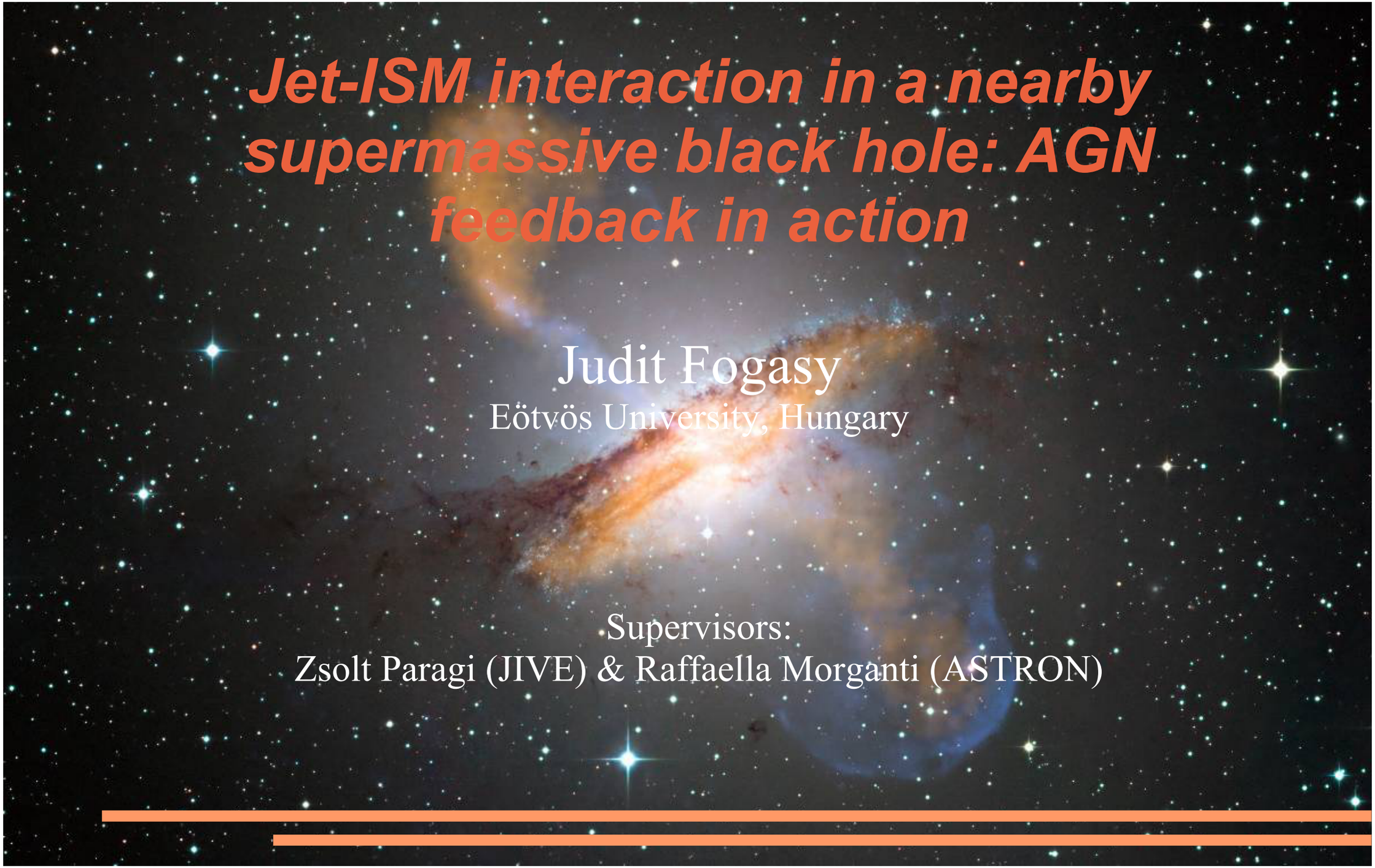

Jet-ISM interaction in a nearby supermassive black hole: AGN feedback in action

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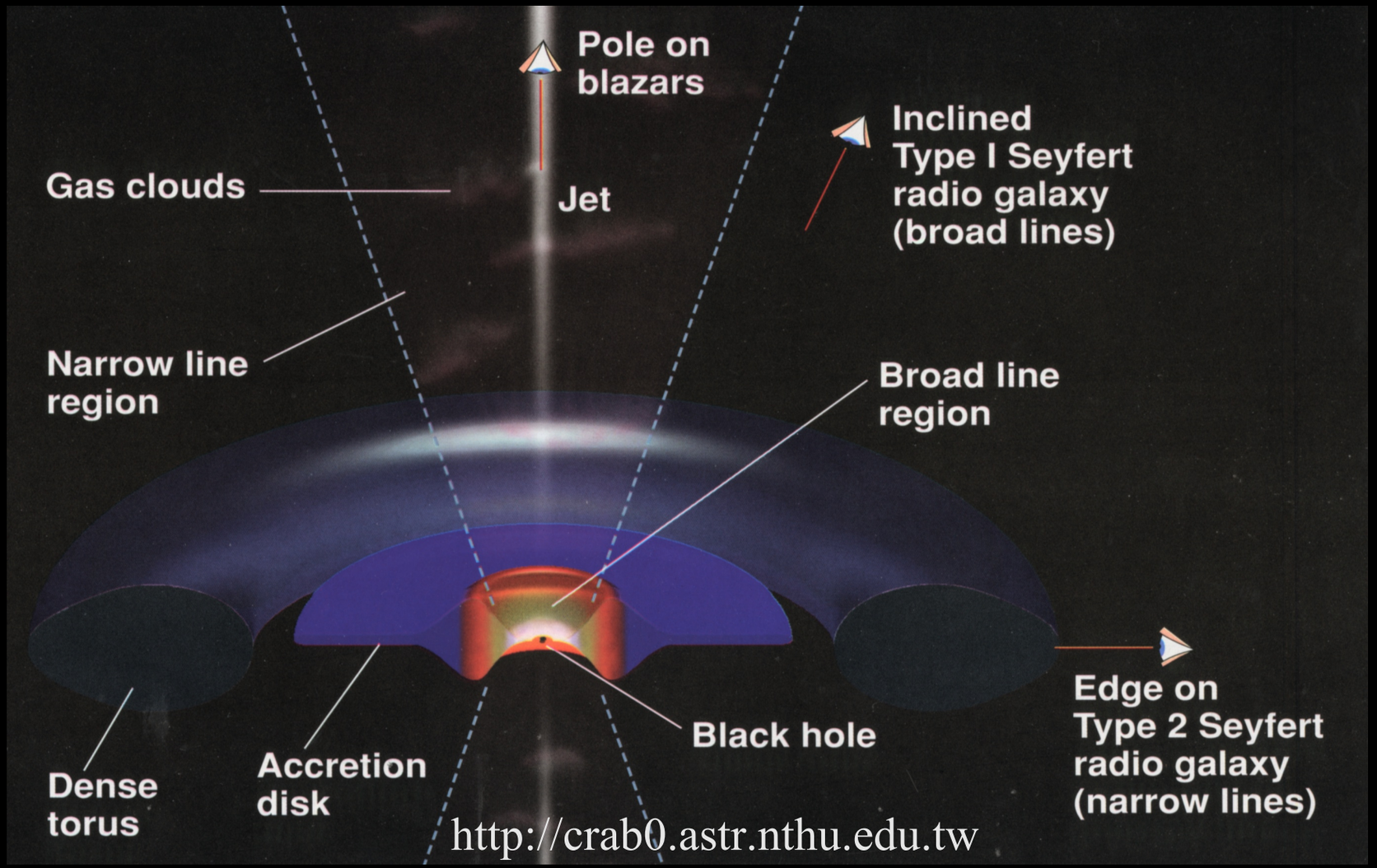
Active galactic nuclei



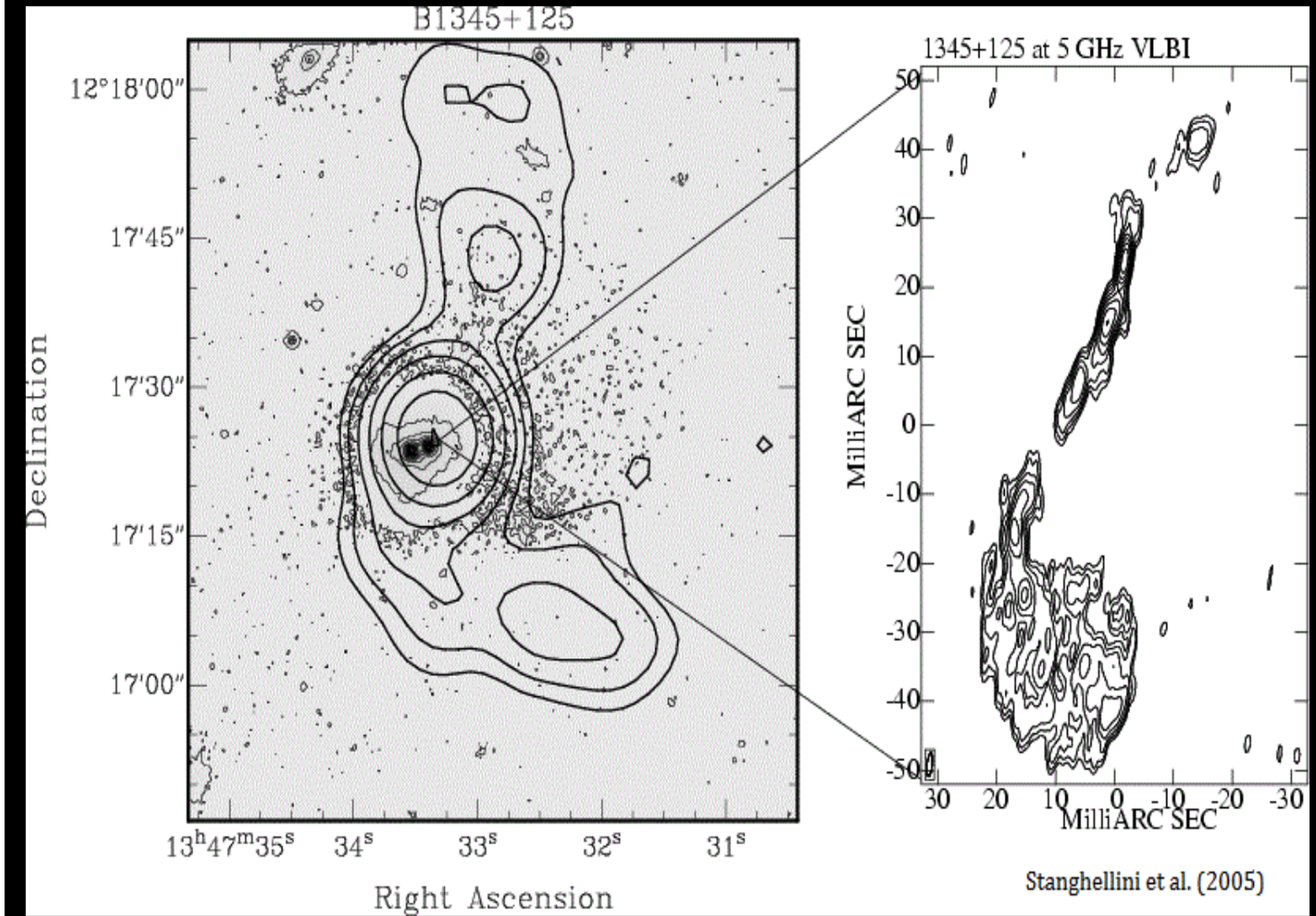
GHz Peaked Spectra (GPS) sources

- GPS <1kpc
- Simple and convex radio spectrum
- Very young sources
- High radio luminosity
- Low fractional polarization
- Apparently low variability
- Two-sided radio morphology
- Ideal objects to study AGN feedback

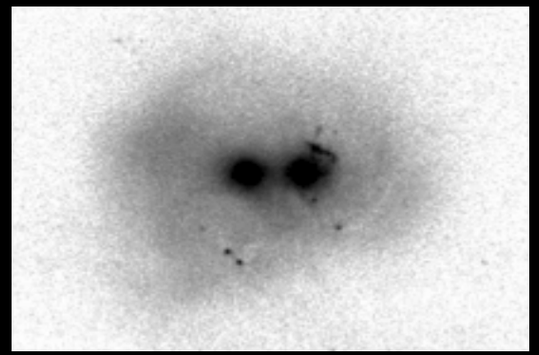
HI outflows

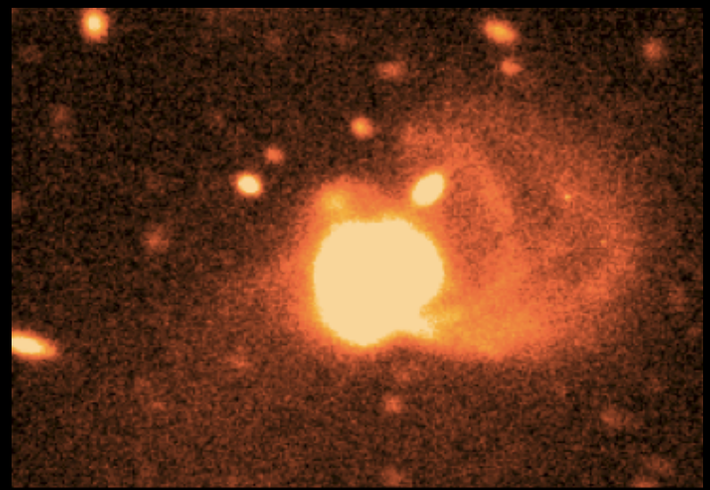
- AGN feedback:
  - Halting the growth of the supermassive black hole
  - Stop star formation
  - Influence the evolution of the host galaxy
- Interaction between the radio jet and the ISM→ gas outflows
- **Main goal: to find the location of HI outflow in 4C12.50**

4C12.50

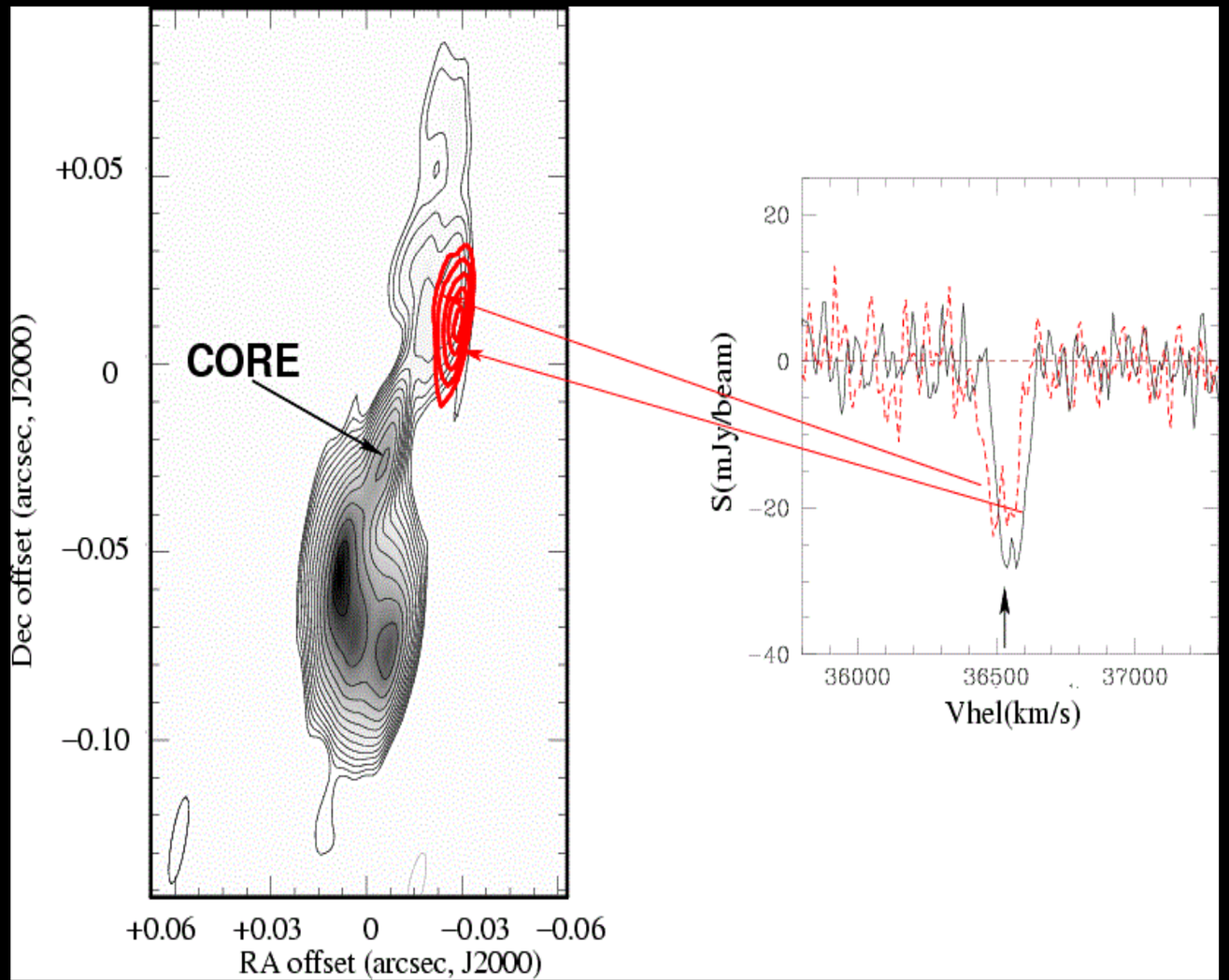

B1345+125
12°18'00"
17'45"
17'30"
17'15"
17'00"
Declination
13h47m35s
34s
33s
32s
31s
Right Ascension

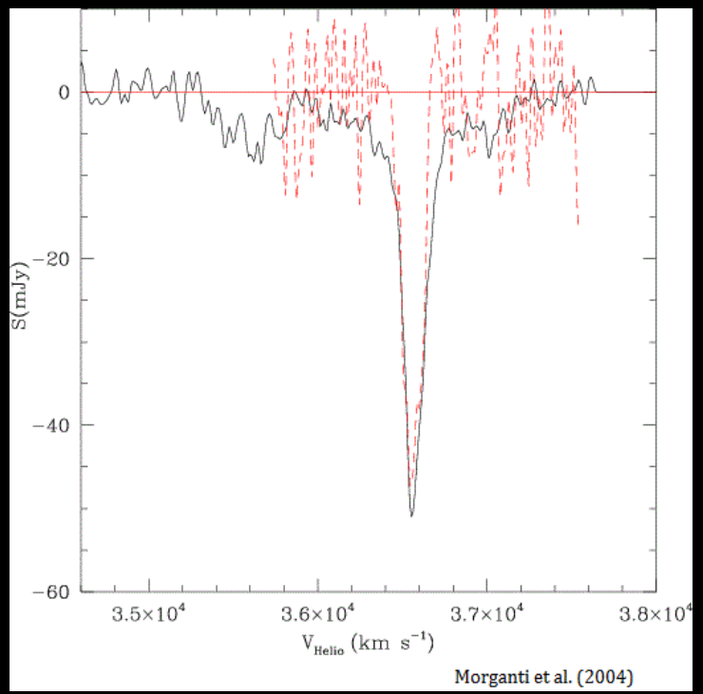
1345+125 at 5 GHz VLBI
MilliARC SEC
MilliARC SEC
Stanghellini et al. (2005)





HI absorption lines





Morganti et al. (2004)

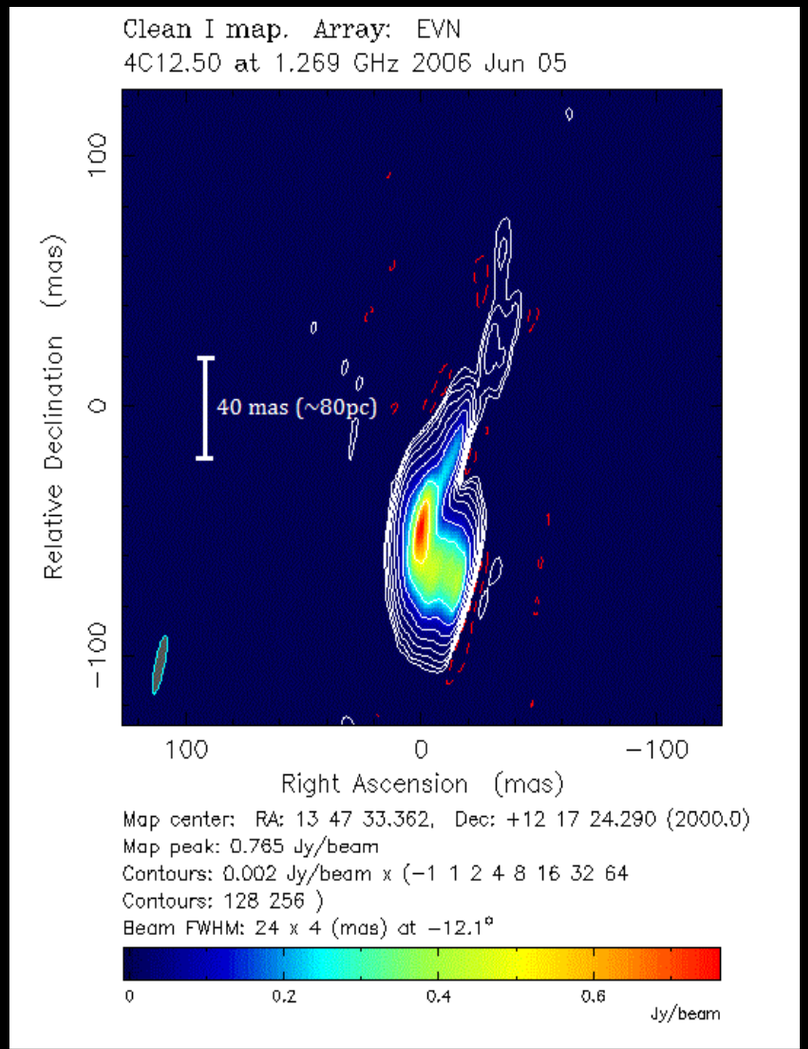
Present observations

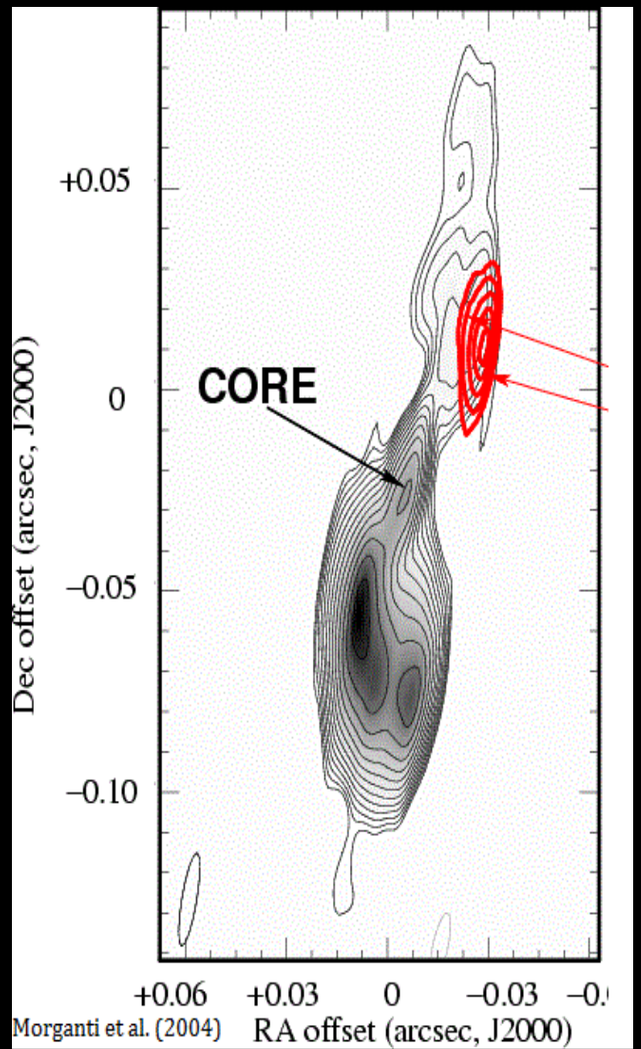
- EVN+VLBA (including WB, EF, GB, AR)
- 5-6 June 2006
- Number of antennas: 15
- Scan hours: 14.504 h
- 1260.88-1276.88 MHz
- Bandwidth: 16 MHz→detect the broad absorption
- Spectral channels/baseband: 512
- Velocity resolution: 7 km/sec

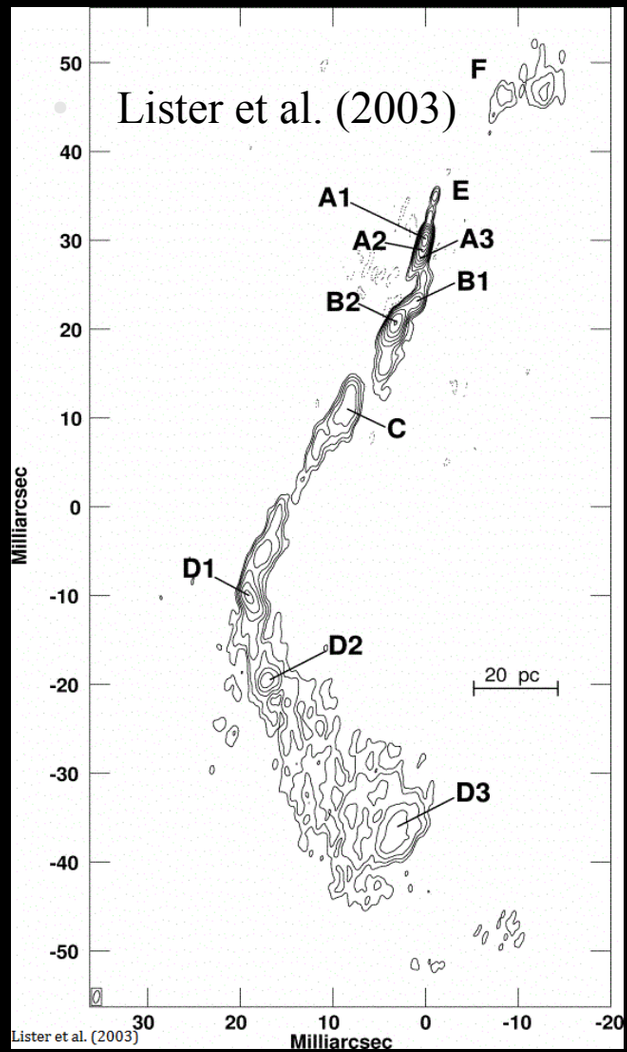
Data processing

- AIPS+Difmap
- Flagging RFI, Fort Davis (VLBA) antenna out
- Priori amplitude calibration using T_{sys} and Gain tables
- Fringe fitting
- Bandpass calibration
- Continuum mapping
- Doppler correction
- Continuum subtracting
- Kvis

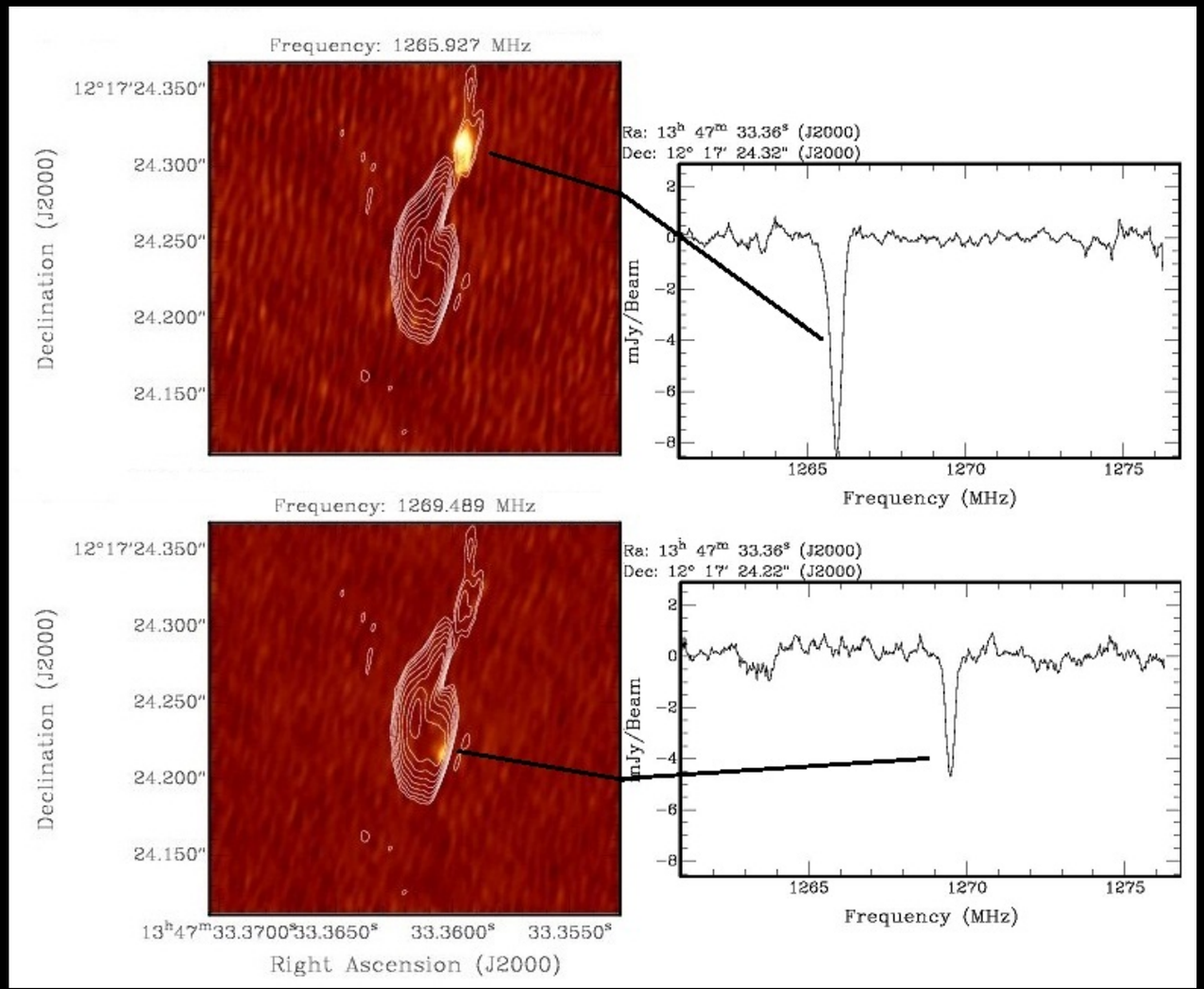
Results

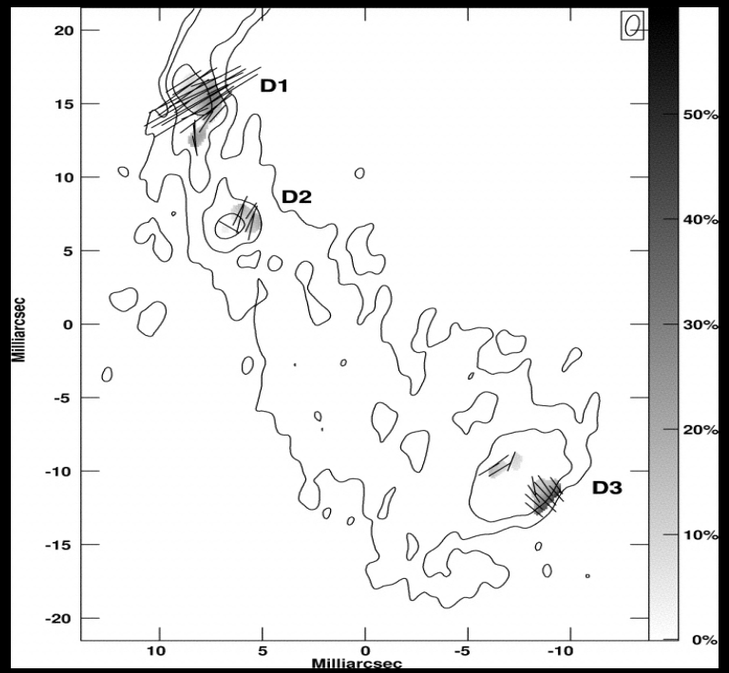

Clean I map. Array: EVN
4C12.50 at 1.269 GHz 2006 Jun 05
Relative Declination (mas)
100
0
−100
40 mas (~80pc)
100
0
−100
Right Ascension (mas)
Map center: RA: 13 47 33.362, Dec: +12 17 24.290 (2000.0)
Map peak: 0.765 Jy/beam
Contours: 0.002 Jy/beam x (−1 1 2 4 8 16 32 64
Contours: 128 256)
Beam FWHM: 24 x 4 (mas) at −12.1°
0
0.2
0.4
0.6
Jy/beam


CORE
+0.05
0
−0.05
−0.10
Dec offset (arcsec, J2000)
+0.06
+0.03
0
−0.03
RA offset (arcsec, J2000)
Morganti et al. (2004)


Lister et al. (2003)
F
A1
E
A2
A3
B1
B2
C
D1
D2
D3
20 pc
Milliarcsec
50
40
30
20
10
0
-10
-20
-30
-40
-50
30
20
10
0
-10
-20
Milliarcsec
Lister et al. (2003)

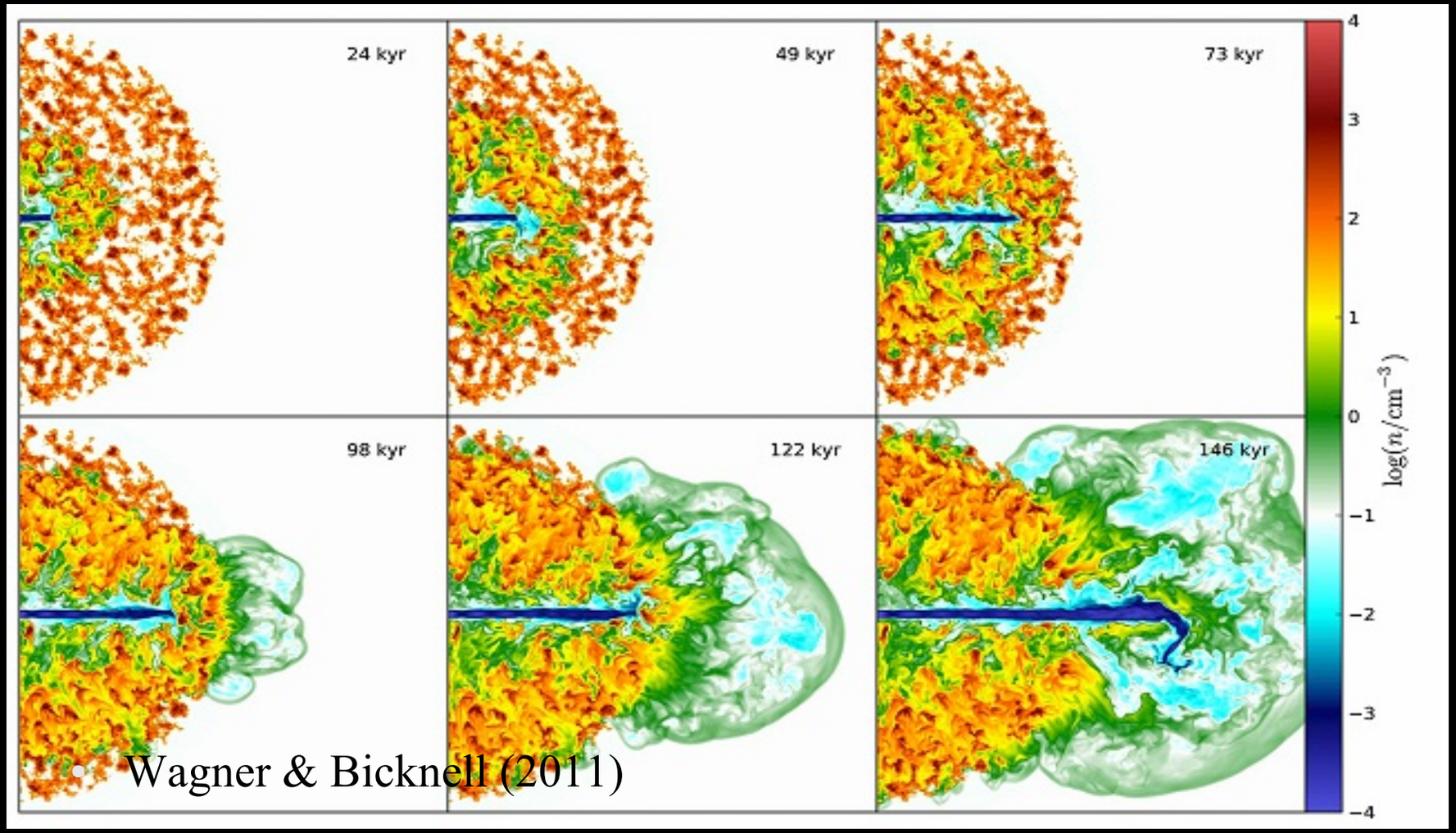
Results





- Beam : 9x4 mas (PA=-12°)
- Noise: 0.4 mJy
  Narrow component:
- HI mass: 10^5-10^6 M_{sun}
- Mass outflow rate: 8-21 M_{sun}/year (Morganti et al. 2004, 2005)

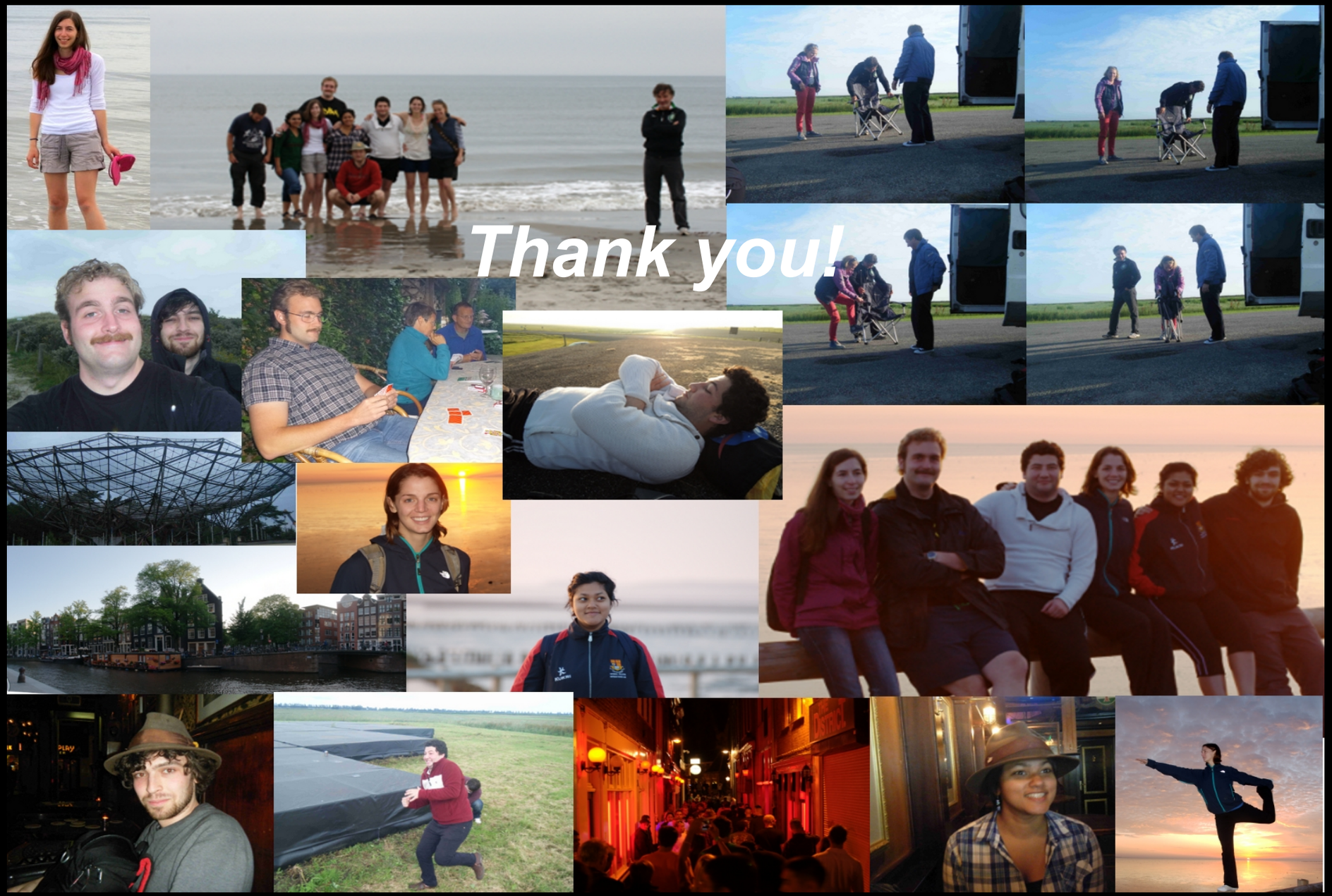
Relativistic jet feedback in evolving galaxies



- Wagner & Bicknell (2011)

Summary

- Data processing
- Detection of the narrow and broad HI absorption
- Localization of the broad component on the VLBI image!
- **We have found an additonal evidence for the radio jet-cloud interaction, we tracked AGN feedback in action!**
- Next steps:
  - Determine the physical properties of the south cloud
  - Understand the impact of such outflow for the evolution of this radio source


Thank you!