The stellar mass content of radio galaxy hosts at 1.5 < z <5

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Introduction

- The hosts of powerful radio galaxies represent the most massive galaxies at their epoch (K-z; Rocca-Volmerange et al. 2004)

- By observing the SEDs from the rest frame optical through the H-band rest-frame with Spitzer, we aim at studying the stellar population properties of RGs at $1.5 < z < 5$ with unprecedented details.

Spitzer observations of 69 RGs

3-camera programme: GO 3329 (PI: Stern D.) (IRAC, IRS,MIPS) (see N. Seymour's Talk)

Ancillary data:

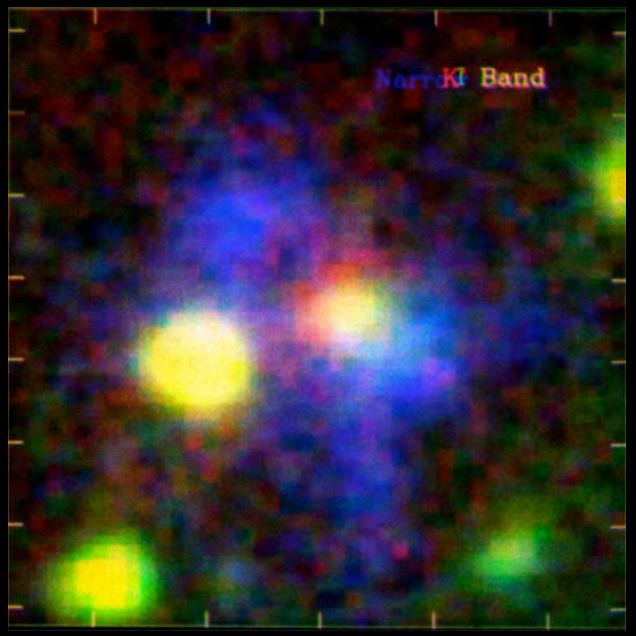
- 48/70 have HST imaging
- 16 have Chandra/XMM-Newton data
- 43 have published sub-mm data
- 22 have deep optical polarimetric observations from Keck/ VLT

- Optical and NIR VLT, Palomar and Subaru imaging is

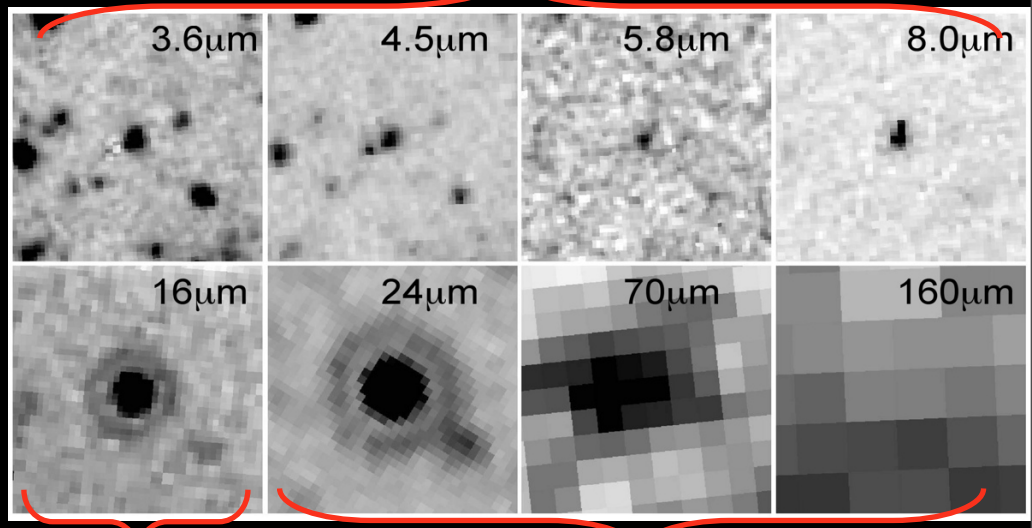
Enable us to sample the entire relevant stellar SEDs

4C+23.56 (z=2.483)

- Found in 4C sample of ultra steep spectrum r.sources
- Large, biconical Lyα nebula aligned with radio axis (Knoop&Chambers, 97)
- Highly polarised (P=15%) r.f. UV continuum
- Extended X-ray emission coincident with the radio lobes spanning ~0.5 Mpc.
- L(0.5-8) keV = 7.5 × 10^44 erg s-1 (Johnson et al. 07)



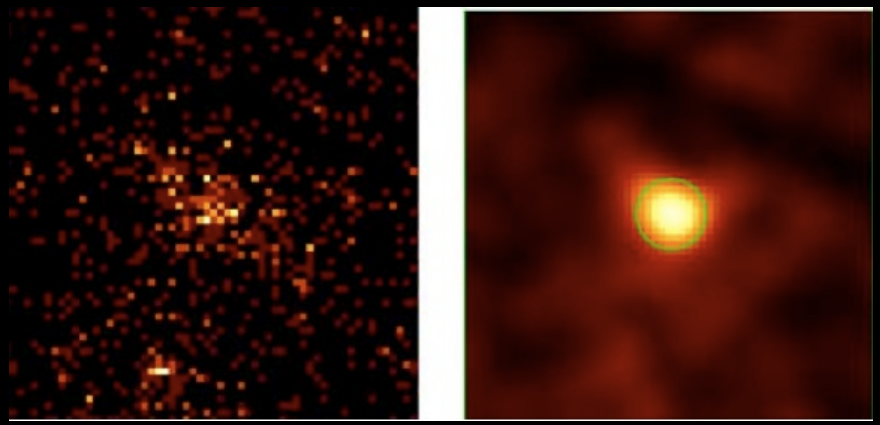
Spitzer/IRAC



IRS

MIPS

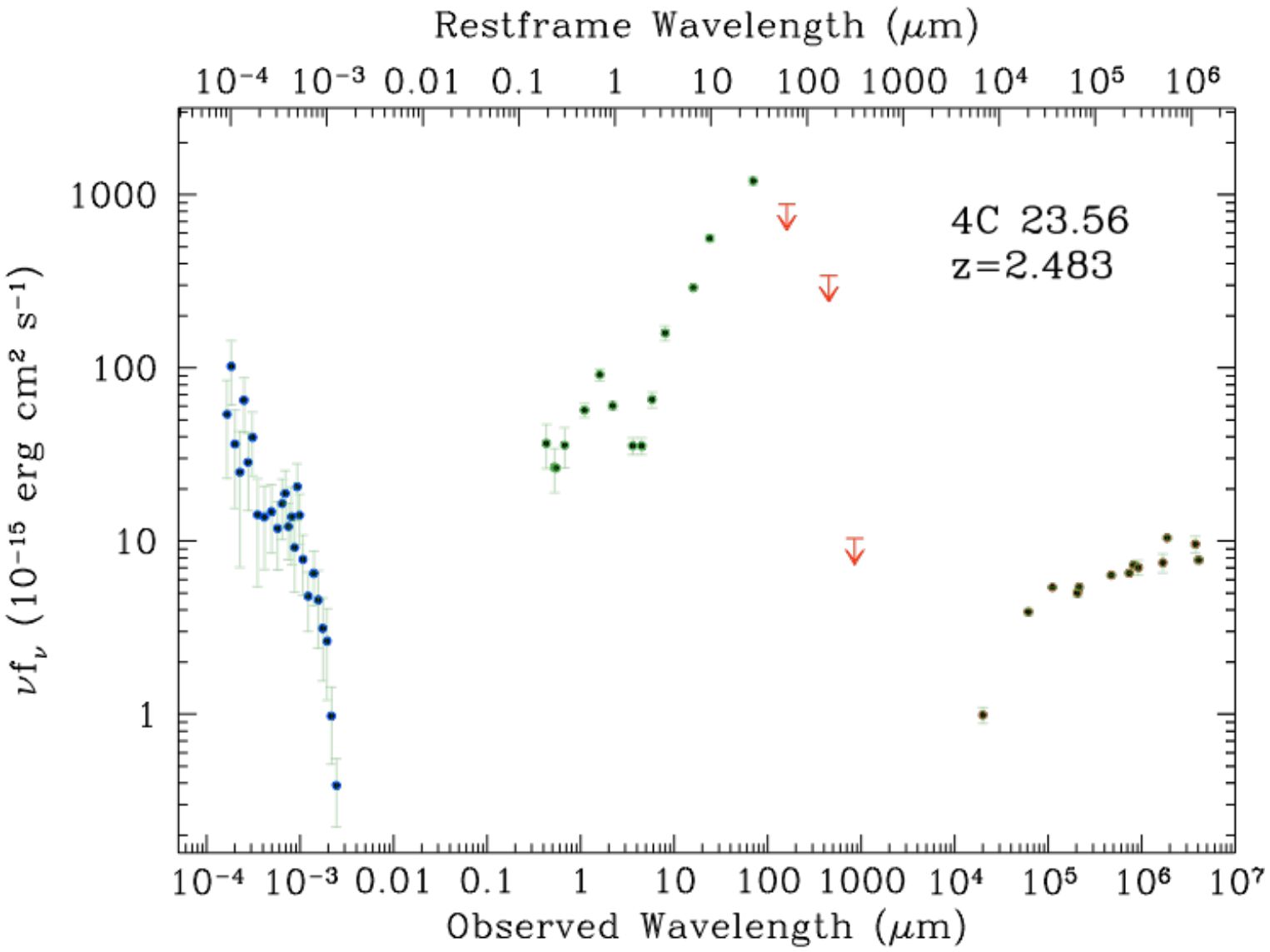
XMM/EPIC



0.5-2 keV

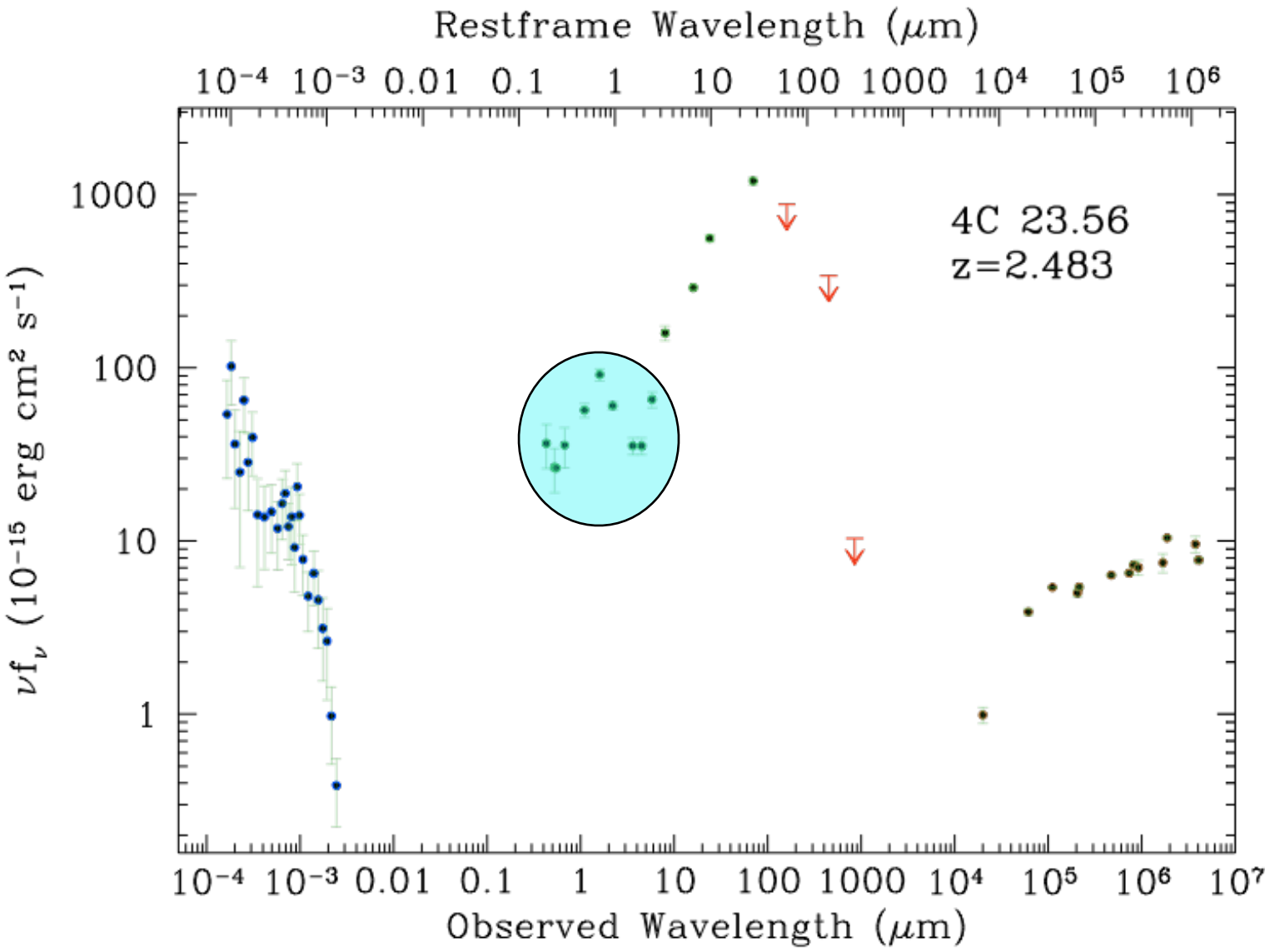
Smoothed 2-8 keV

Composite SED

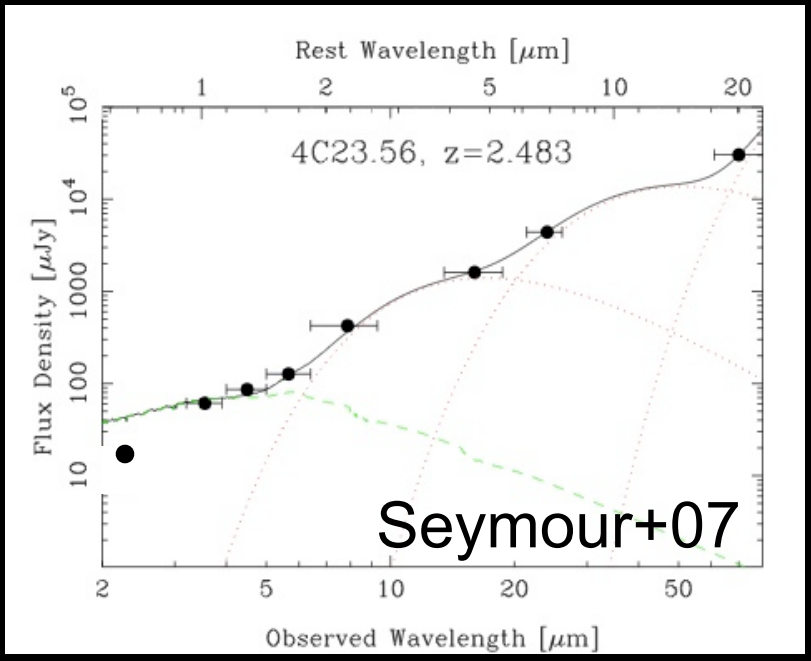


De Breuck et al., in prep.

Composite SED



De Breuck et al., in prep.



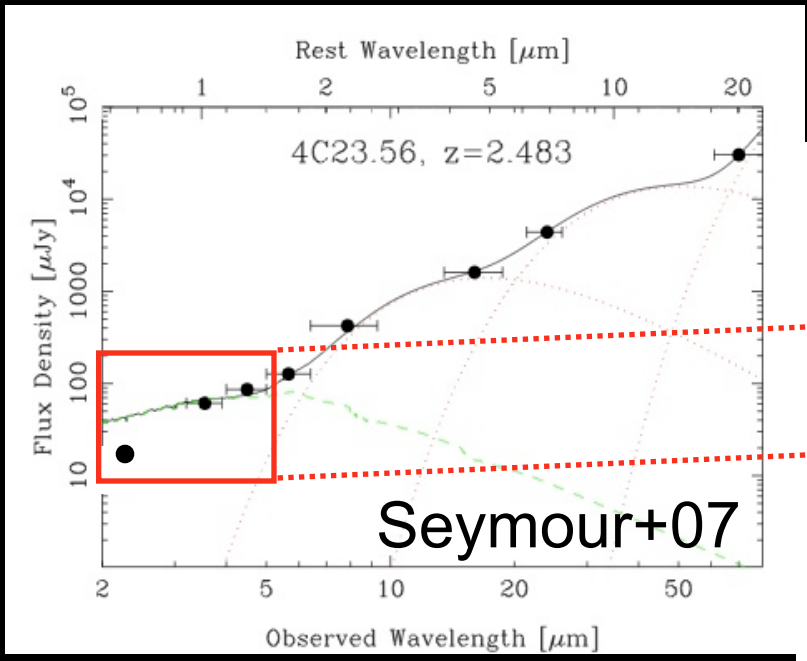
PEGASE.2 Elliptical

M=6.1E11 Msol

z_f= 10

Salpeter IMF

We use SpecPOL to disentangle the scattered quasar contribution in the blue (Vernet+2001)

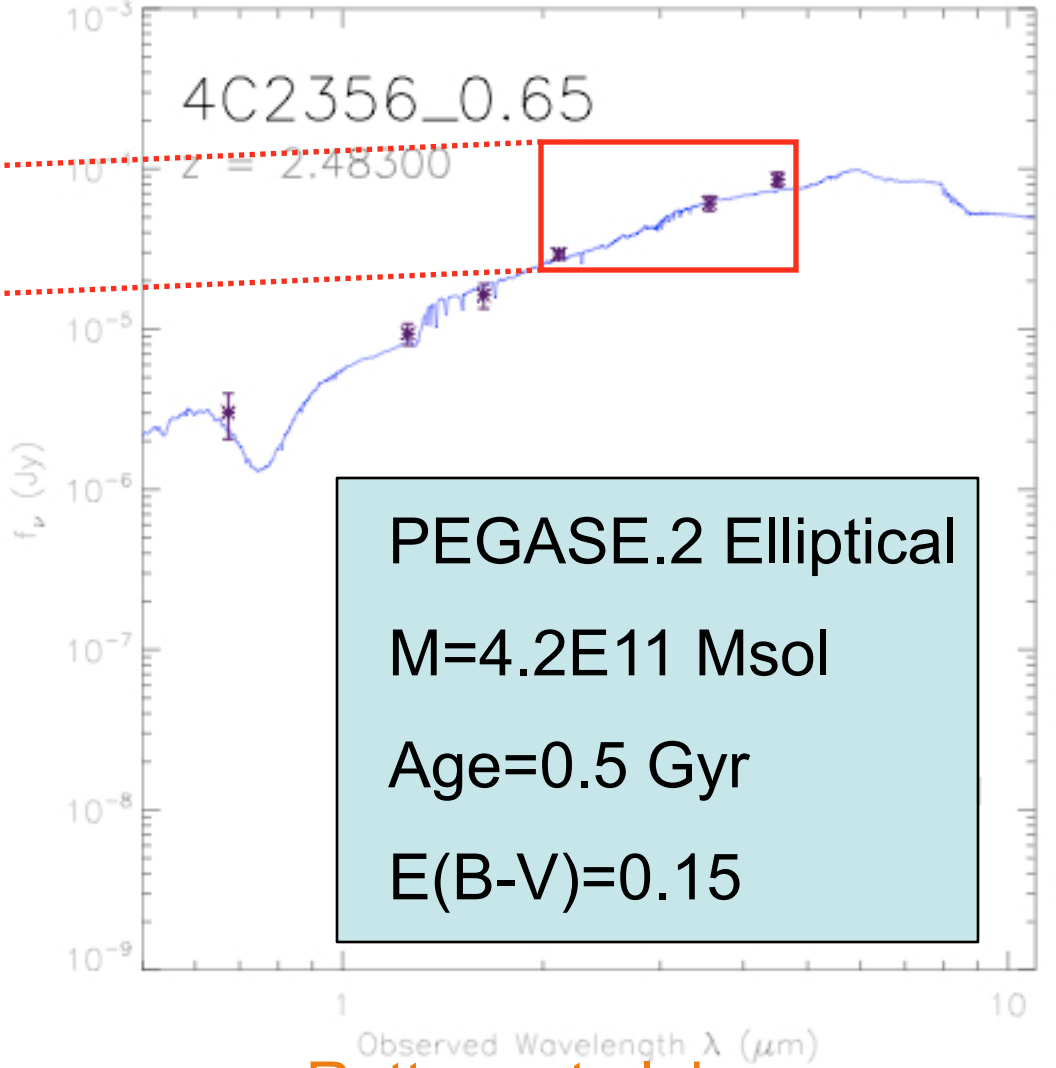


PEGASE.2 Elliptical

M=6.1E11 Msol

z_f= 10

Salpeter IMF



PEGASE.2 Elliptical

M=4.2E11 Msol

Age=0.5 Gyr

E(B-V)=0.15

Rettura et al. in prep.

Will do this for the Entire SHizRaG sample of ~60 RGs at 1.5<z<5 !

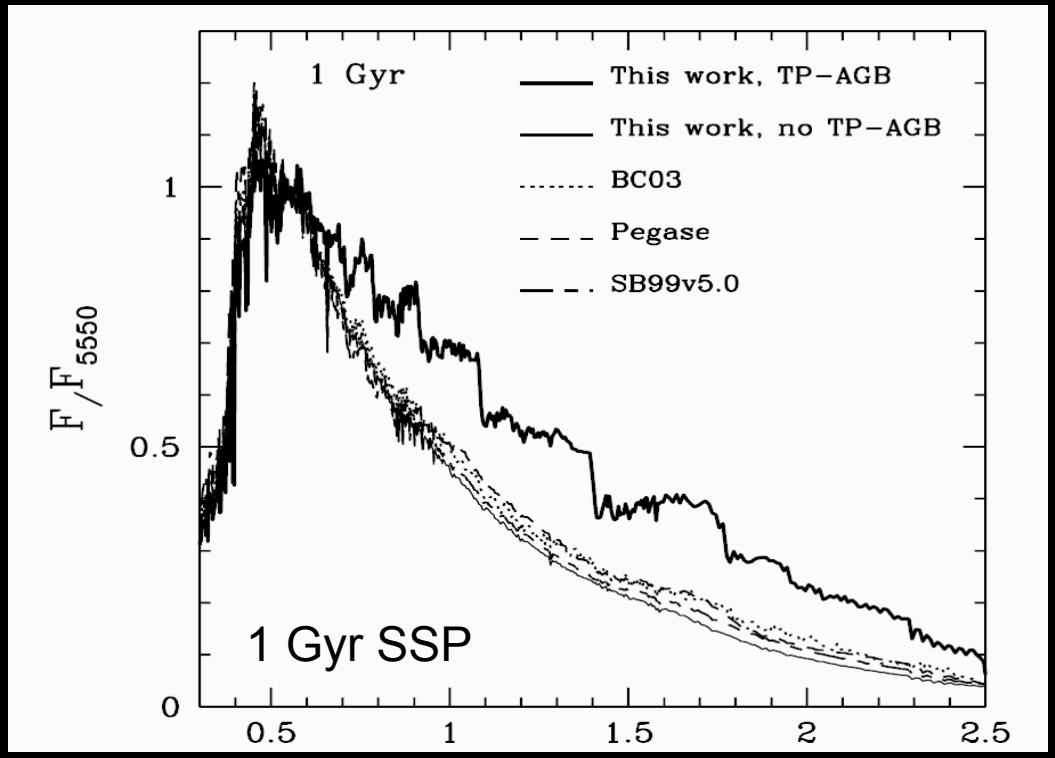
TP-AGB phase in spectral synthesis models

•At λobs ~ 2μm a short-duration thermally-pulsating (TP-) AGB phase is thought to be relevant

•We checked the reliability of our photometric-stellar mass determination against different spectrum synthesis models prescriptions:

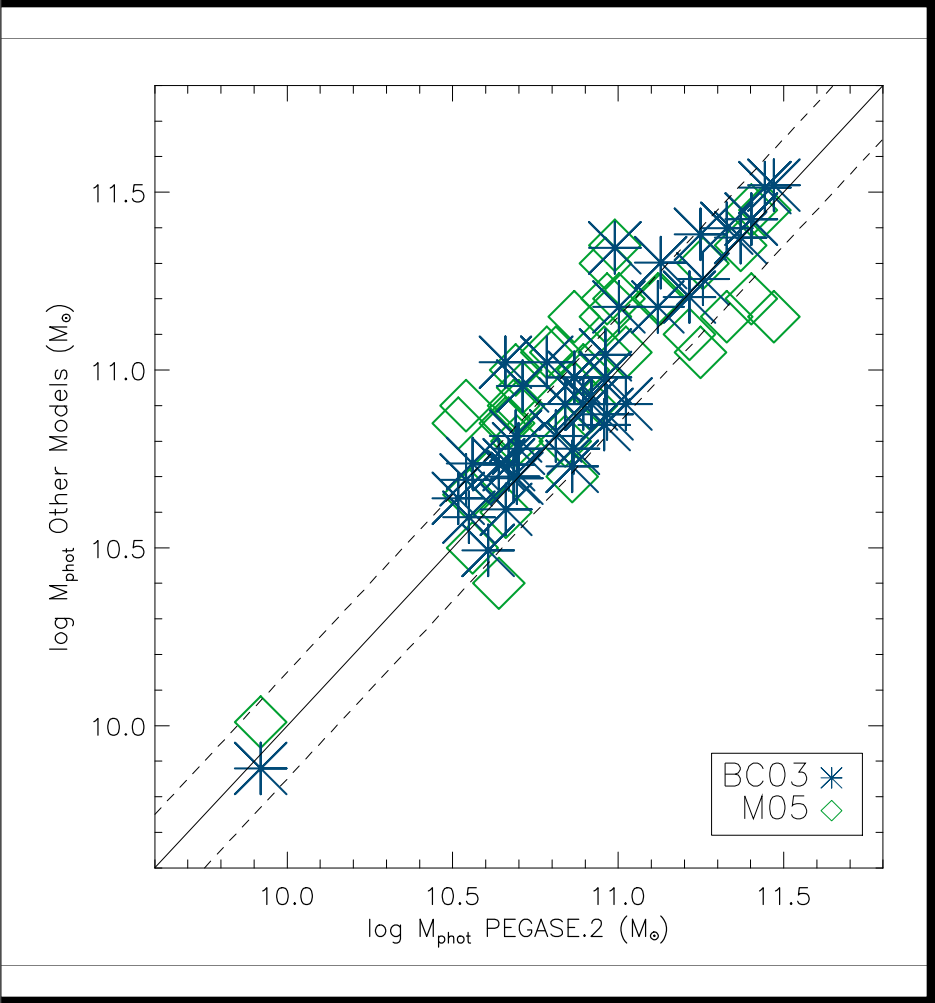
•3 codes implement this phase in a different way. Soon will have a fourth (Charlot & Bruzual 07)

•CSPs based on both PEGASE.2 , Bruzual&Charlot (BC03) and Maraston (M05) models.



Maraston et al. 2005

Comparing different stellar population synthesis models determination of galaxy mass at z~1.

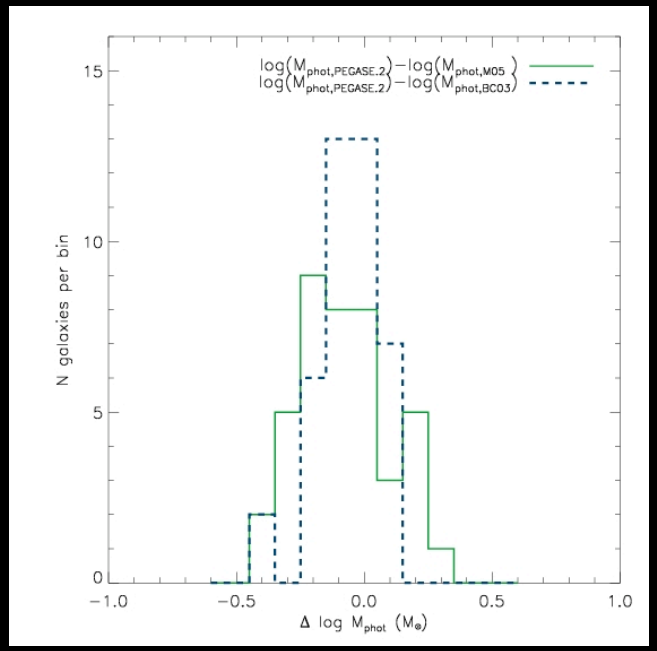


$< \Delta \log (M_{phot}/Msol) >$ = -0.06 BC03

= -0.08 M05

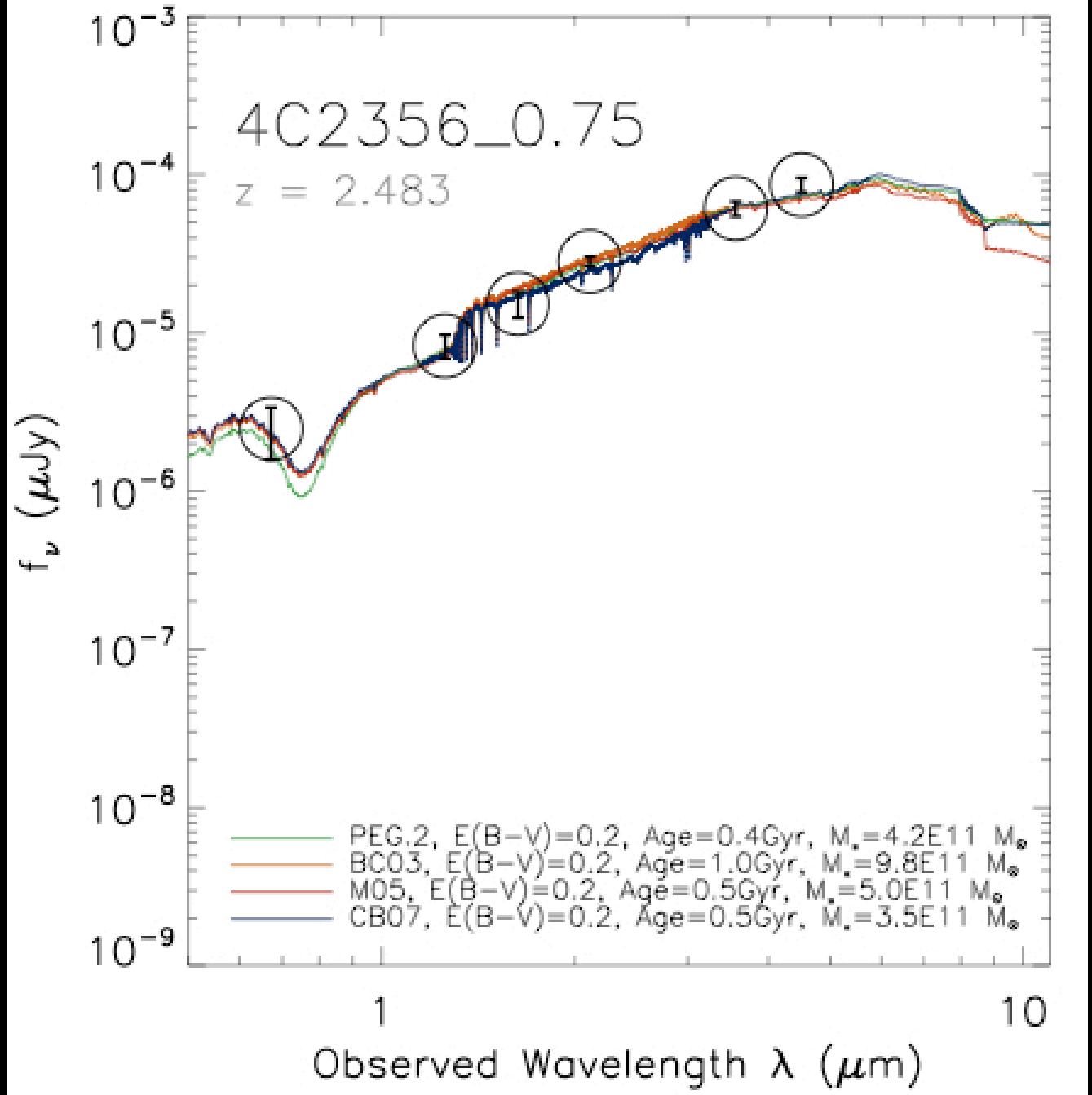
Stdev = 0.11, 0.17 dex

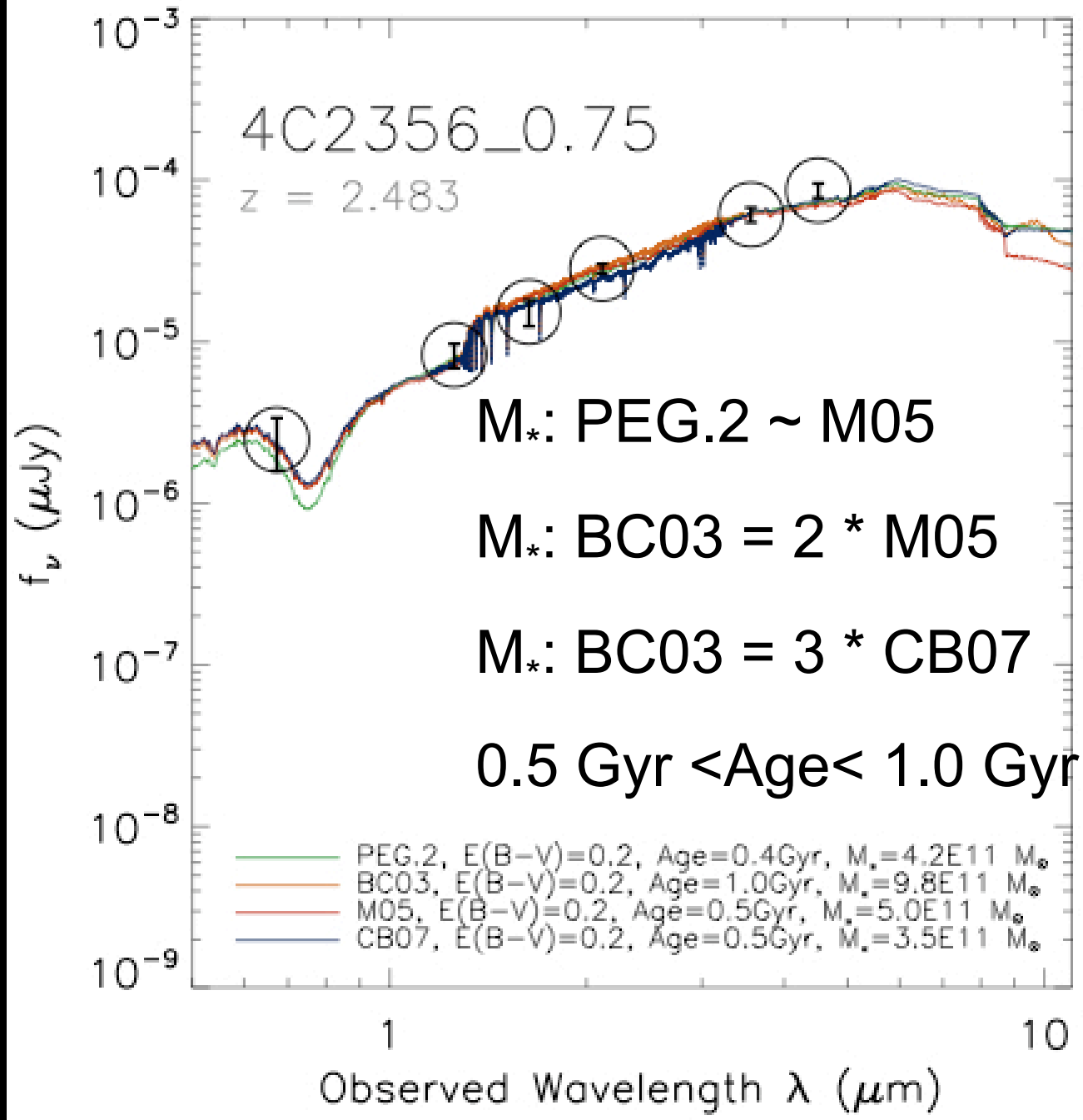
Typical errors= 40%= 0.15 dex

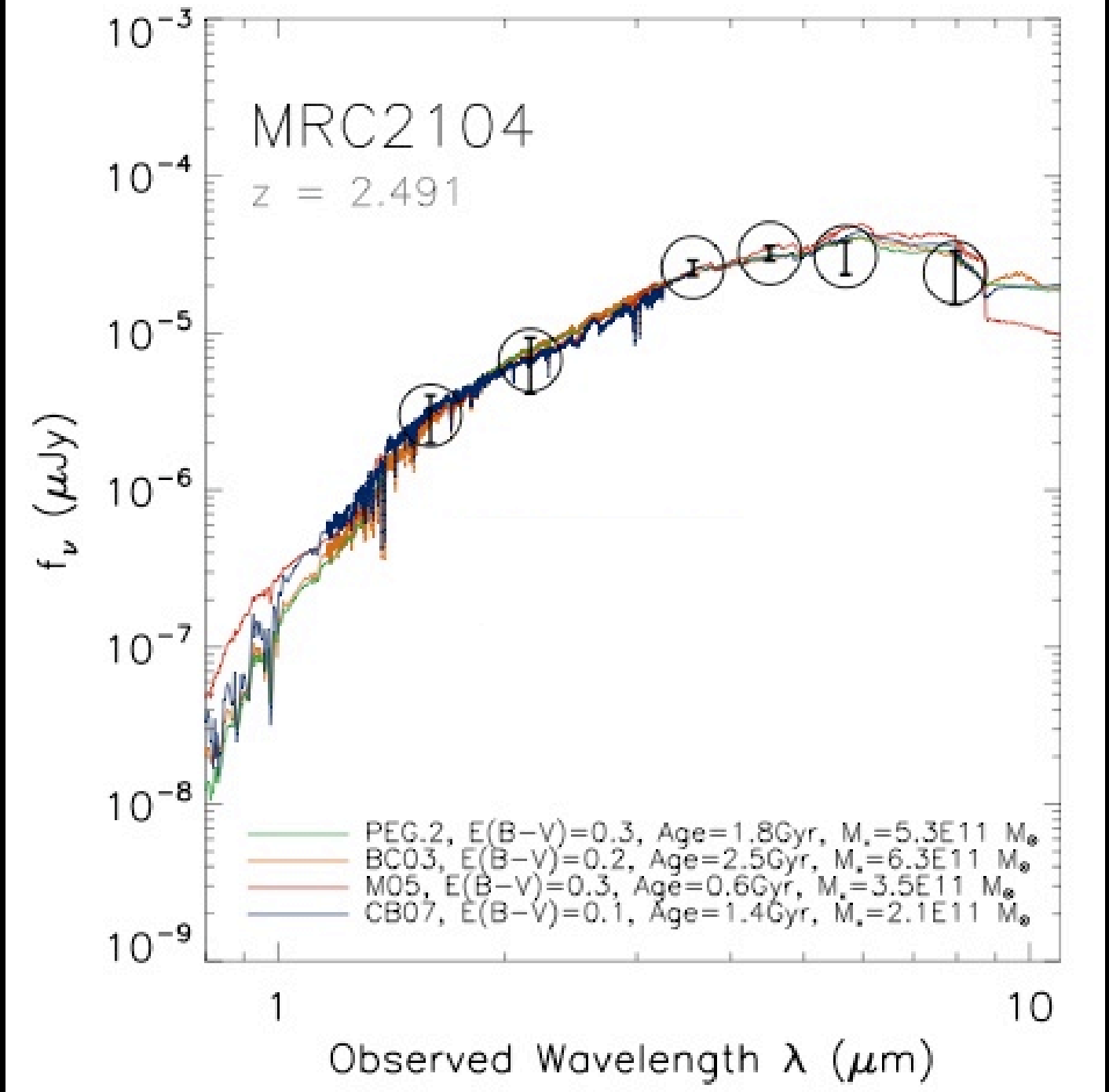


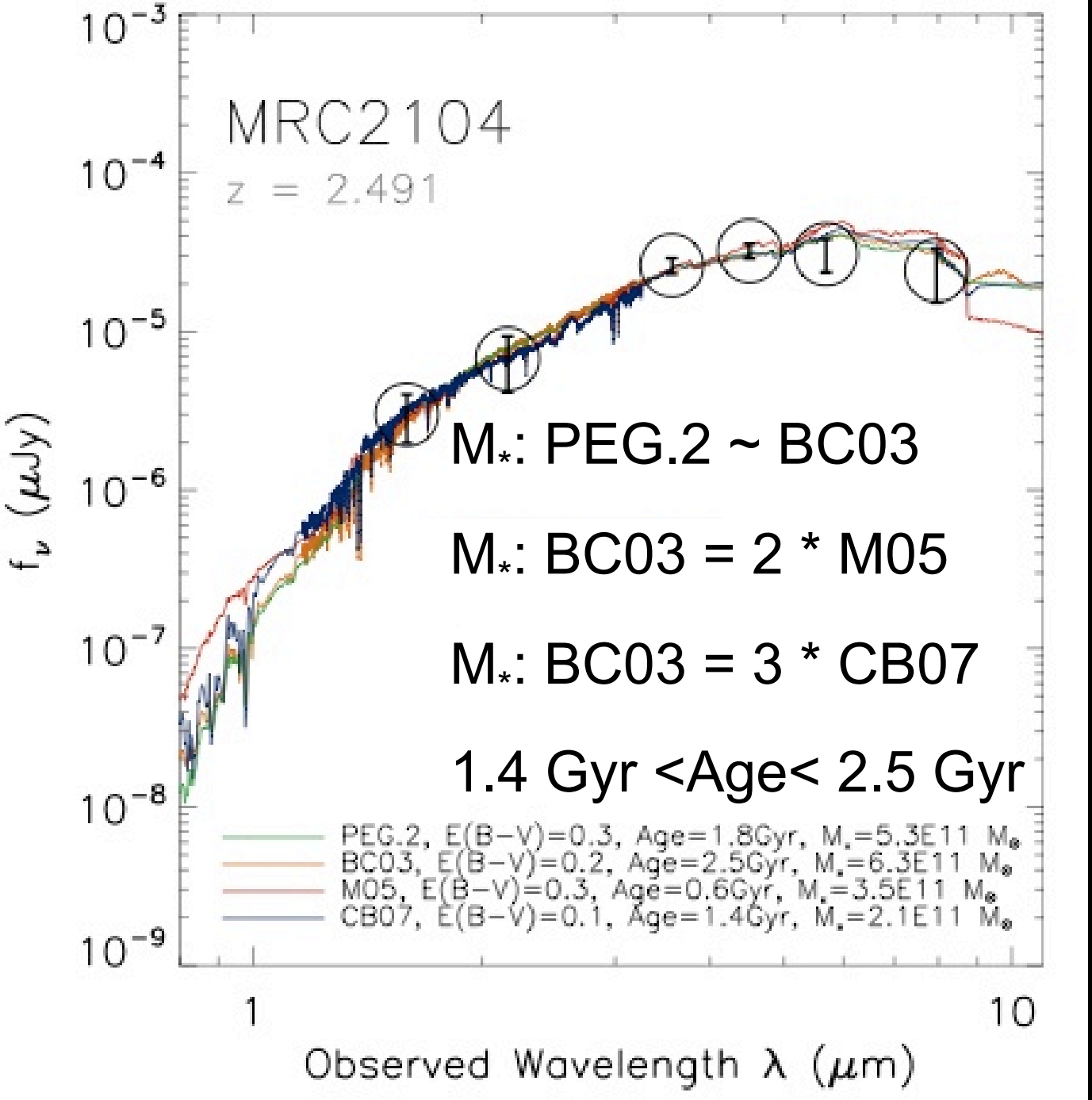
Rettura+ 2006

We find the overall difference in photometric-stellar masses of ETG galaxies at z~1 NOT to be striking


4C2356_0.75
z = 2.483
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
f_ν (μJy)
PEG.2, E(B−V)=0.2, Age=0.4Gyr, M$_*$=4.2E11 M$_\odot$
BC03, E(B−V)=0.2, Age=1.0Gyr, M$_*$=9.8E11 M$_\odot$
M05, E(B−V)=0.2, Age=0.5Gyr, M$_*$=5.0E11 M$_\odot$
CB07, E(B−V)=0.2, Age=0.5Gyr, M$_*$=3.5E11 M$_\odot$
1
10
Observed Wavelength λ (μm)


4C2356_0.75
z = 2.483
M*: PEG.2 ~ M05
M*: BC03 = 2 * M05
M*: BC03 = 3 * CB07
0.5 Gyr <Age< 1.0 Gyr
PEG.2, E(B−V)=0.2, Age=0.4Gyr, M*=4.2E11 M⊙
BC03, E(B−V)=0.2, Age=1.0Gyr, M*=9.8E11 M⊙
M05, E(B−V)=0.2, Age=0.5Gyr, M*=5.0E11 M⊙
CB07, E(B−V)=0.2, Age=0.5Gyr, M*=3.5E11 M⊙
f_ν (μJy)
Observed Wavelength λ (μm)


MRC2104
z = 2.491
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
f_ν (μJy)
PEG.2, E(B−V)=0.3, Age=1.8Gyr, M_*=5.3E11 $M_\odot$
BC03, E(B−V)=0.2, Age=2.5Gyr, M_*=6.3E11 $M_\odot$
M05, E(B−V)=0.3, Age=0.6Gyr, M_*=3.5E11 $M_\odot$
CB07, E(B−V)=0.1, Age=1.4Gyr, M_*=2.1E11 $M_\odot$
1
10
Observed Wavelength λ (μm)


MRC2104
z = 2.491
M*: PEG.2 ~ BC03
M*: BC03 = 2 * M05
M*: BC03 = 3 * CB07
1.4 Gyr <Age< 2.5 Gyr
PEG.2, E(B−V)=0.3, Age=1.8Gyr, M*=5.3E11 M⊙
BC03, E(B−V)=0.2, Age=2.5Gyr, M*=6.3E11 M⊙
M05, E(B−V)=0.3, Age=0.6Gyr, M*=3.5E11 M⊙
CB07, E(B−V)=0.1, Age=1.4Gyr, M*=2.1E11 M⊙
10^-3
10^-4
10^-5
10^-6
10^-7
10^-8
10^-9
f_ν (μJy)
1
10
Observed Wavelength λ (μm)

Objectives

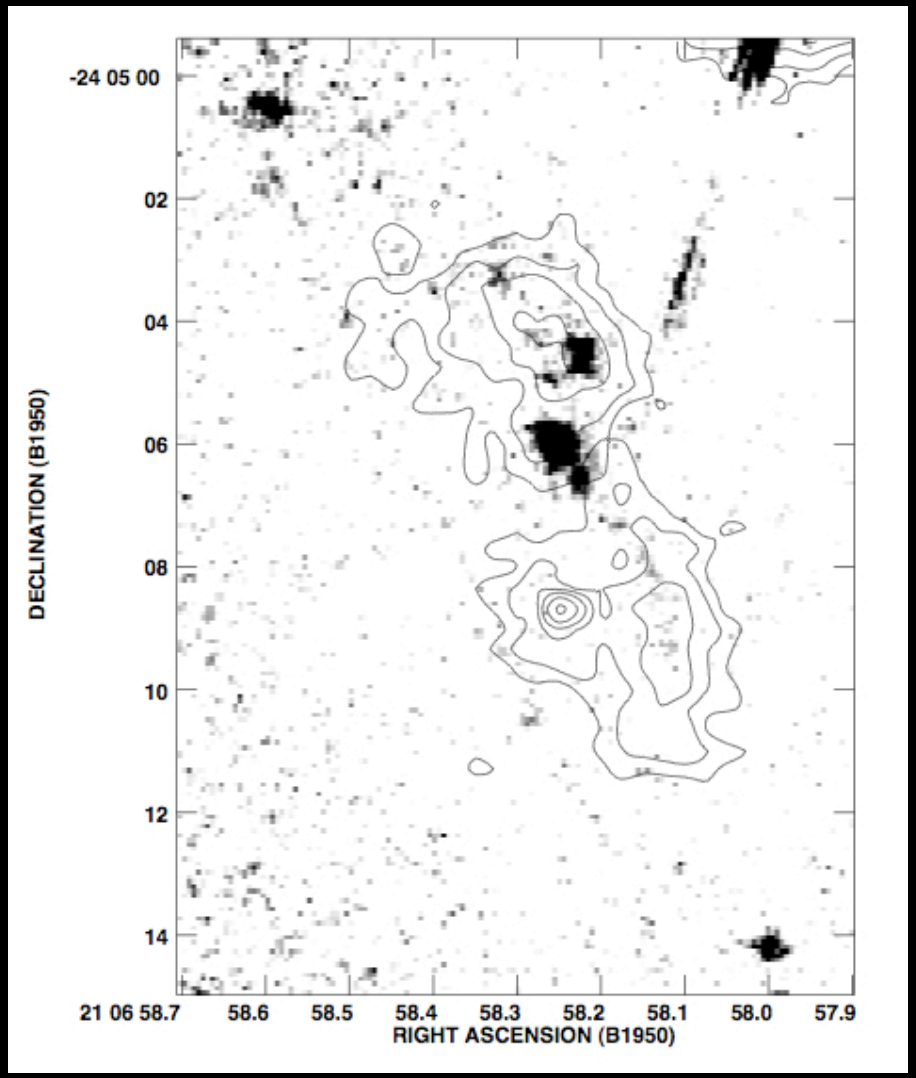
A multi-wavelength survey enables us to measure for the first time the masses and the ages of highz Radio Galaxy hosts.

The use of different Stellar Population models will also enable to understand how robust our results are

The extension of this analysis to our entire sample will directly and more robustly test models of formation and evolution of the most massive systems at every epoch.

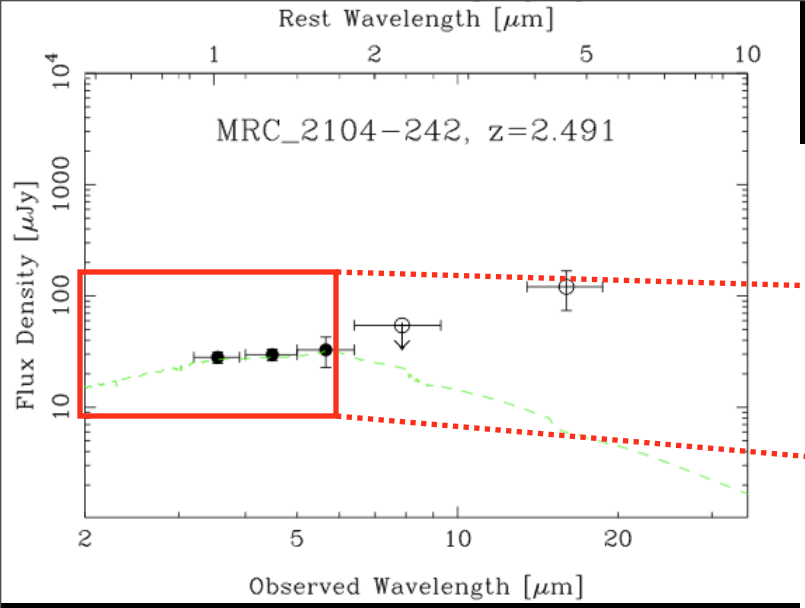
Danke

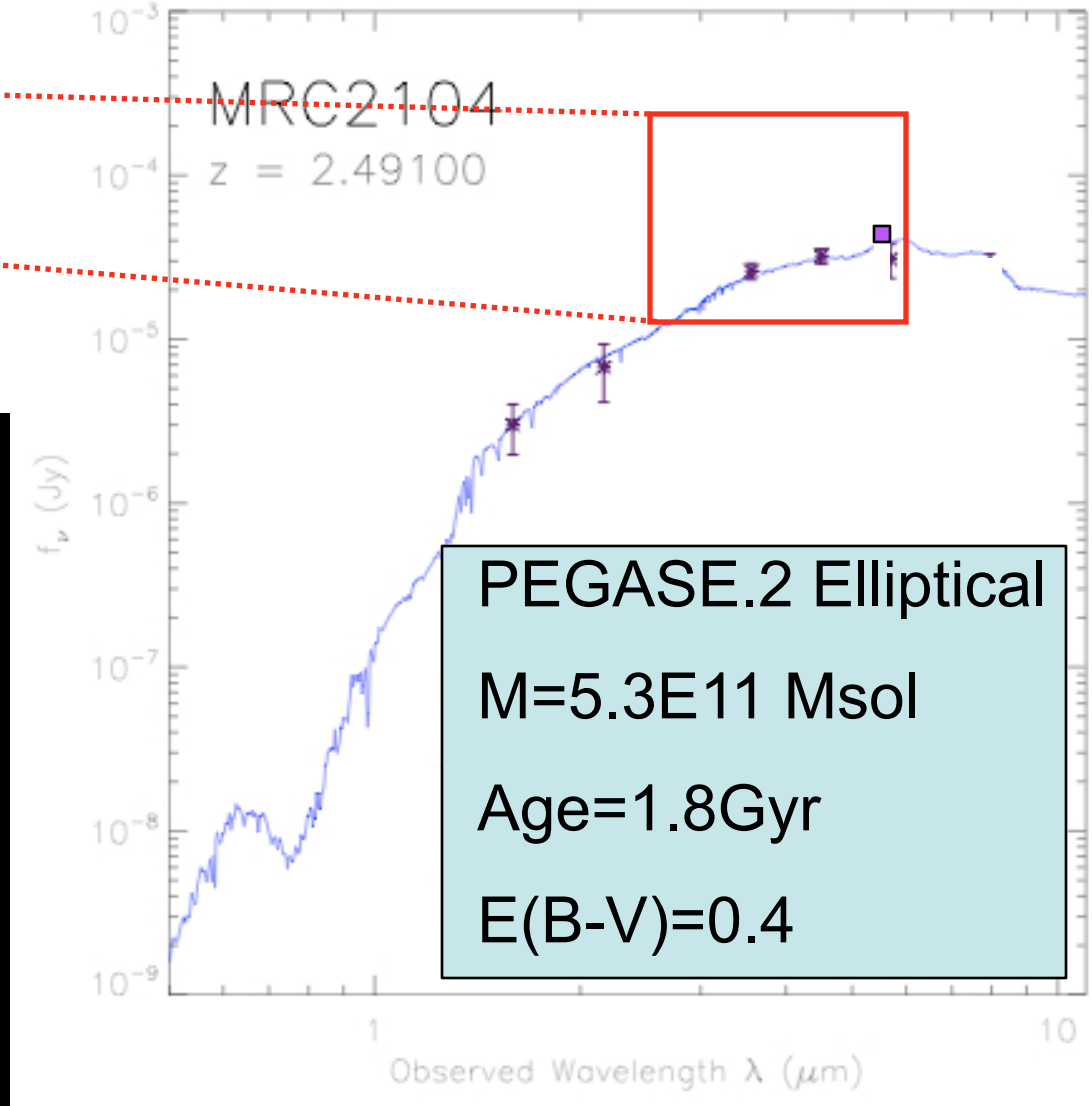
MRC2104



NICMOS image + Lyα contours (Pentericci et al. 1999)

Using SpecPOL to disentangle the scattered quasar contribution in the blue (Vernet+2001)





PEGASE.2 Elliptical

M=2.5E11 Msol

z_f= 10

(Seymour+07)

PEGASE.2 Elliptical

M=5.3E11 Msol

Age=1.8Gyr

E(B-V)=0.4

Rettura et al. in prep