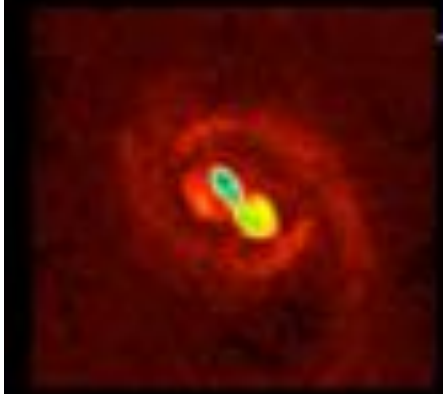
Do z~0 AGN Show Signatures of Black Hole Growth Feedback?



Prajval Shastri

Indian Institute of Astrophysics, Bengaluru

Mike Dopita (ANU)
Rebecca Davies (ANU)
Lisa Kewley (ANU)
Julie Banfield (ANU)
Elise Hampton (ANU)
Adam Thomas (ANU)
Brent Groves (ANU)
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Preeti Kharb (TIFR)
MN Sundar (Jain University)
Fergus Longbottom (ANU)
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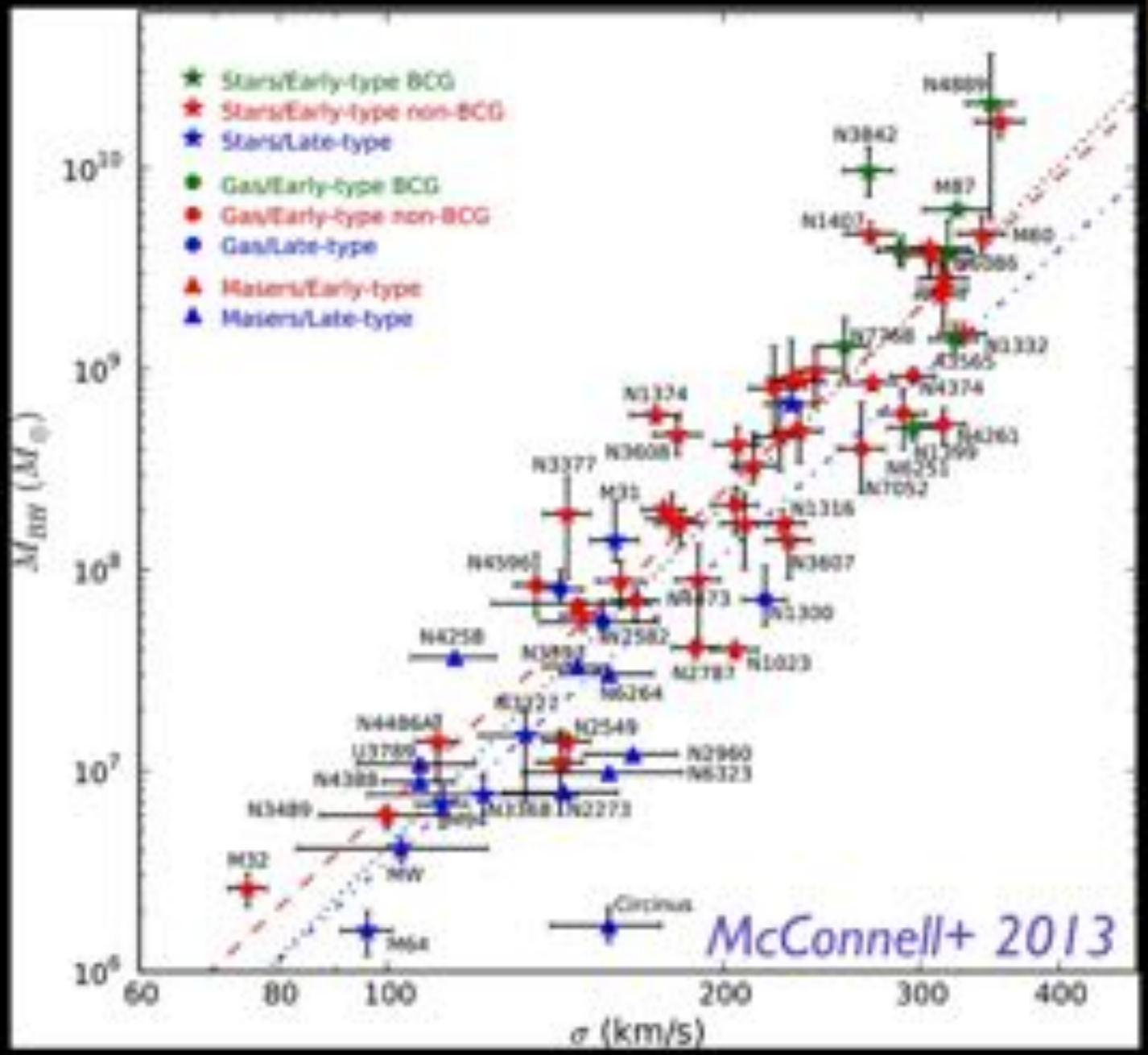
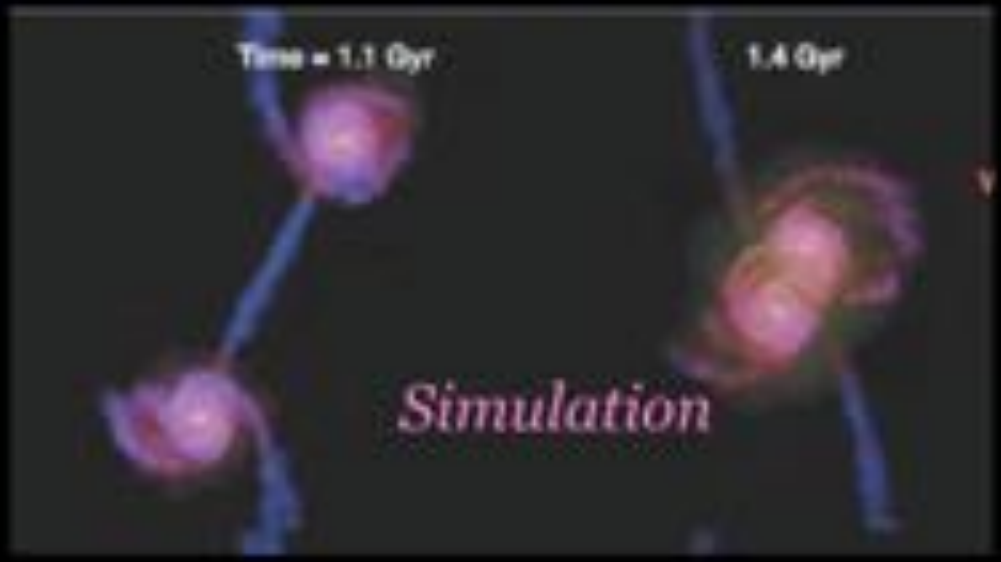
Jaya Maithil (U Wyoming)
Vikram Radhakrishnan (Leiden U)
Maitrayee Gupta (CAMK)
Swayamtrupta Panda (NIIT)
Ingyin Zaw (NYU)
Shweta Srivastava (PRL)


Hatu peak, Narkanda, Hima
Ajay Talwar & Pankaj Sharma


Stars/Early-type BCG
Stars/Early-type non-BCG
Stars/Late-type
Gas/Early-type BCG
Gas/Early-type non-BCG
Gas/Late-type
Masers/Early-type
Masers/Late-type
M_{BH} ($M_\odot$)
10^{10}
10^9
10^8
10^7
10^6
60
80
100
200
300
400
σ (km/s)
N4889
N3842
M87
N1407
M60
N1332
N4374
N1374
N3608
N3377
M31
N1316
N3607
N4596
N1300
N4258
N2787
N1023
N6264
N2549
N2960
N6323
N3489
N2273
M32
MW
M64
Circinus
McConnell+ 2013

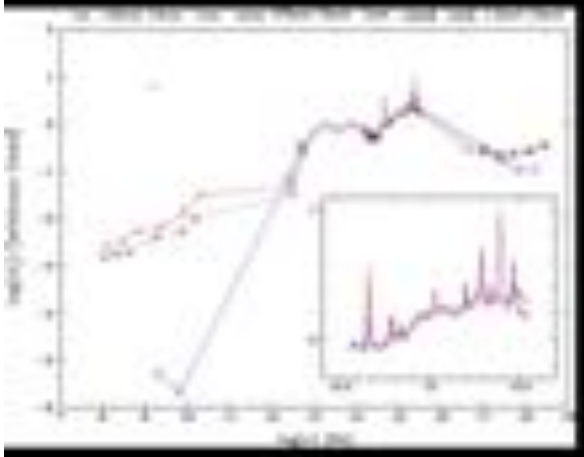
TWO ways in which SMBHs can increase mass:

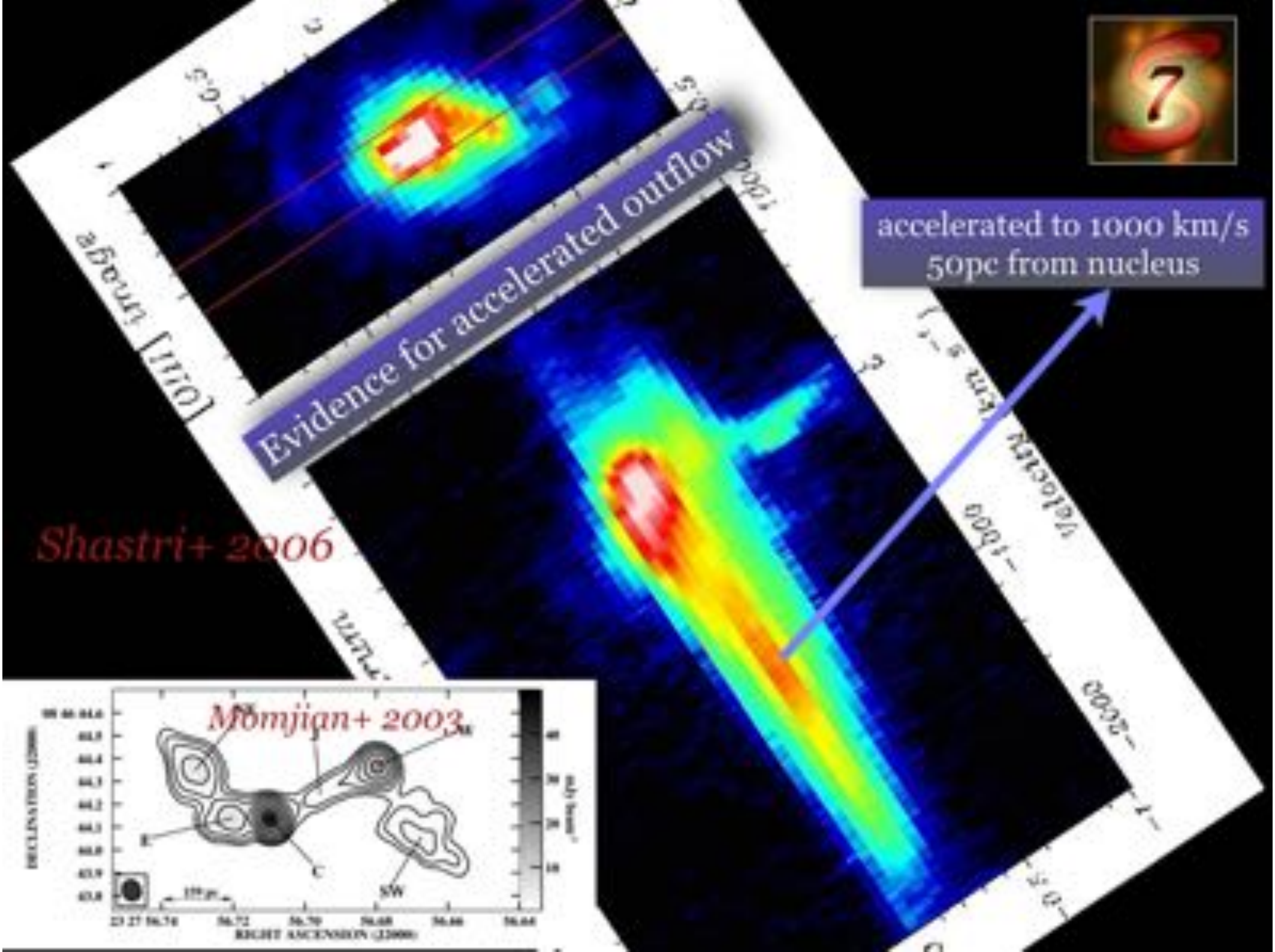
a. Growth via galaxy and SMBH merger



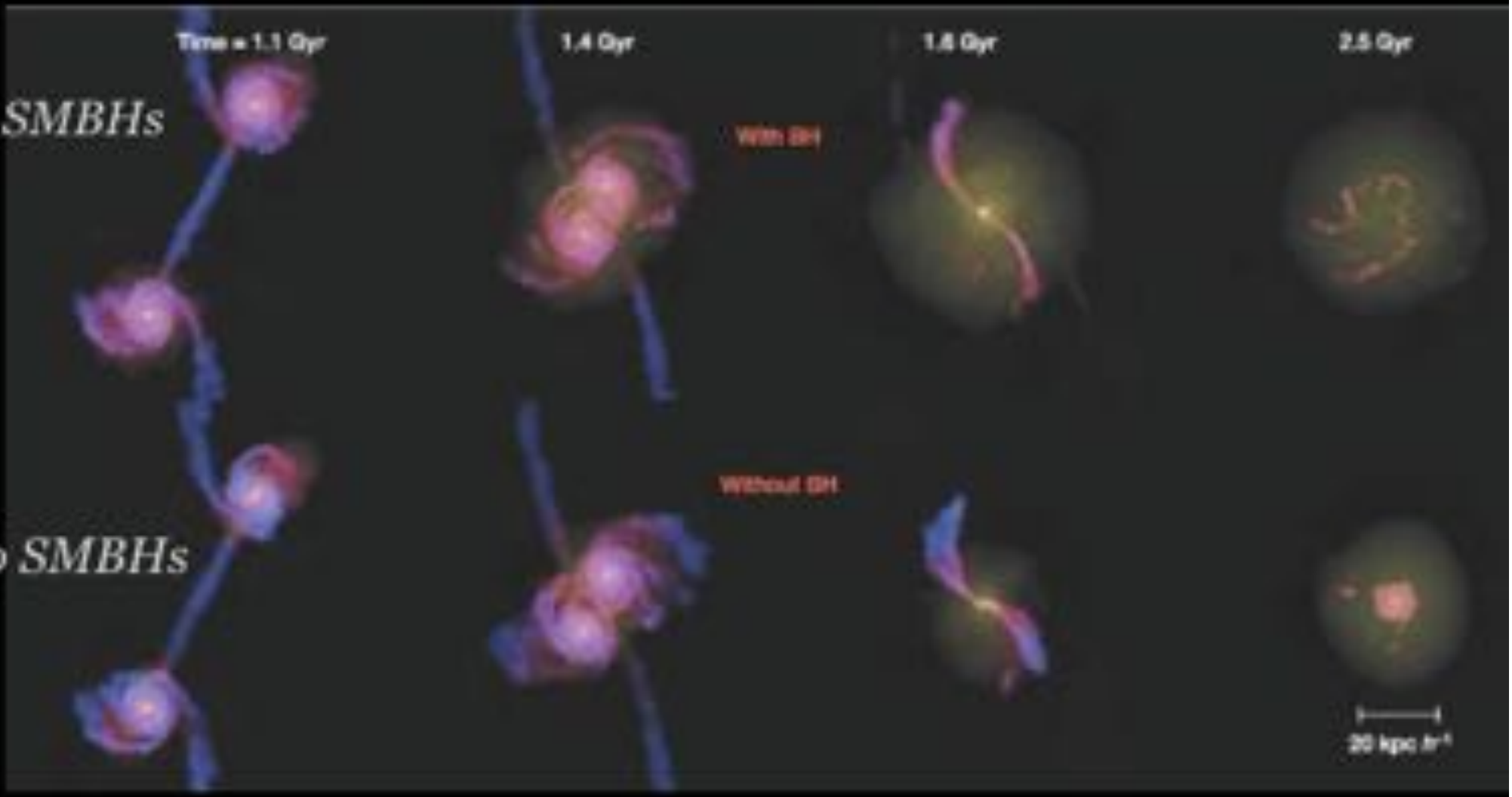
b. Growth via accretion of matter

Gallimore 1997




Evidence for accelerated outflow
accelerated to 1000 km/s
50pc from nucleus
Shastri+ 2006
Mundell+ 2003
Momjian+ 2003
SW

di Matteo+ 2005



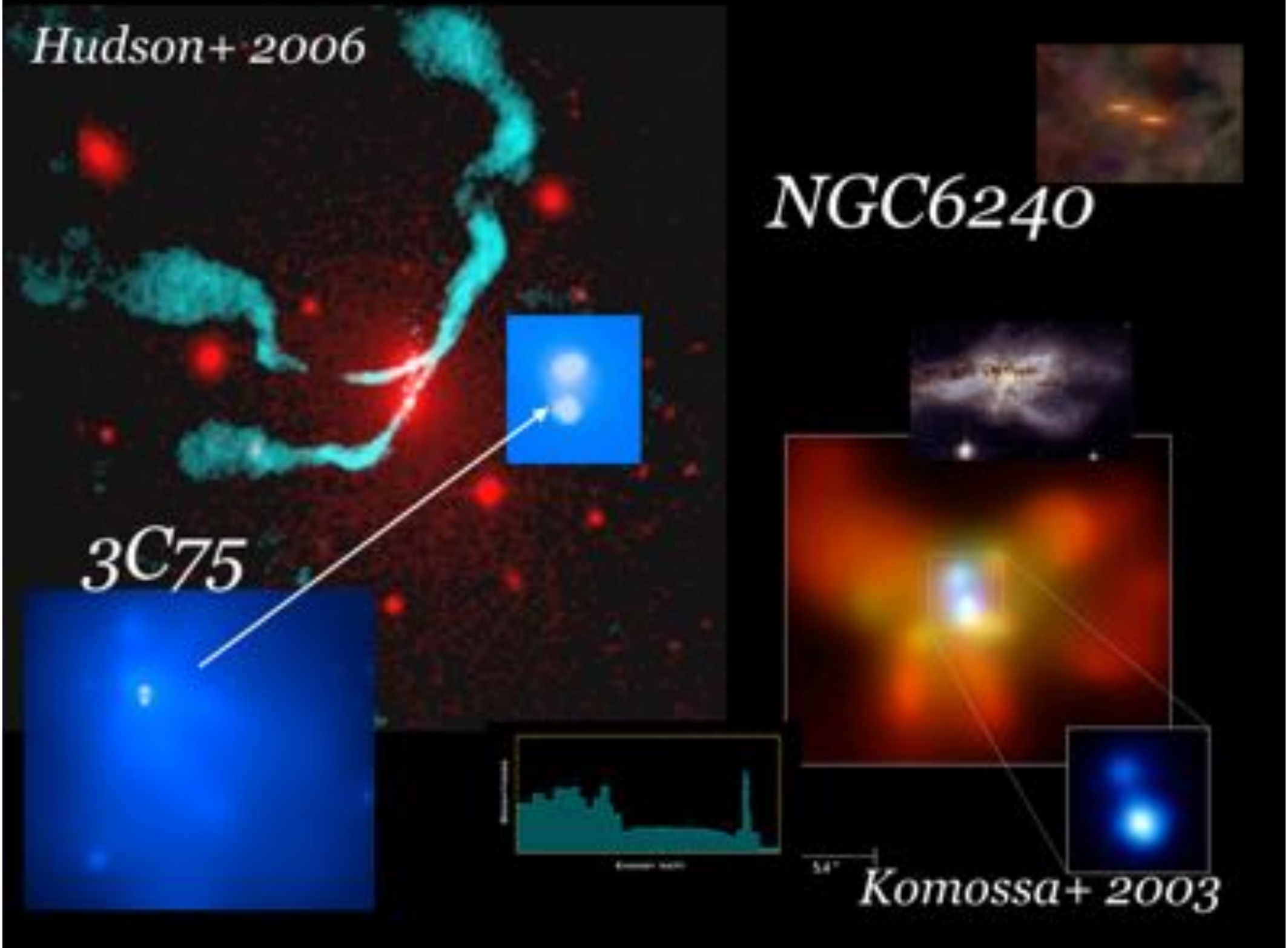
w/ SMBHs

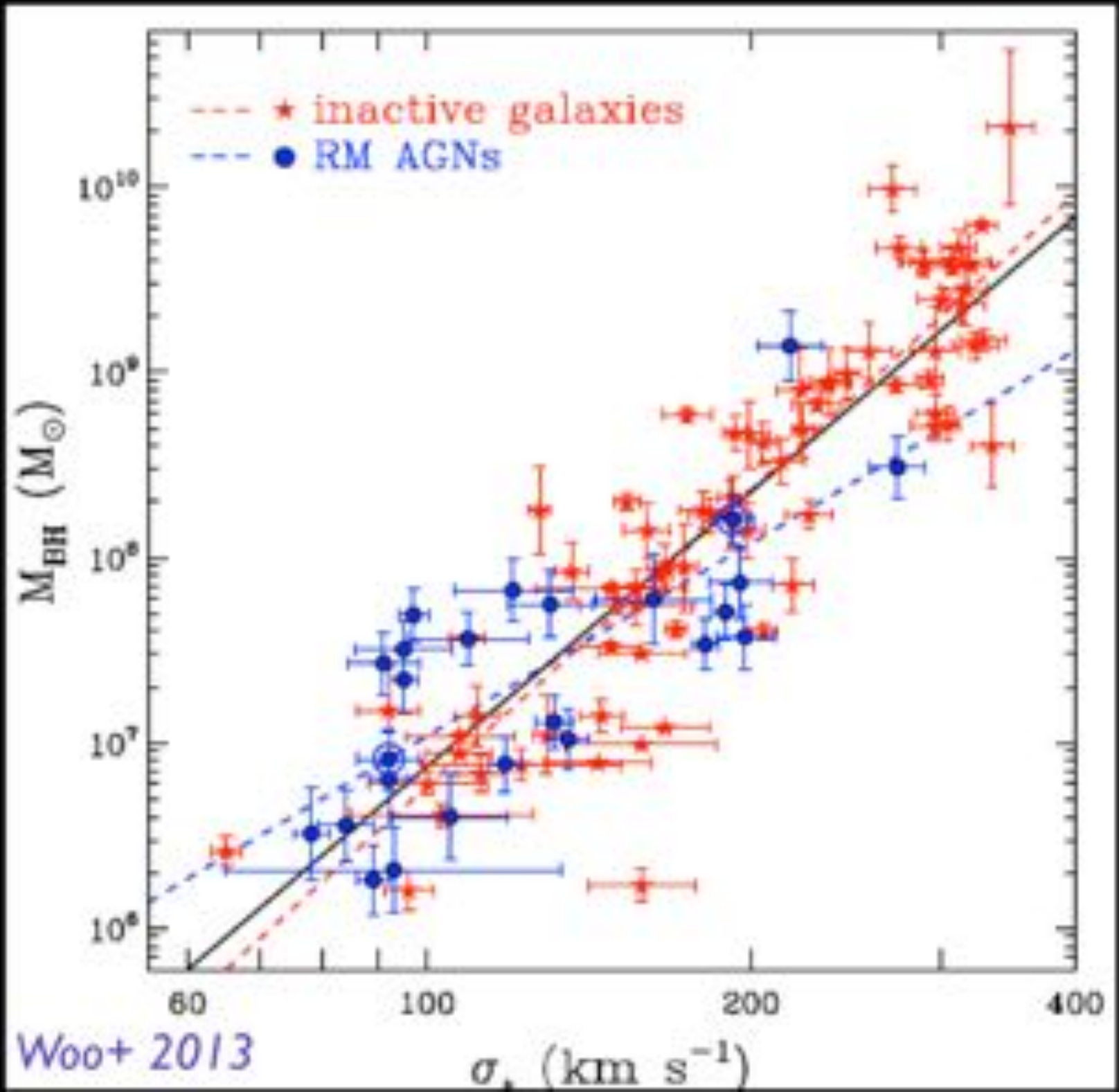
w/o SMBHs

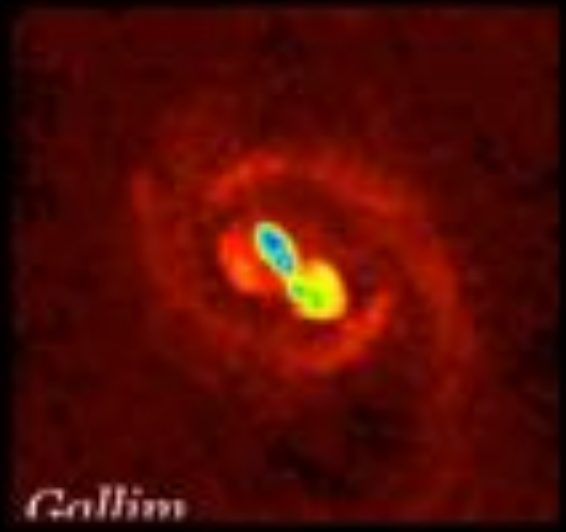
colour=> temperature; brightness => density

Results consistent with correlation between M_{BH} & M_{bulge}


Hubble Heritage
Hubble Heritage
Hubble Heritage

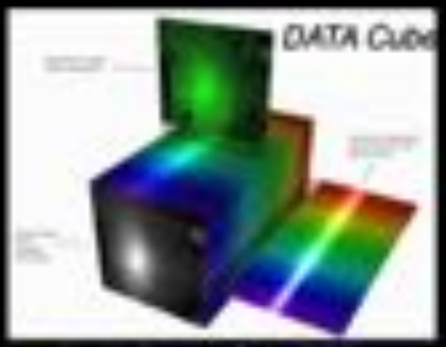

Hudson+ 2006
NGC6240
3C75
Komossa+ 2003


inactive galaxies
RM AGNs
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
M_{BH} ($M_\odot$)
60
100
200
400
σ_* (km s^{-1})
Woo+ 2013



- photoionization due to the AGN
- starformation activity
- chemical abundance in the inner host galaxy
- kinematics of the gaseous outflow
- interaction with the synchrotron jets

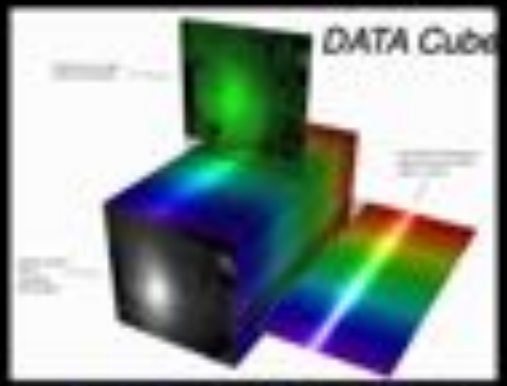
Siding Spring Southern Seyfert Spectroscopic Snapshot Survey



Sample:

Picked from the Veron-Cetty Veron catalouge of AGN by applying the following observational filters:

- *Declination < 10° N*
- *Redshift <0.02*
- *Galactic Latitude |bII| > 15° (soft cut off)*
- *Radio flux density >20mJy for most (all objects radio-detected*



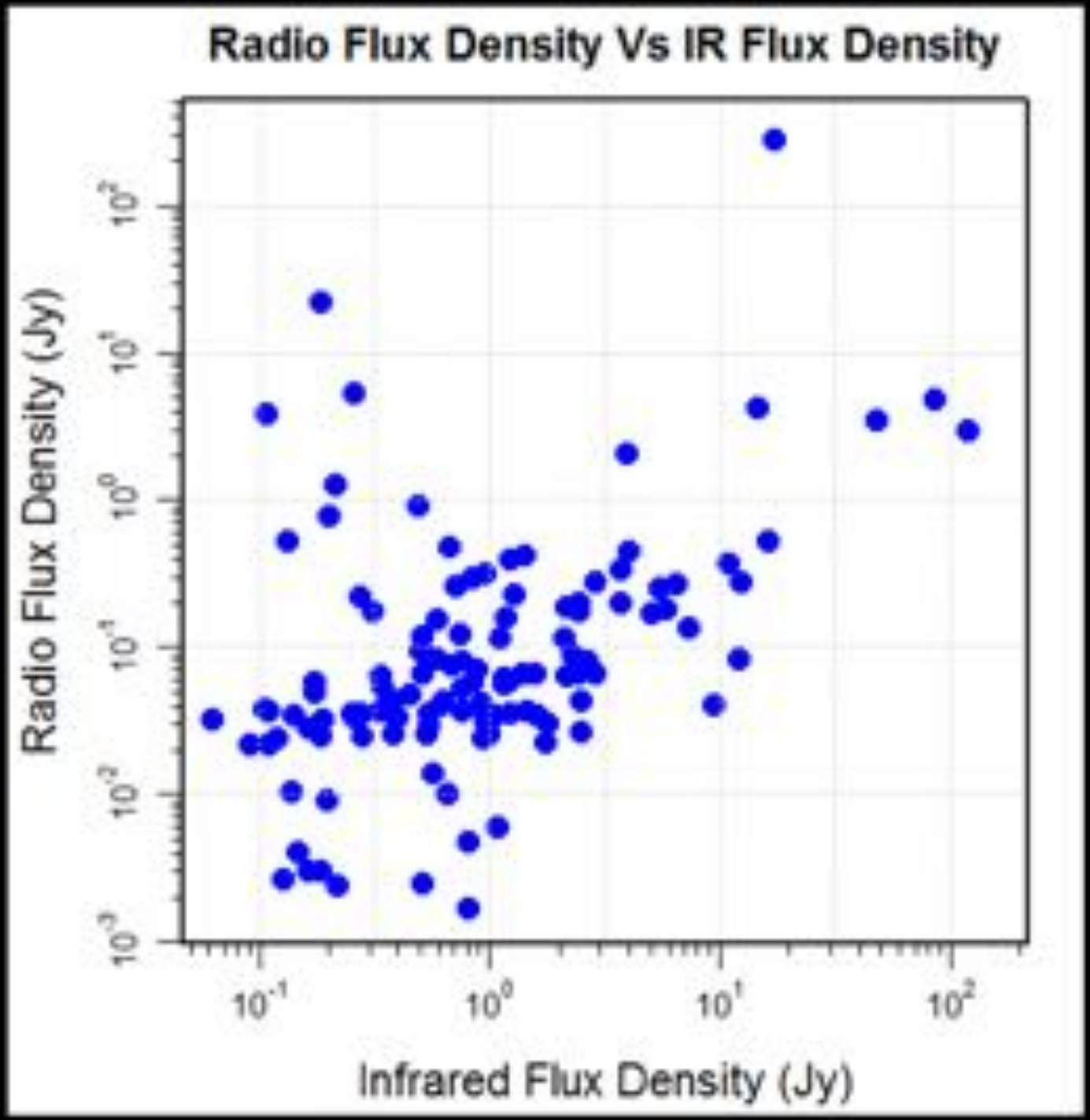
Extended Narrow-line regions imaged

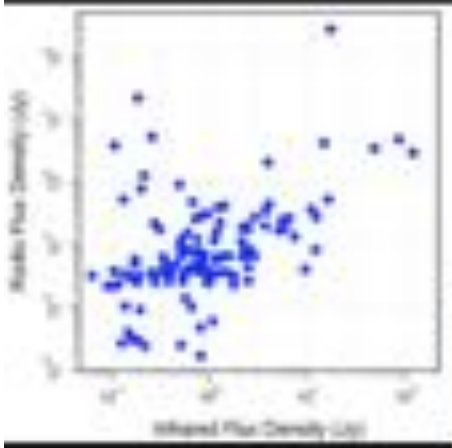
Results from

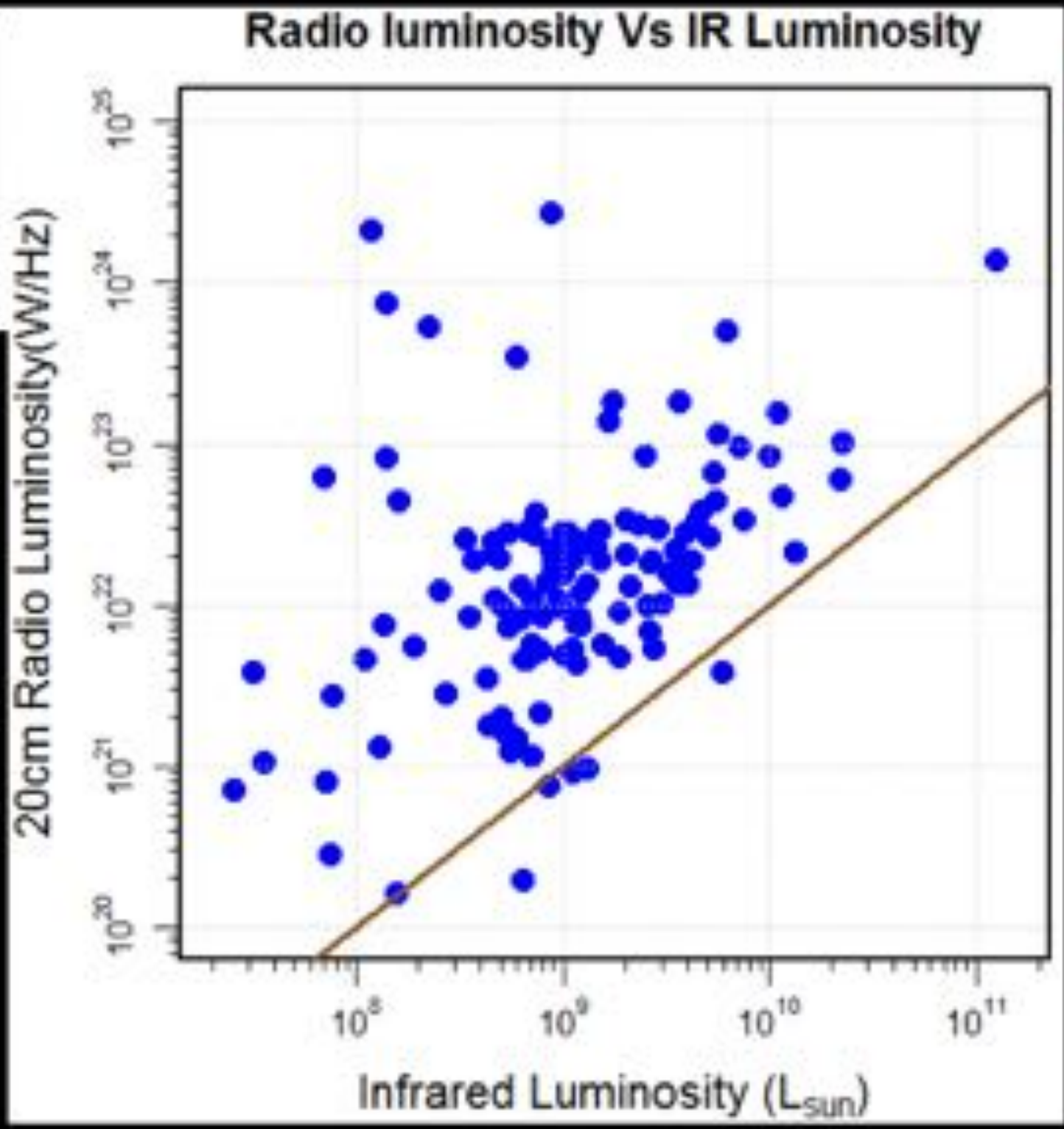
GMRT 610 & 1450MHz follow-up

by

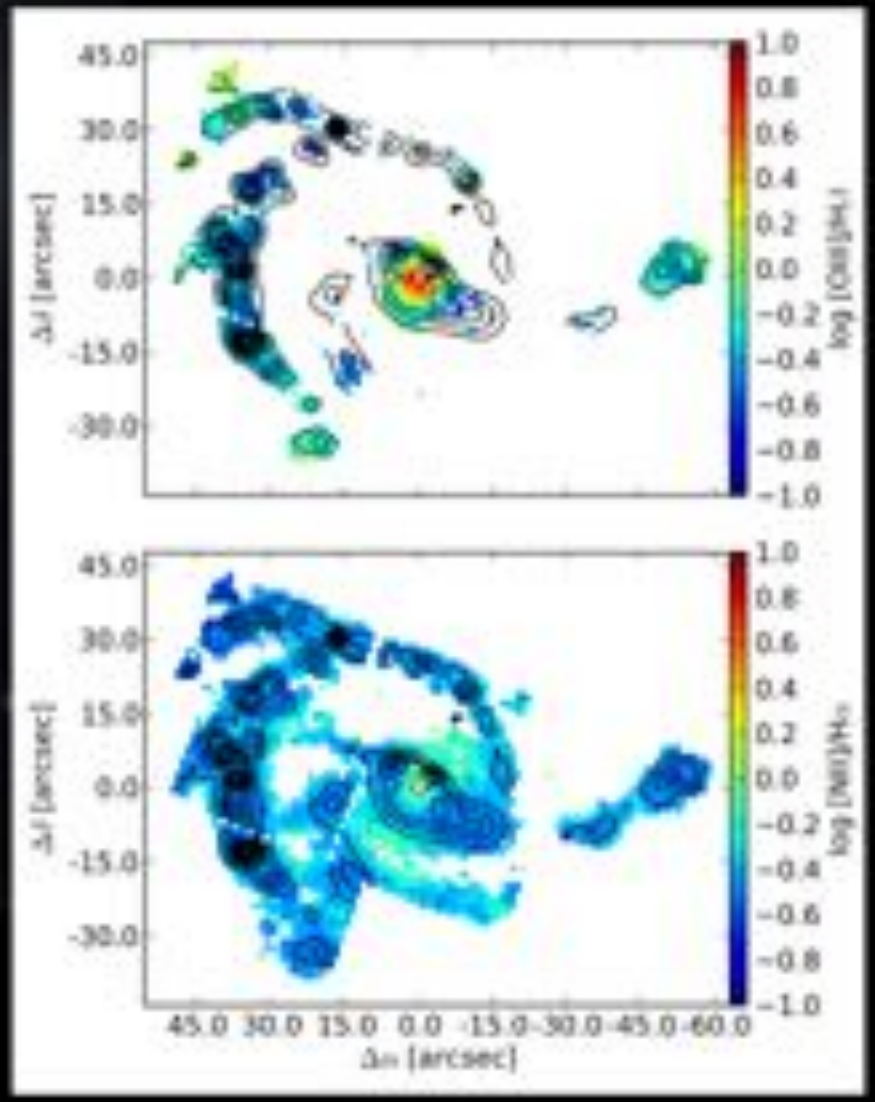
Preeti Kharb: talk later today

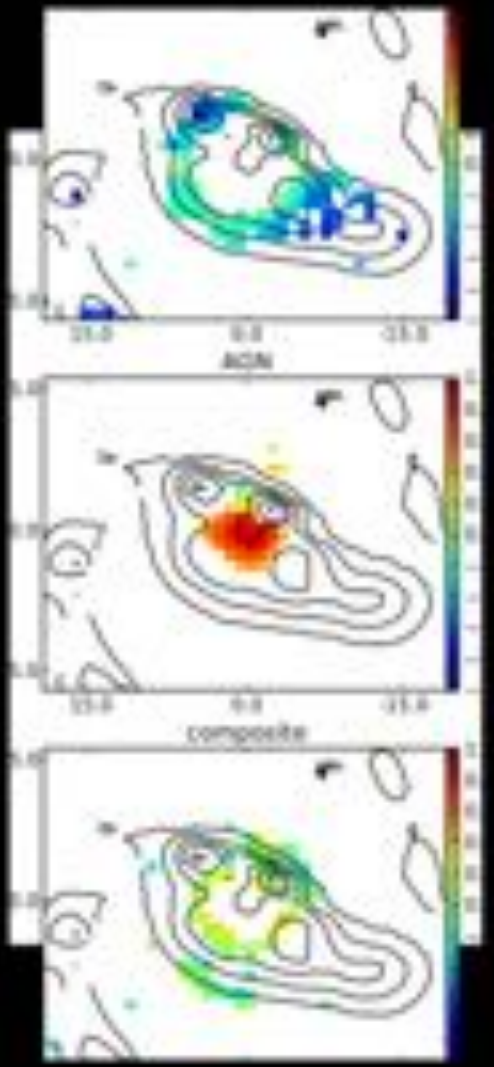

Radio Flux Density Vs IR Flux Density
Radio Flux Density (Jy)
Infrared Flux Density (Jy)
10^{-3}
10^{-2}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{-1}
10^{0}
10^{1}
10^{2}



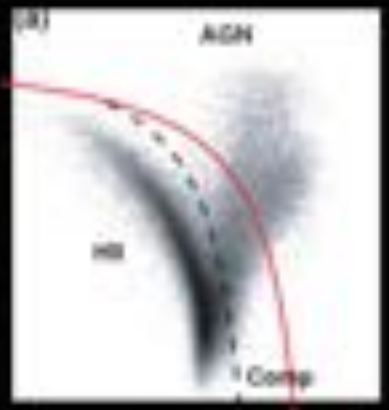

Radio luminosity Vs IR Luminosity
20cm Radio Luminosity(W/Hz)
10^{20}
10^{21}
10^{22}
10^{23}
10^{24}
10^{25}
10^{8}
10^{9}
10^{10}
10^{11}
Infrared Luminosity (L_{sun})

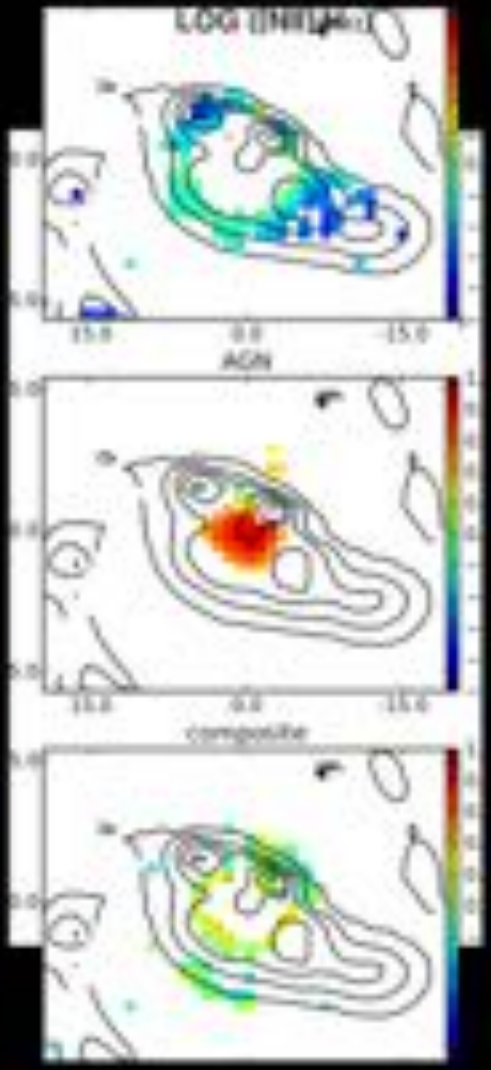
NGC5427

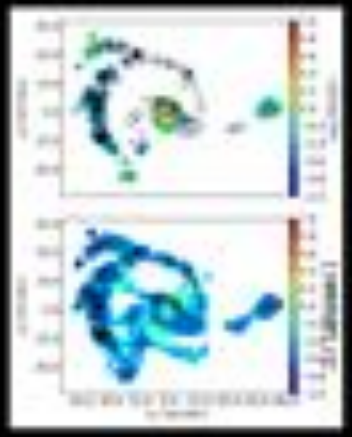

45.0
30.0
15.0
0.0
-15.0
-30.0
Δδ [arcsec]
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
log [OIII]/Hβ
log [NII]/Hα
45.0 30.0 15.0 0.0 -15.0 -30.0 -45.0 -60.0
Δα [arcsec]

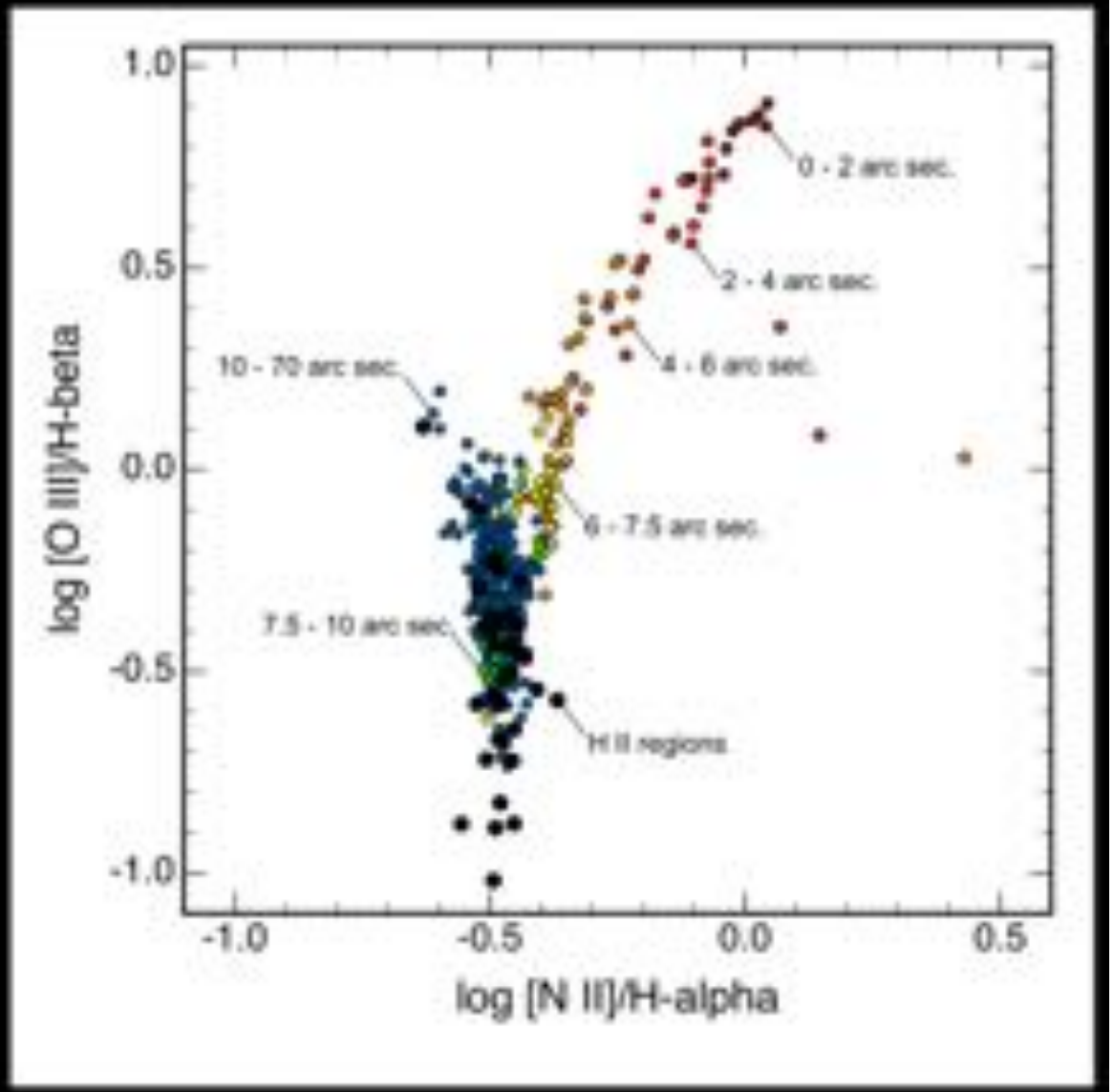

AGN
composite

NGC5427

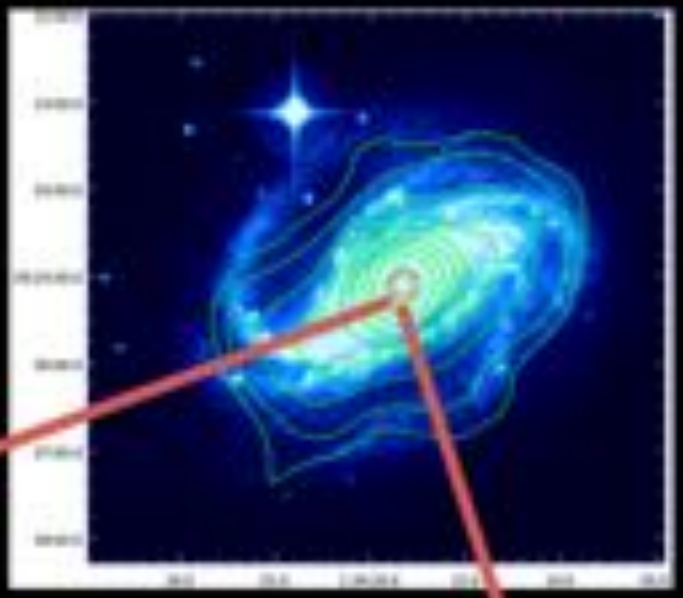

AGN
HII
Comp

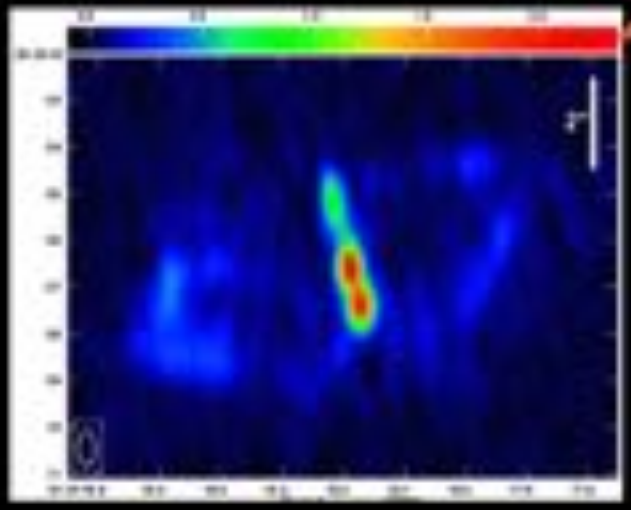

AGN
composite

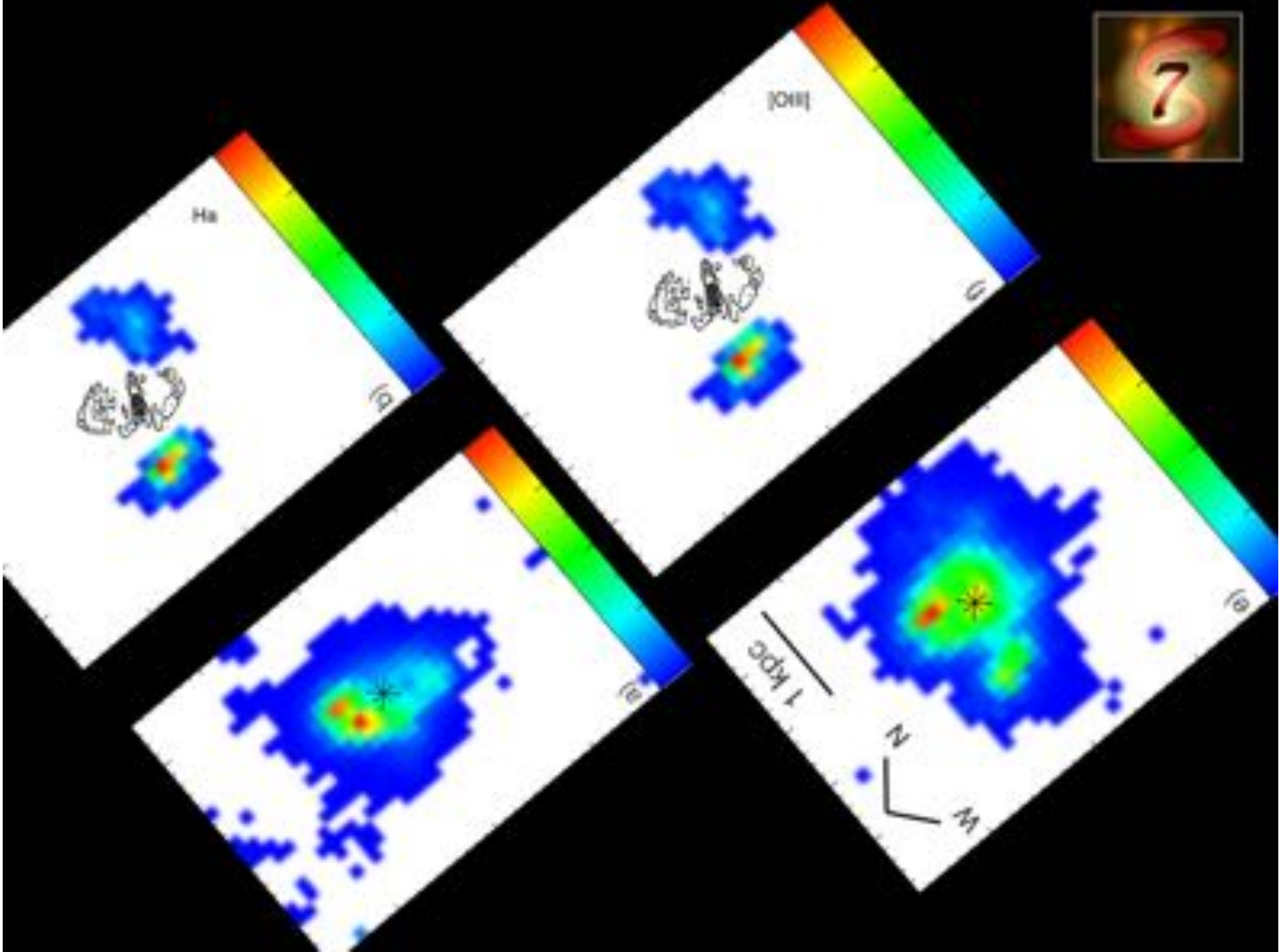


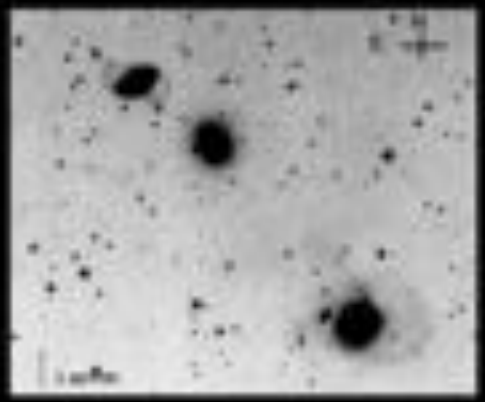

1.0
0.5
0.0
-0.5
-1.0
-1.0
-0.5
0.0
0.5
log [O III]/H-beta
log [N II]/H-alpha
0 - 2 arc sec.
2 - 4 arc sec.
4 - 6 arc sec.
6 - 7.5 arc sec.
7.5 - 10 arc sec.
10 - 70 arc sec.
H II regions

NGC613

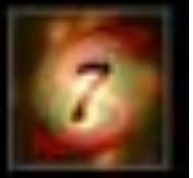




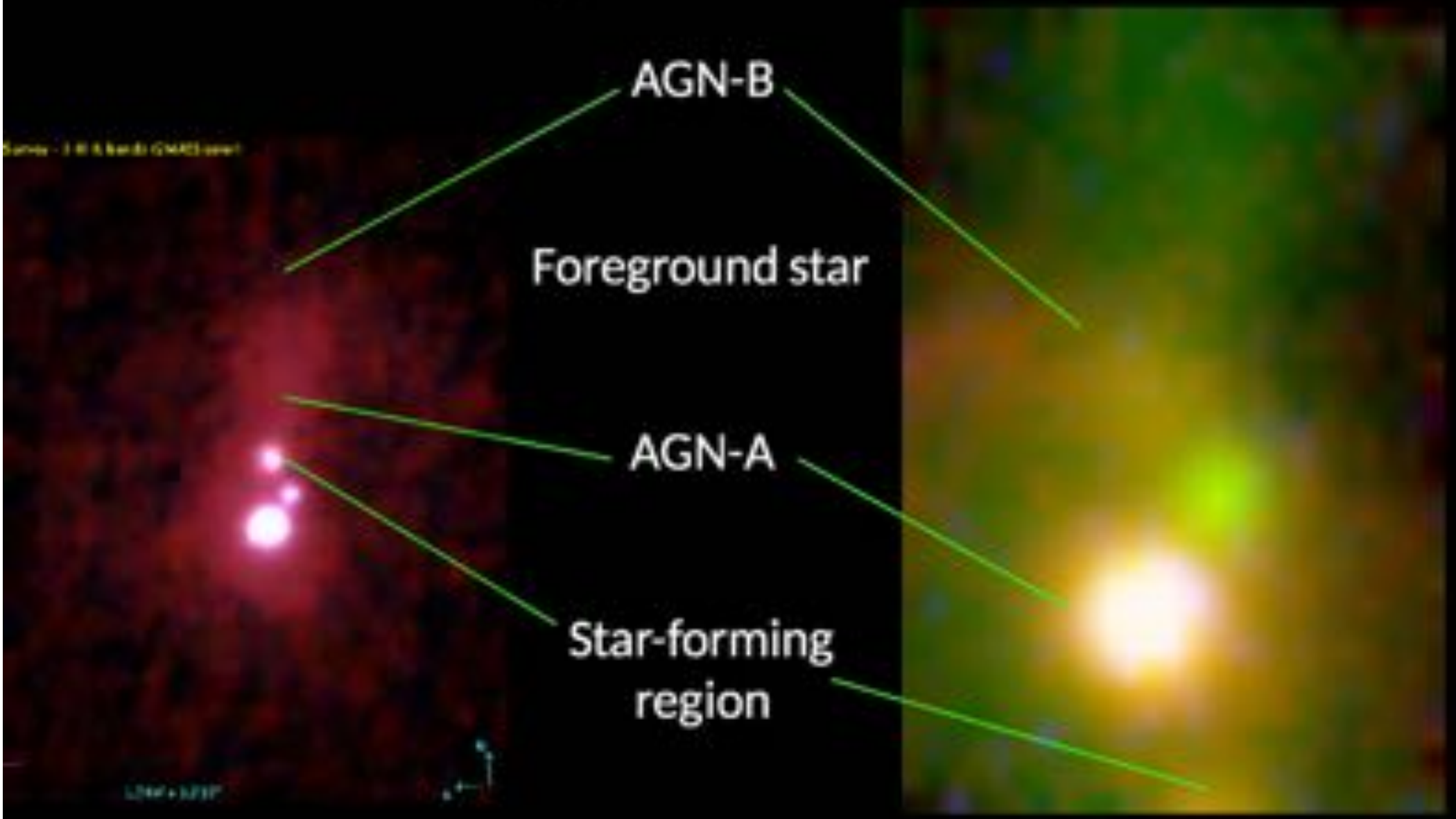

Hα
[OIII]
1 kpc
N
W



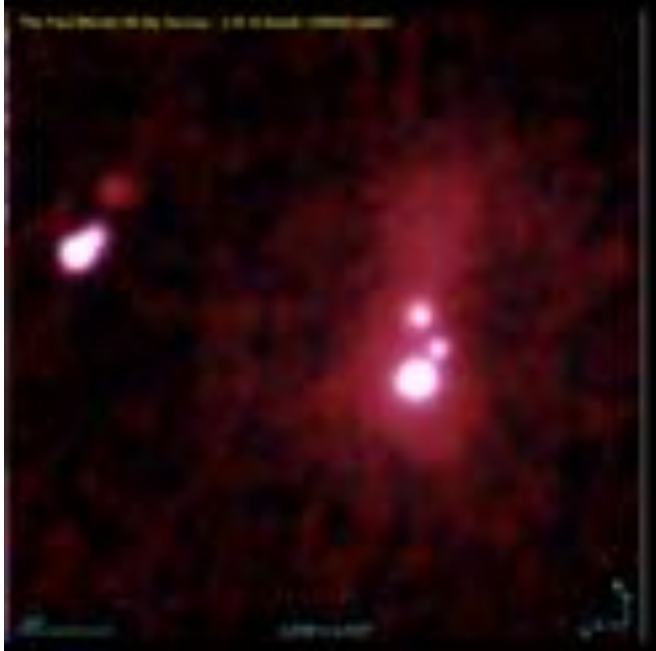
The Carafe Galaxy ESO202 G023

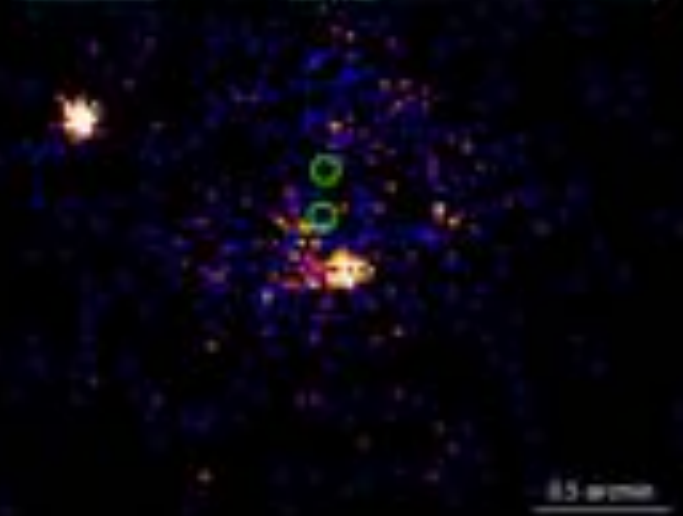


The Carafe Galaxy ESO202 G023



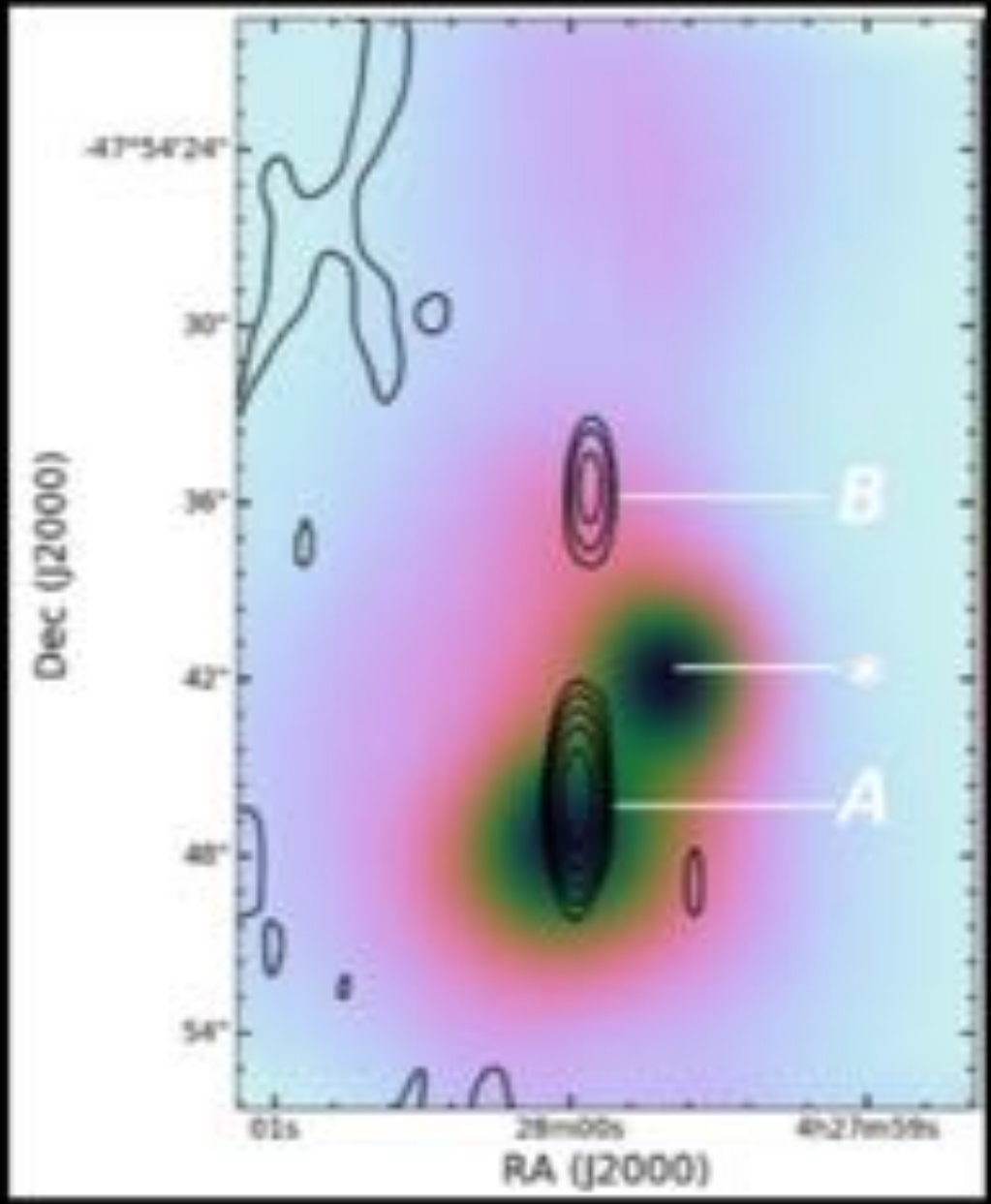
The Carafe Galaxy ESO202 G023



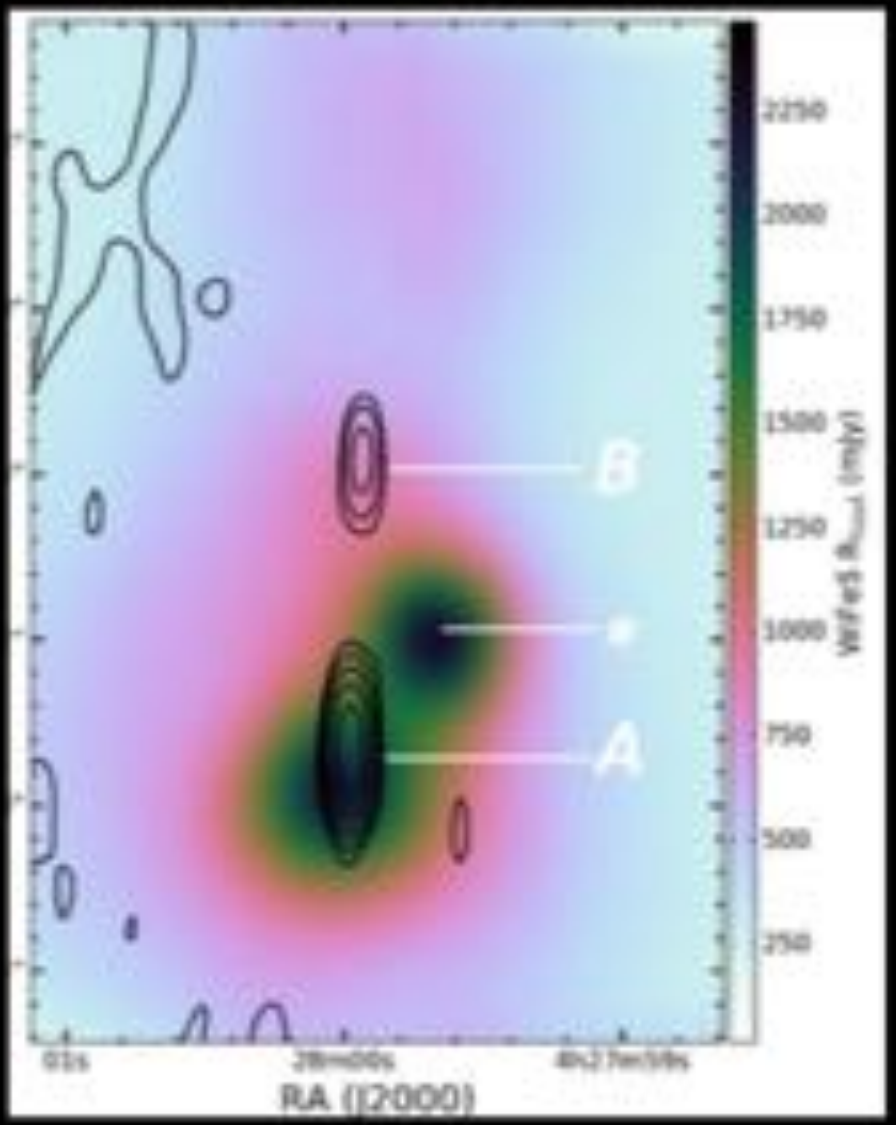


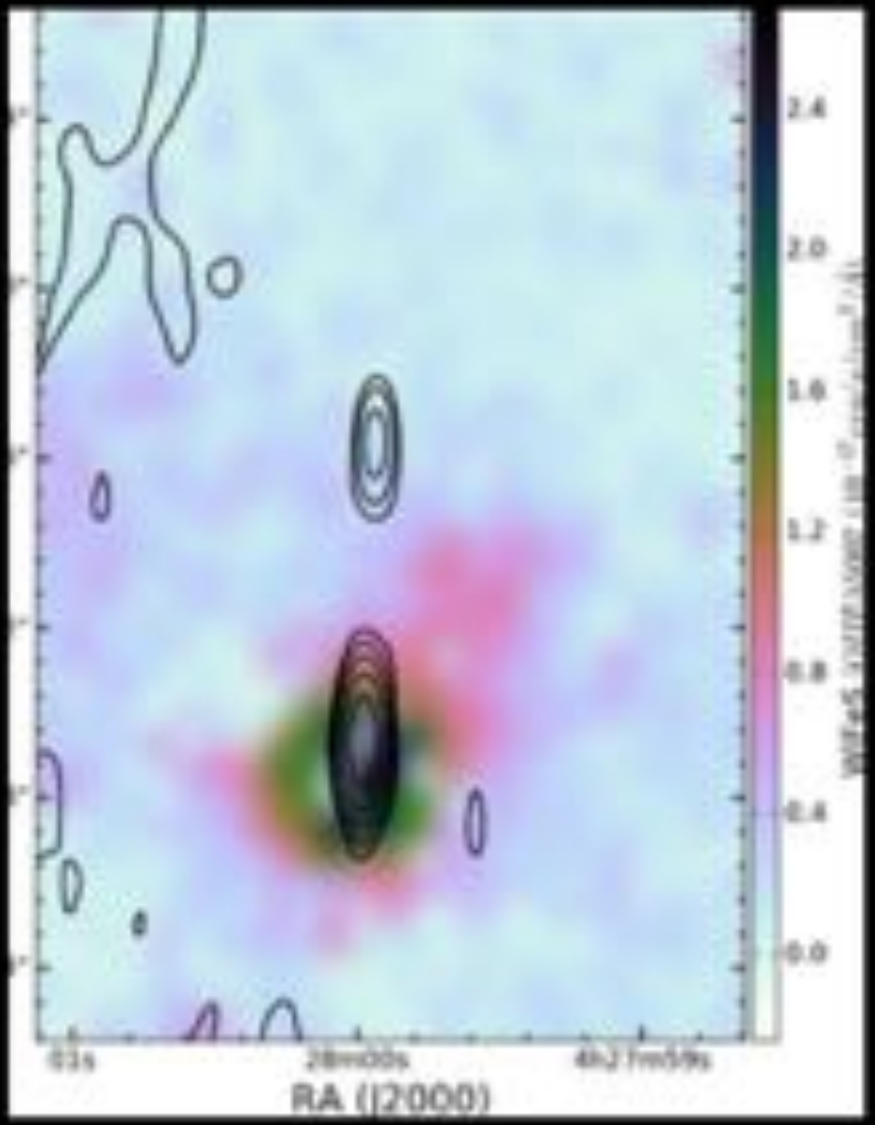
he WISE 3-band image of the Carafe galaxy.

The Carafe Galaxy ESO202 G023

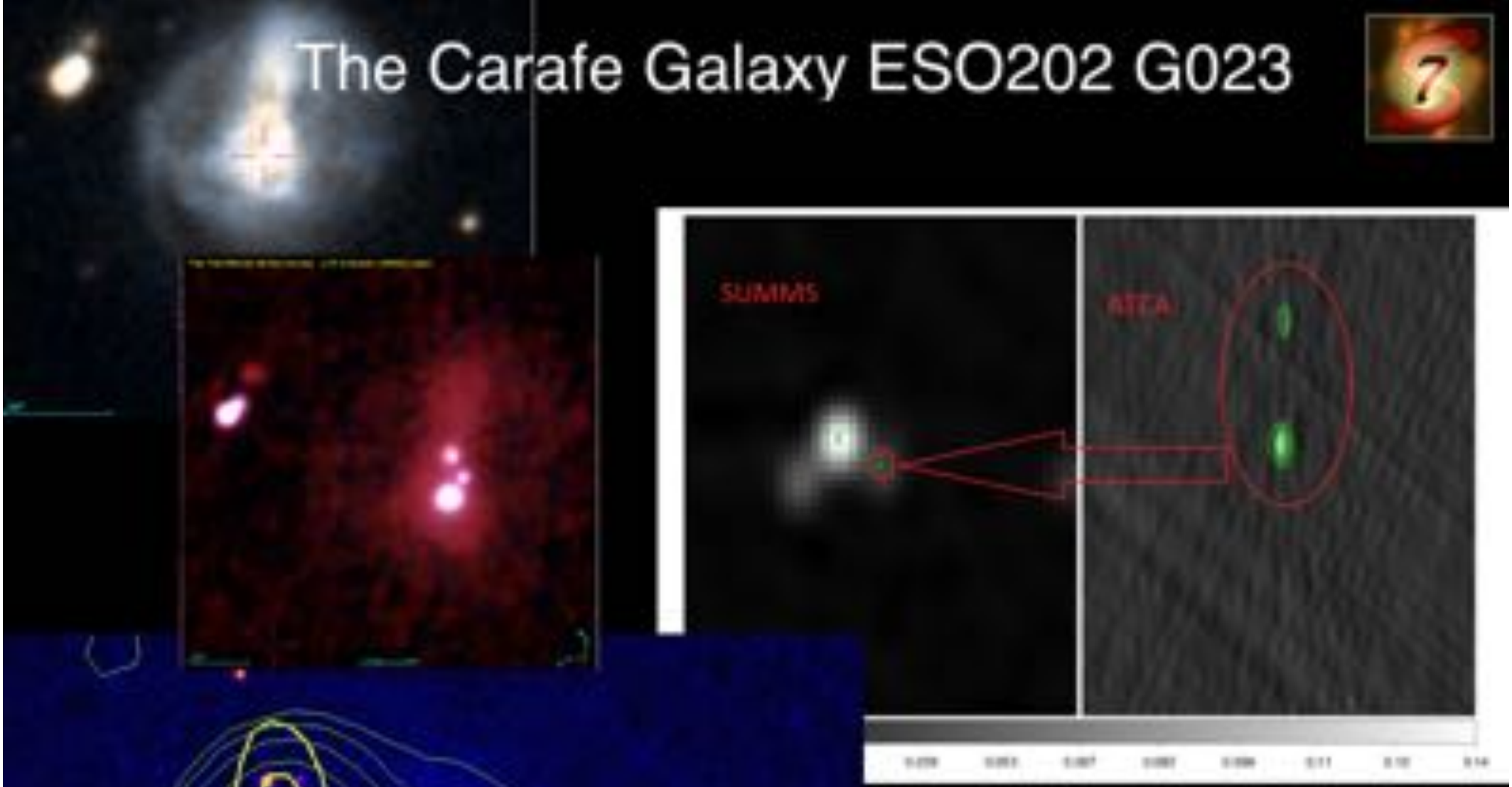


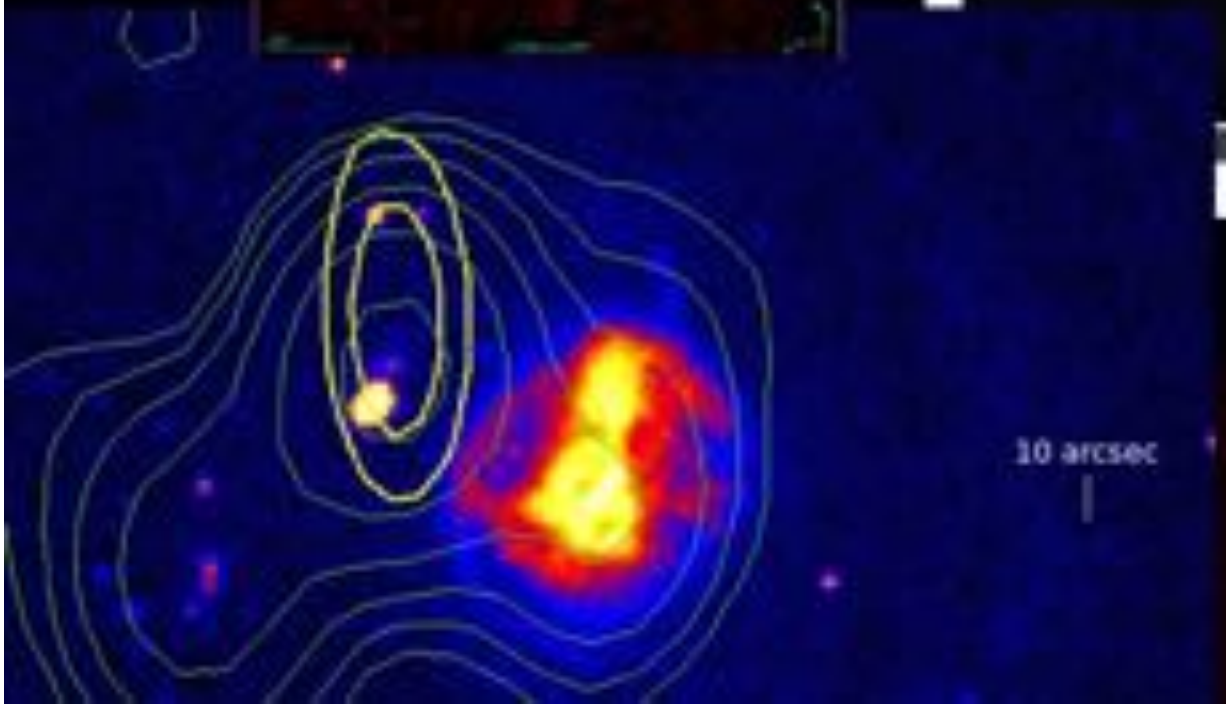
The Carafe Galaxy ESO202 G023



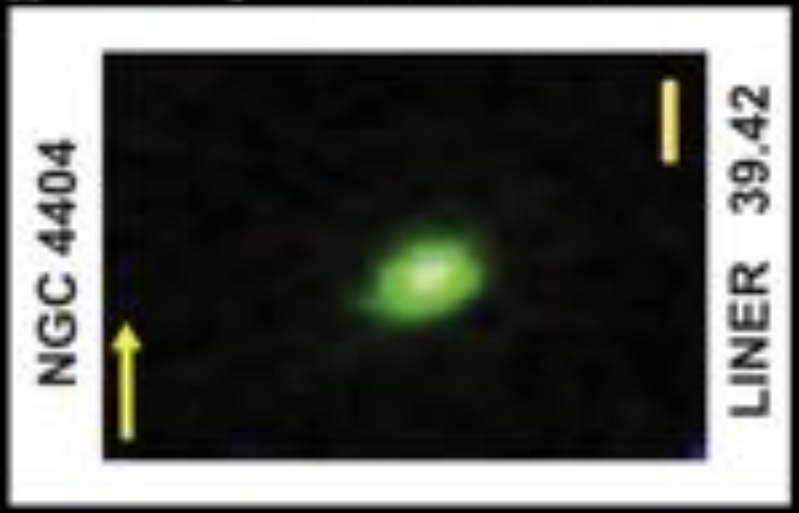


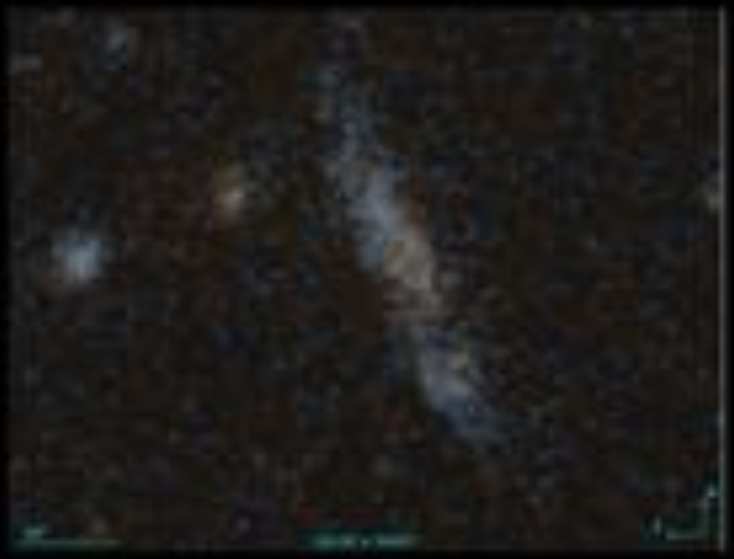
The Carafe Galaxy ESO202 G023

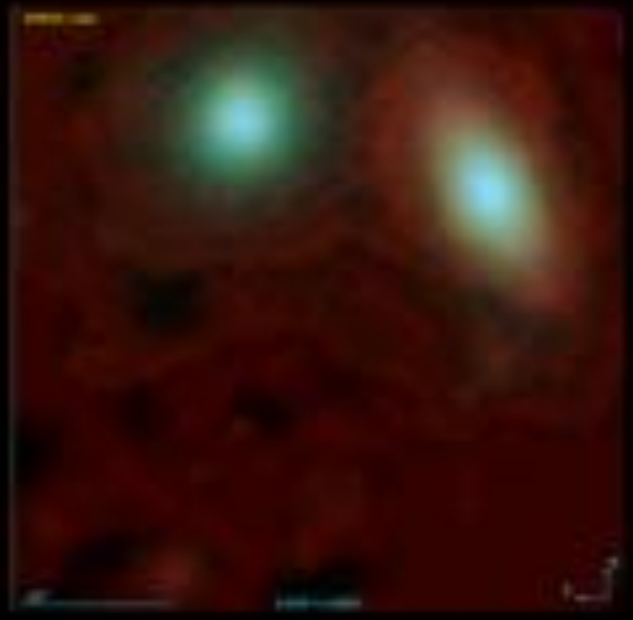




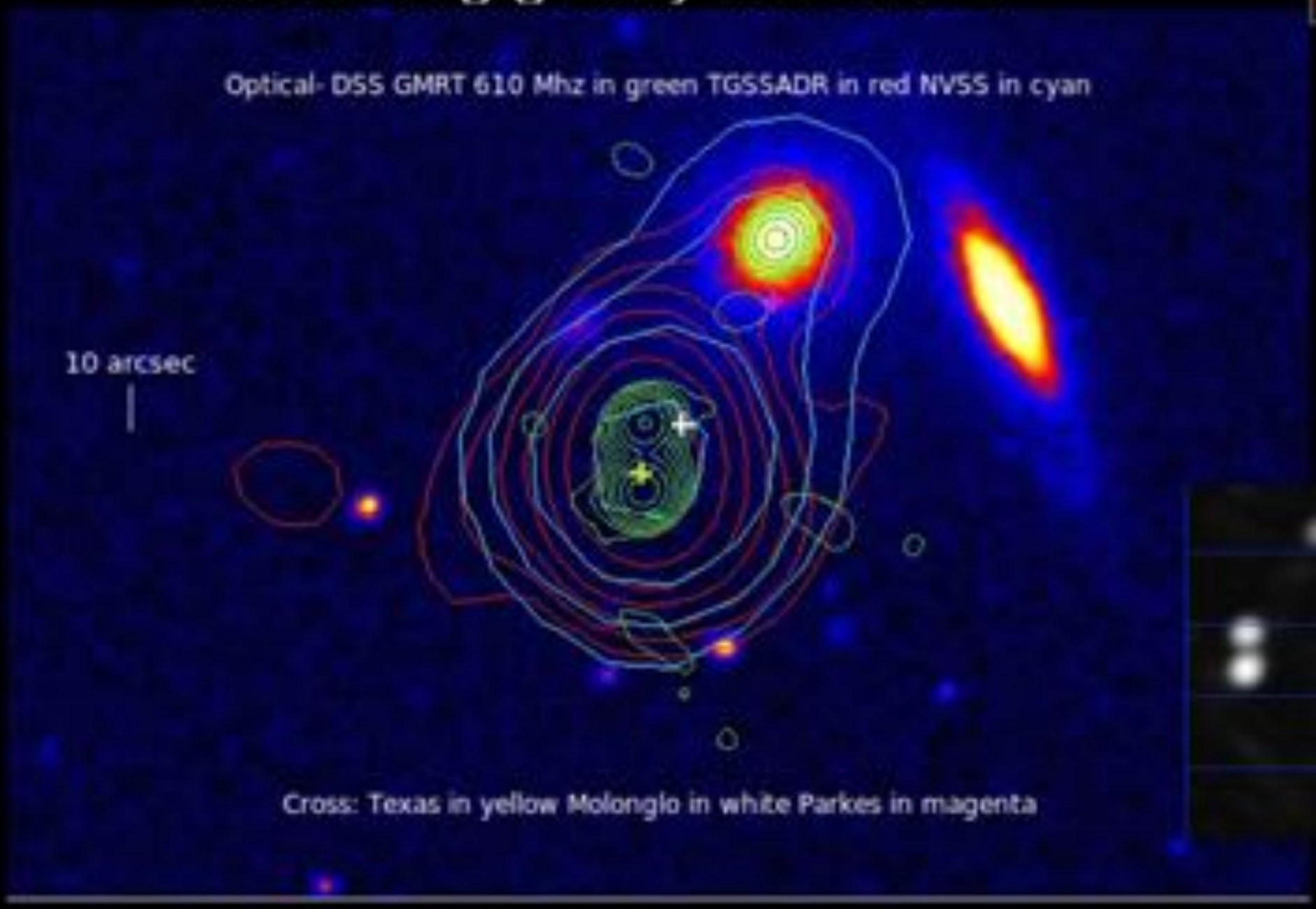
Interacting galaxy NGC4404



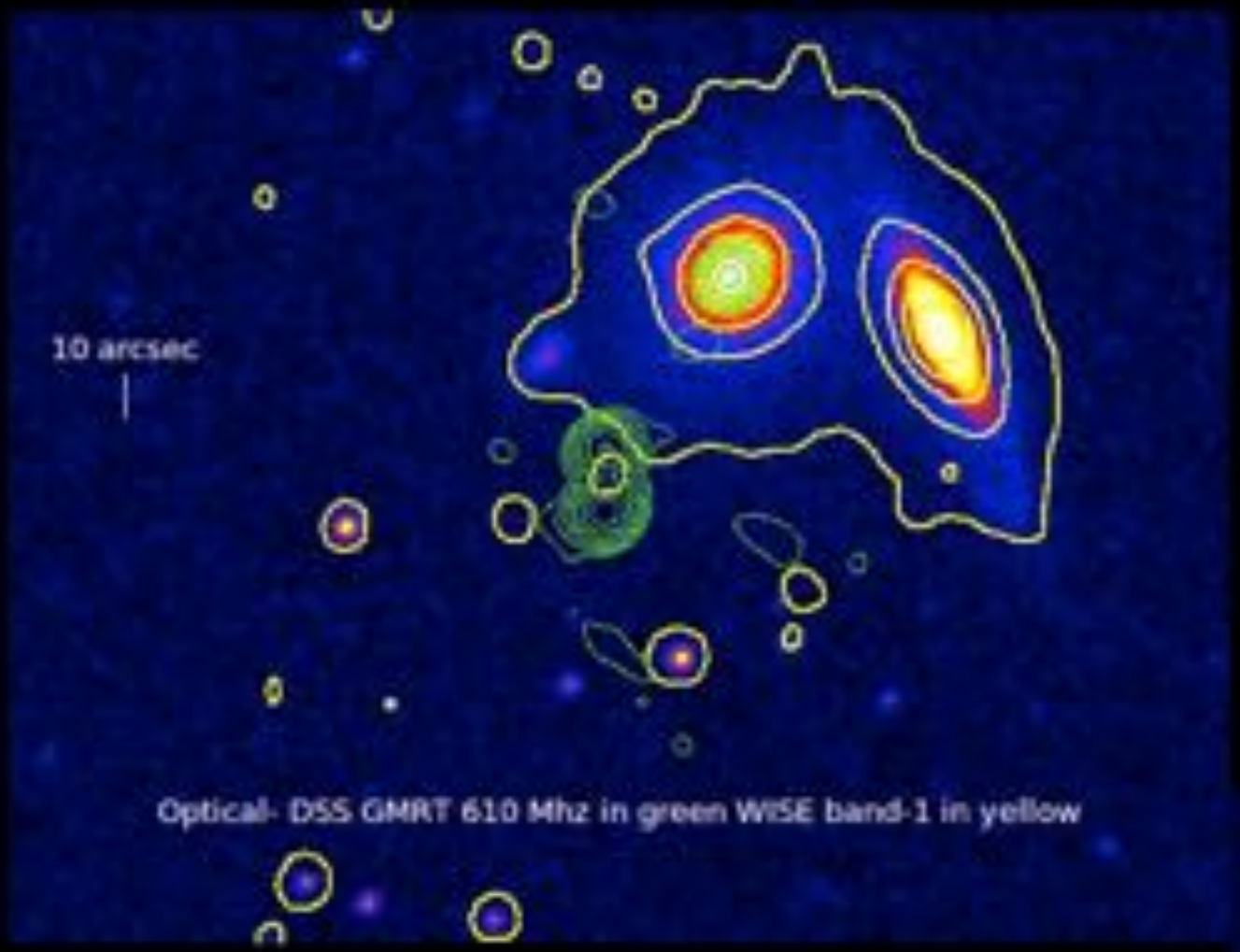


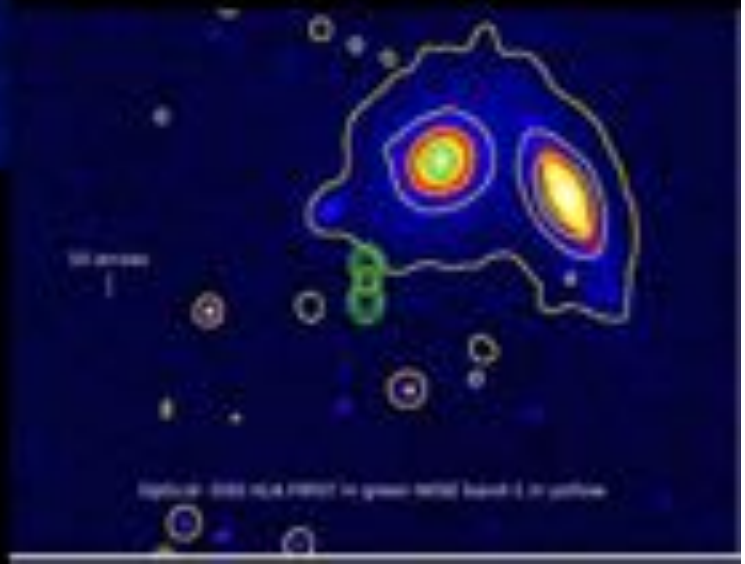


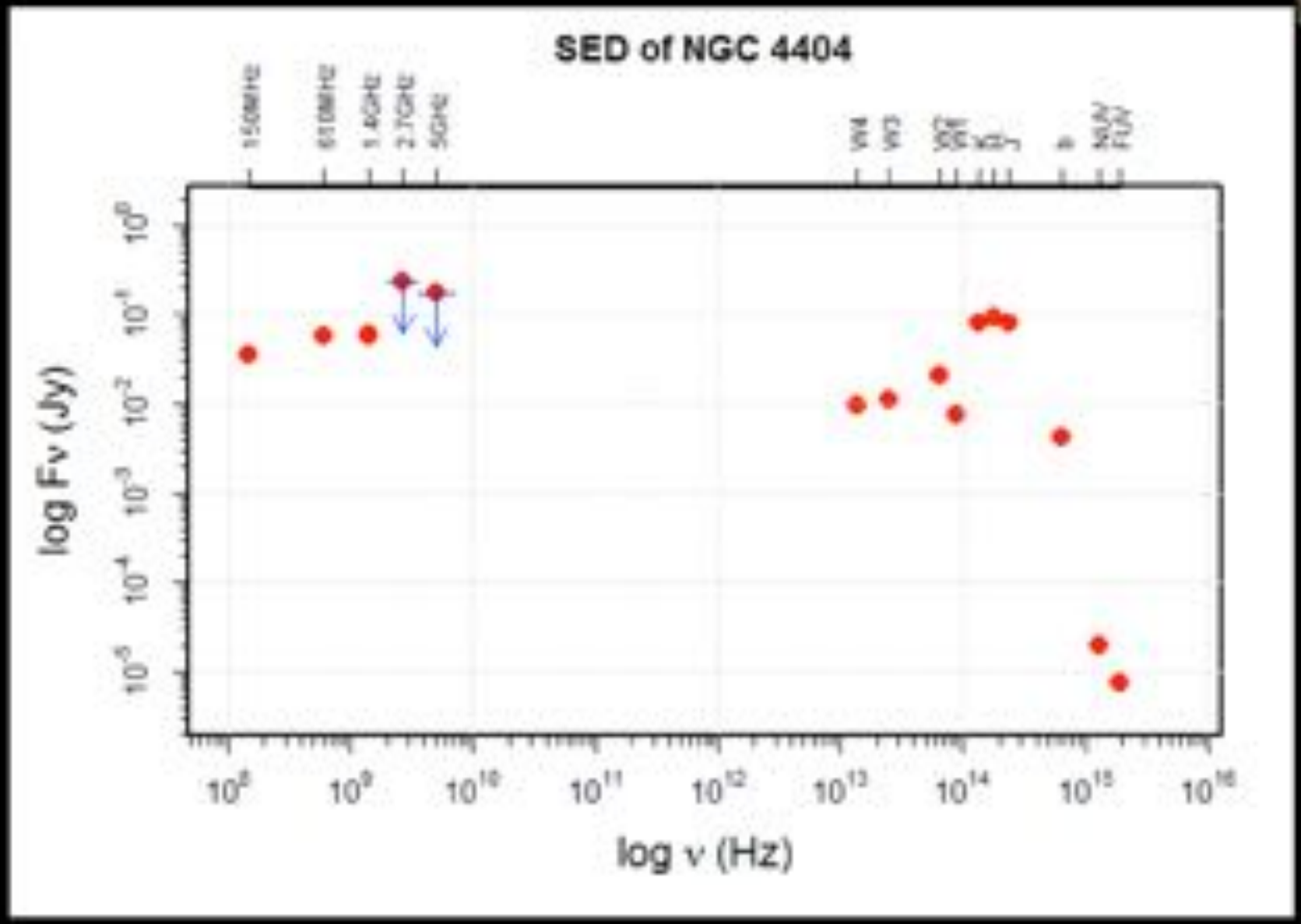
Interacting galaxy NGC4404

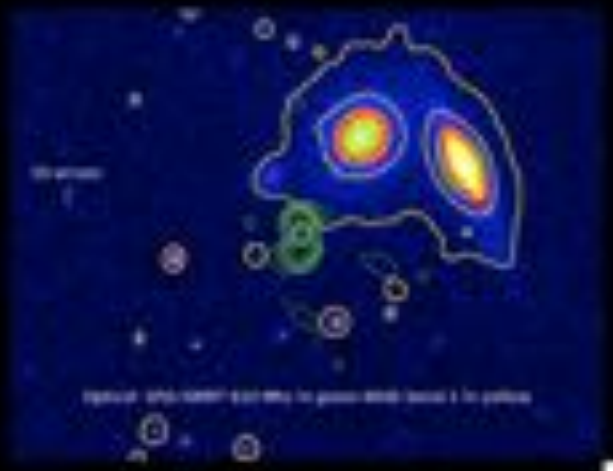


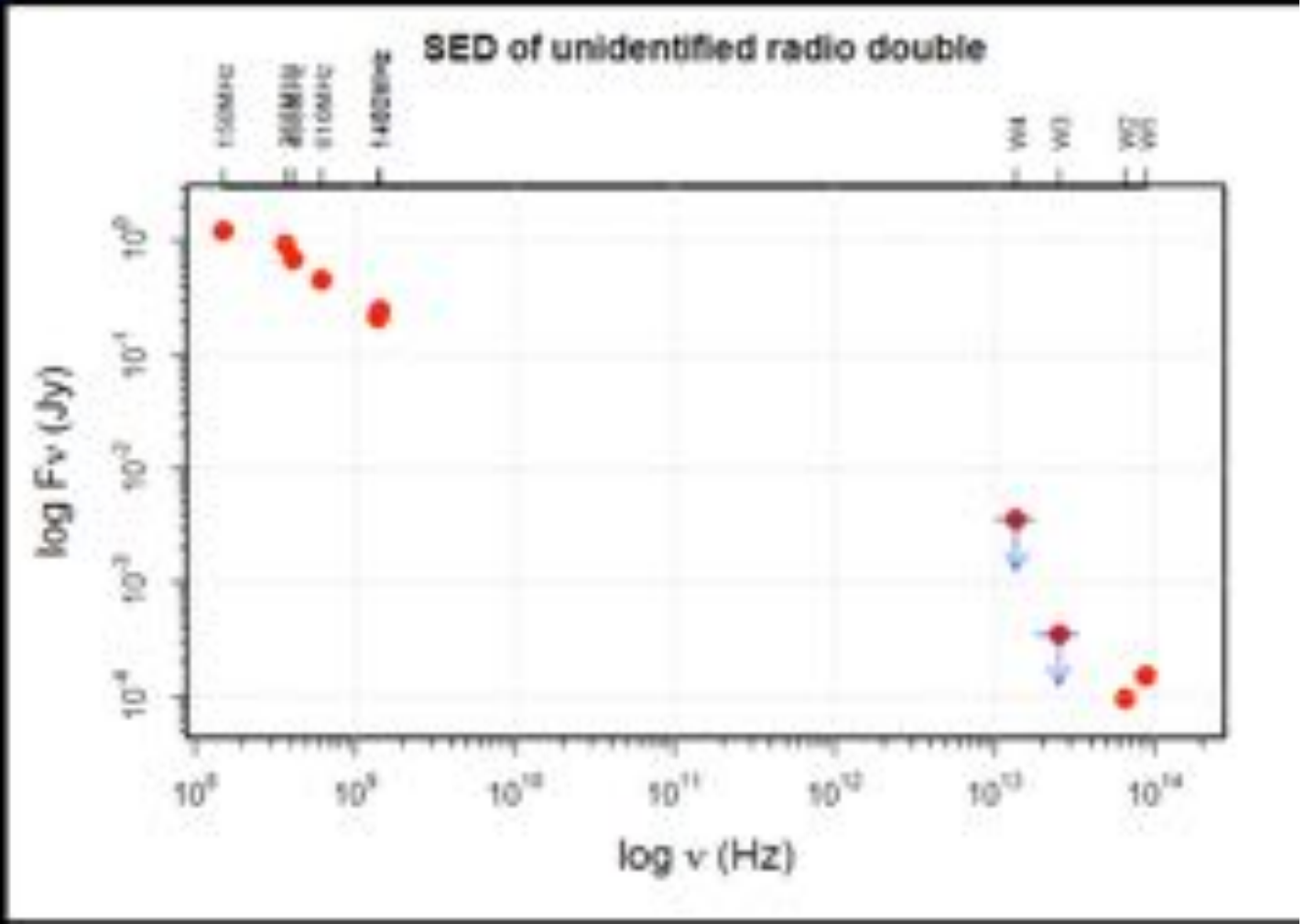
Interacting galaxy NGC4404






SED of NGC 4404
150MHz
610MHz
1.4GHz
2.7GHz
5GHz
W4
W3
SDS
K
J
u
NUV
FUV
log Fν (Jy)
log ν (Hz)




SED of unidentified radio double
log Fν (Jy)
log ν (Hz)

Thank you!