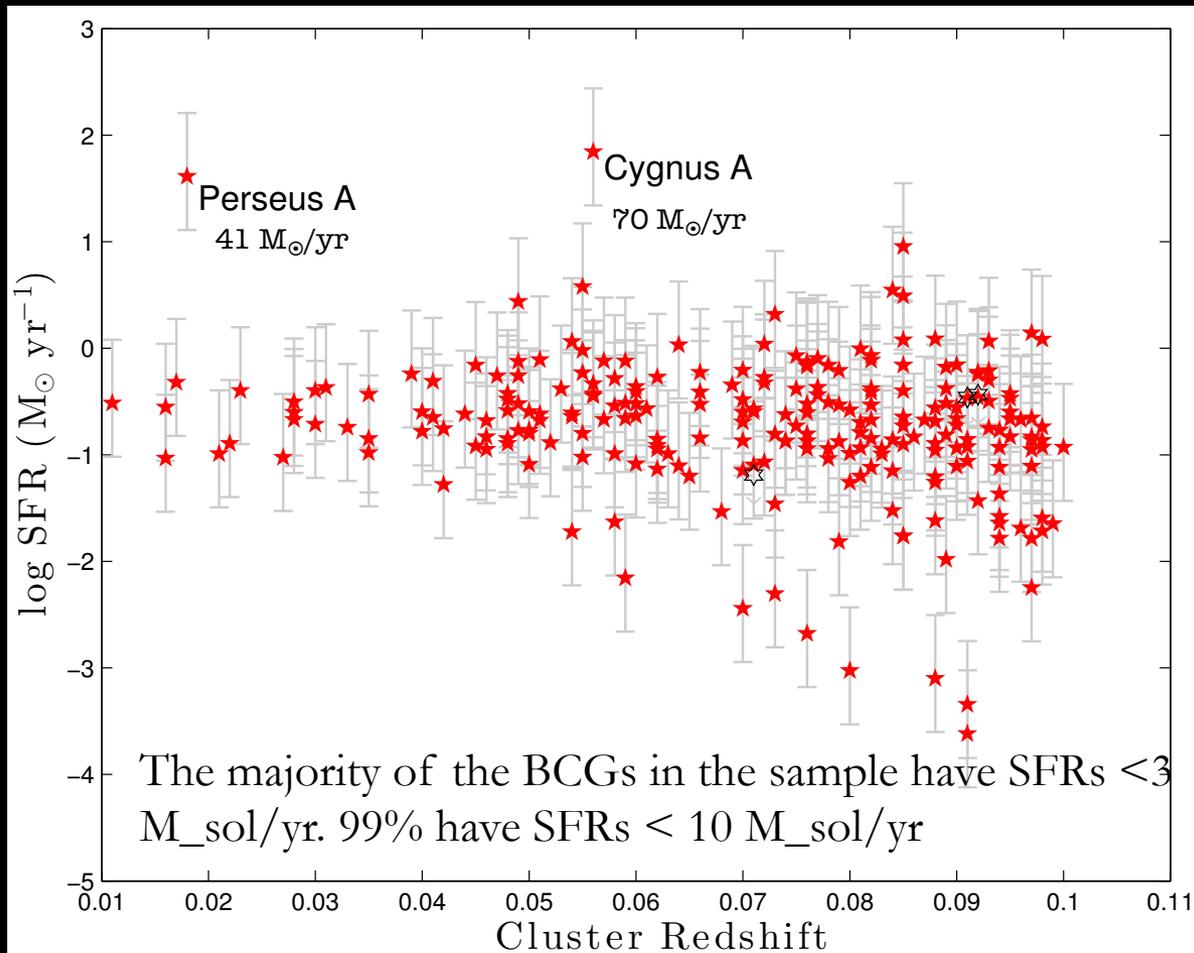
Jarrett et al., 2011

CALCULATING BCG STAR FORMATION RATES



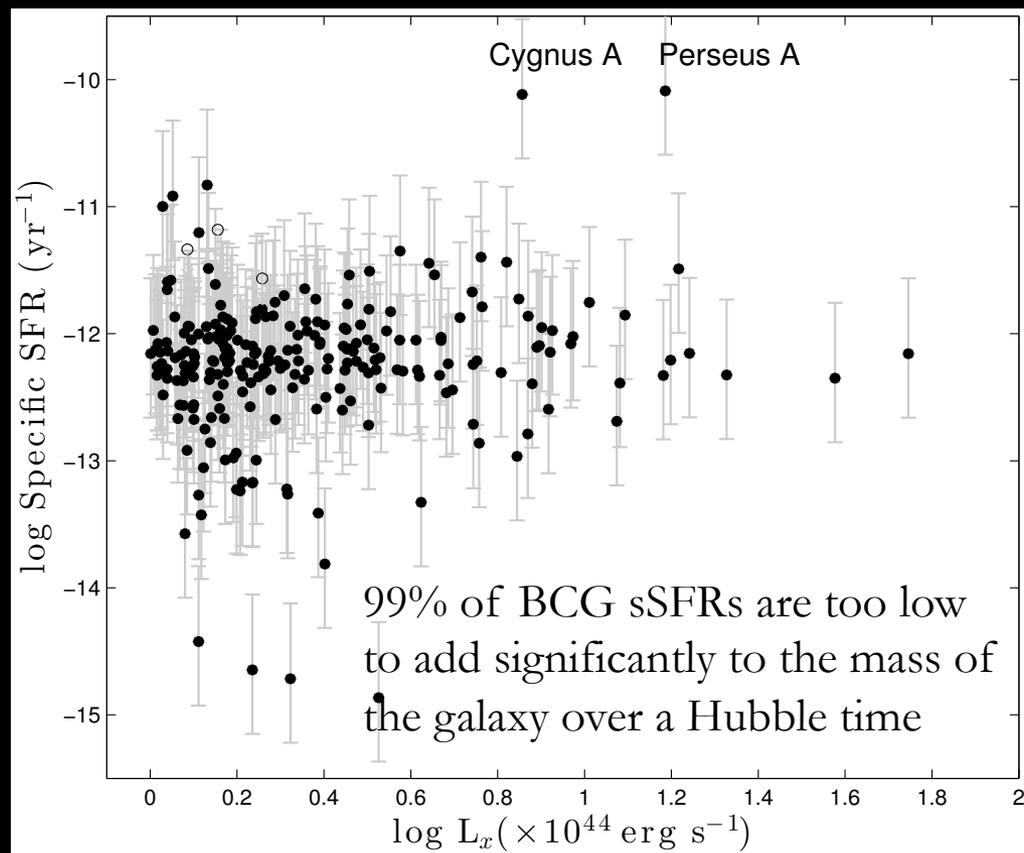
Cluver et al., 2014

STAR FORMATION IN BCGS



Fraser-McKelvie et al.,
2014, MNRAS, 444, L63

STAR FORMATION AS A MECHANISM FOR MASS GROWTH?



Fraser-McKelvie et al.,
2014, MNRAS, 444,
L63

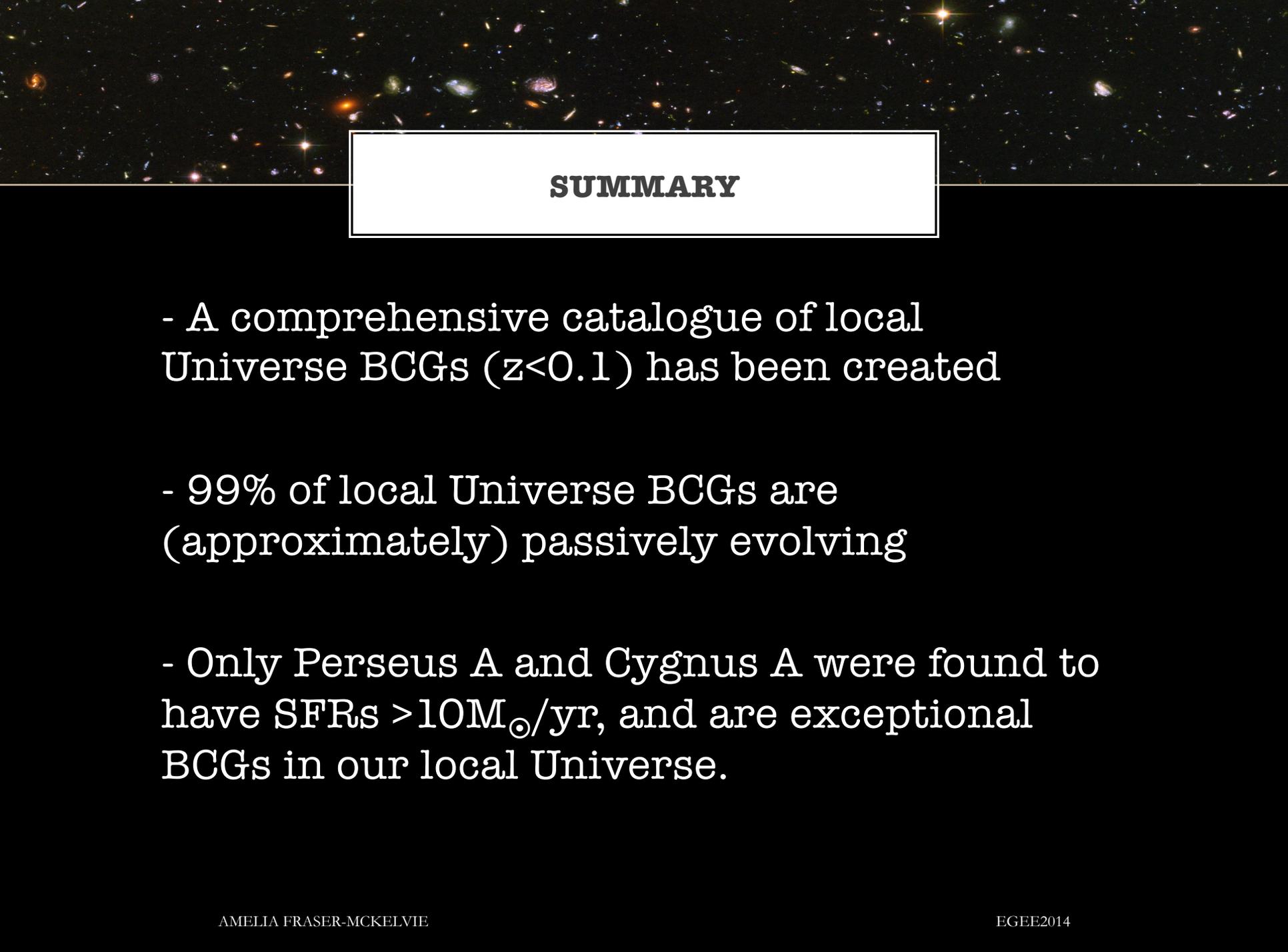
**OUTLIERS: CYGNUS A &
PERSEUS A**



Perseus A



Cygnus A



SUMMARY

- A comprehensive catalogue of local Universe BCGs ($z < 0.1$) has been created
- 99% of local Universe BCGs are (approximately) passively evolving
- Only Perseus A and Cygnus A were found to have SFRs $> 10 M_{\odot}/\text{yr}$, and are exceptional BCGs in our local Universe.

STAR FORMATION IN BCGS

