Multi-frequency VLBI observations of blazar 1156+295

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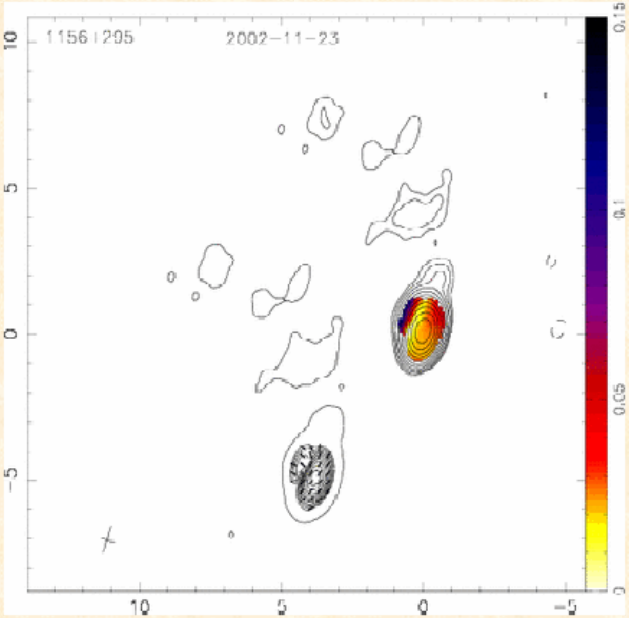
Outline:

- 1. Introduction of 1156+295(4C 29.45)
- 2. Introduction of our observation
- 3. 2cm and 7mm model fit results
- 4. Polarization Structure
- 5. Future works

1. 1156+295 (4C 29.45)

Movie from

“MOJAVE/2cm Survey Data Archive”



1156+295:(4C +29.45 , J1159+2914)
Quasar, Z=0.729
Highly Polarized Quasar
Optically Violent Variable source
EGRET detected source
Extremely variable from gamma- ray to radio wave.

1980-2002,several radio flares occurred during this period.

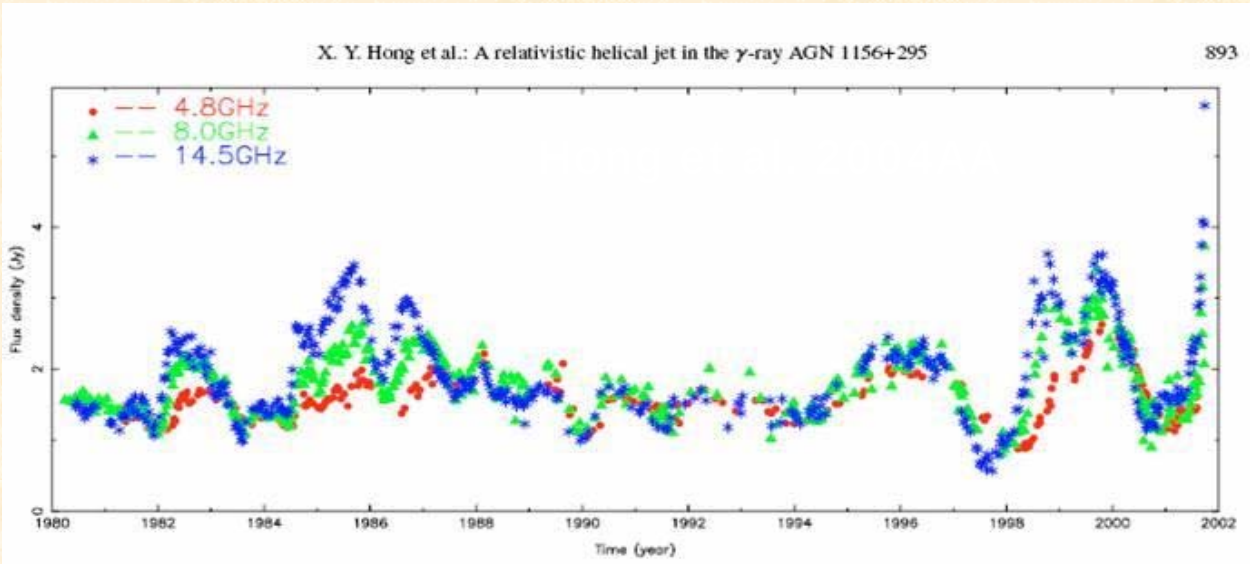
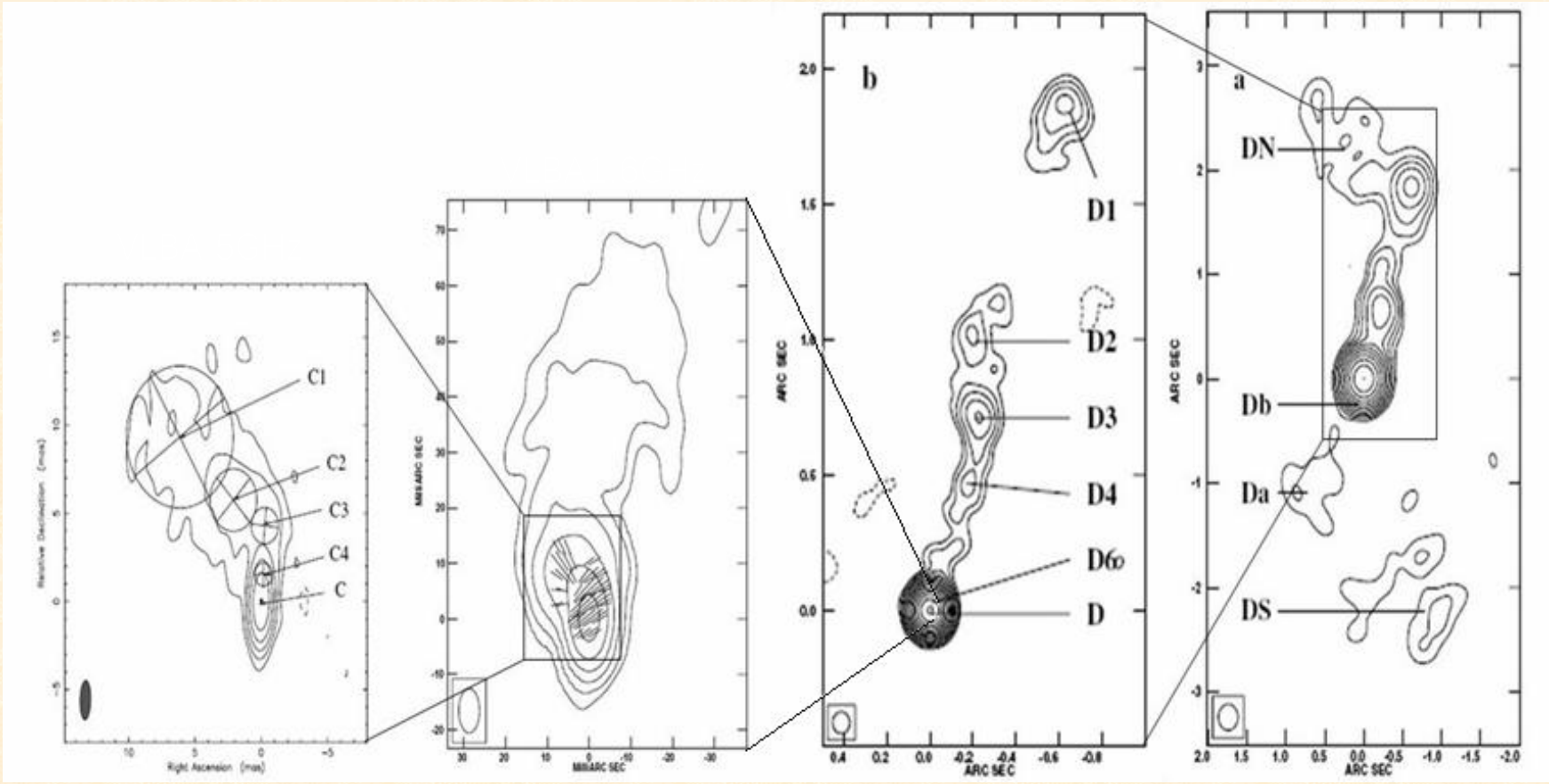


Fig. 5. Light curves of 1156+295 at 4.8, 8.0 and 15 GHz from the monitoring data of the University of Michigan Radio Astronomy Observatory.

1. 1156+295 (4C 29.45)

- From Hong et al. 2004



2.Our latest observation

Motivation:

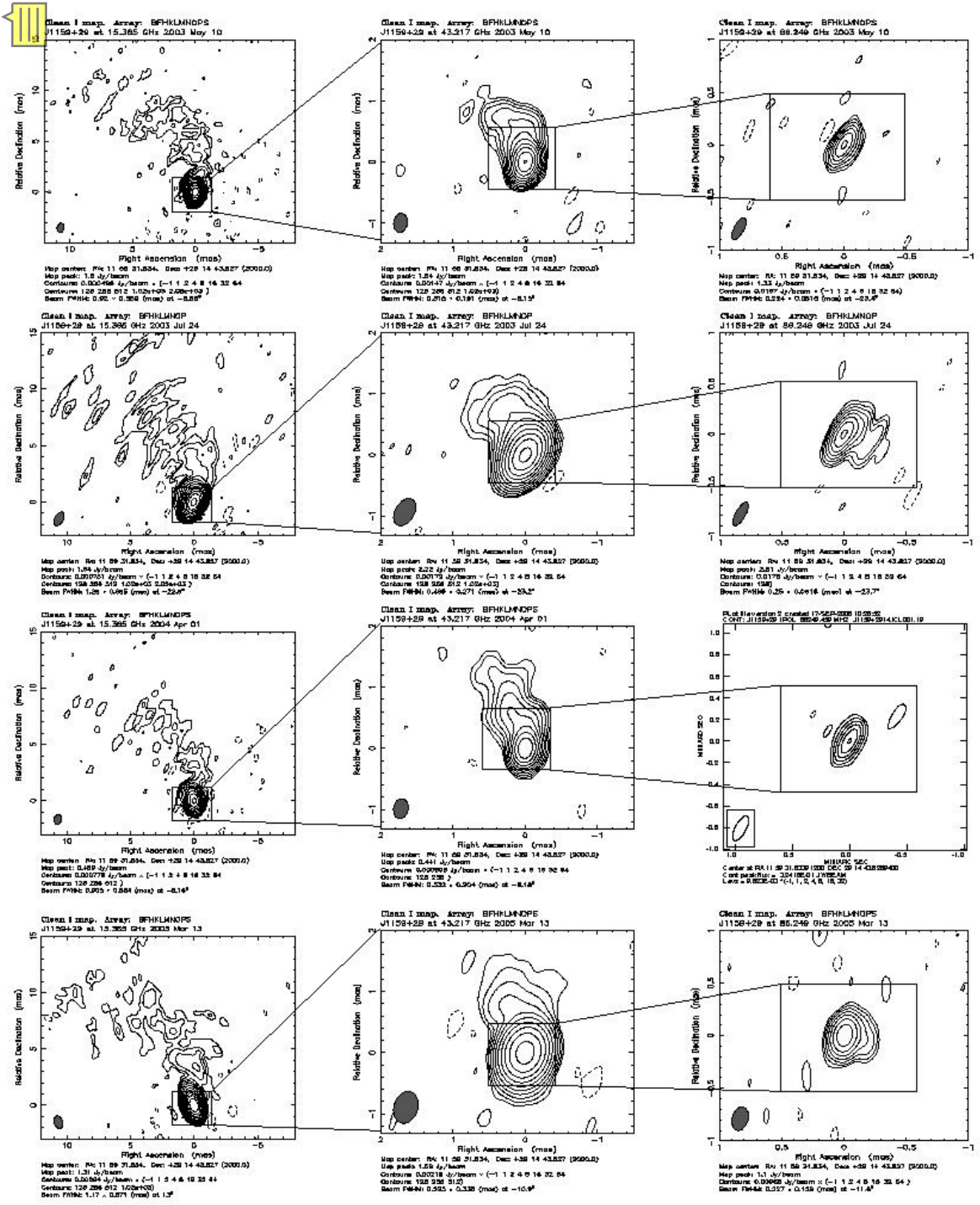
1.To image the sub-pc structure. (z=0.729, 0.1mas~0.5pc)

2.To study the helical motion of the jet components: If there is 1 or 2 jet components during the double-peaked flare; the proper motion of the jet components.

3.To obtain the magnetic field information of the inner jet structure.

Date	Frequency (GHz)		
May 2003	15*	43*	86
July 2003	15*	43*	86
April 2004	15*	43*	86
March 2005	15*	43*	86

*** Designed for polarimetry**



15GHz (2cm)

Peak:0.5~1.8 Jy/Beam

Jet P.A. ~northeast

43GHz (7mm)

Resolution~0.2mas

Peak:0.4~2.2 Jy/Beam

Jet P.A.~ northeast

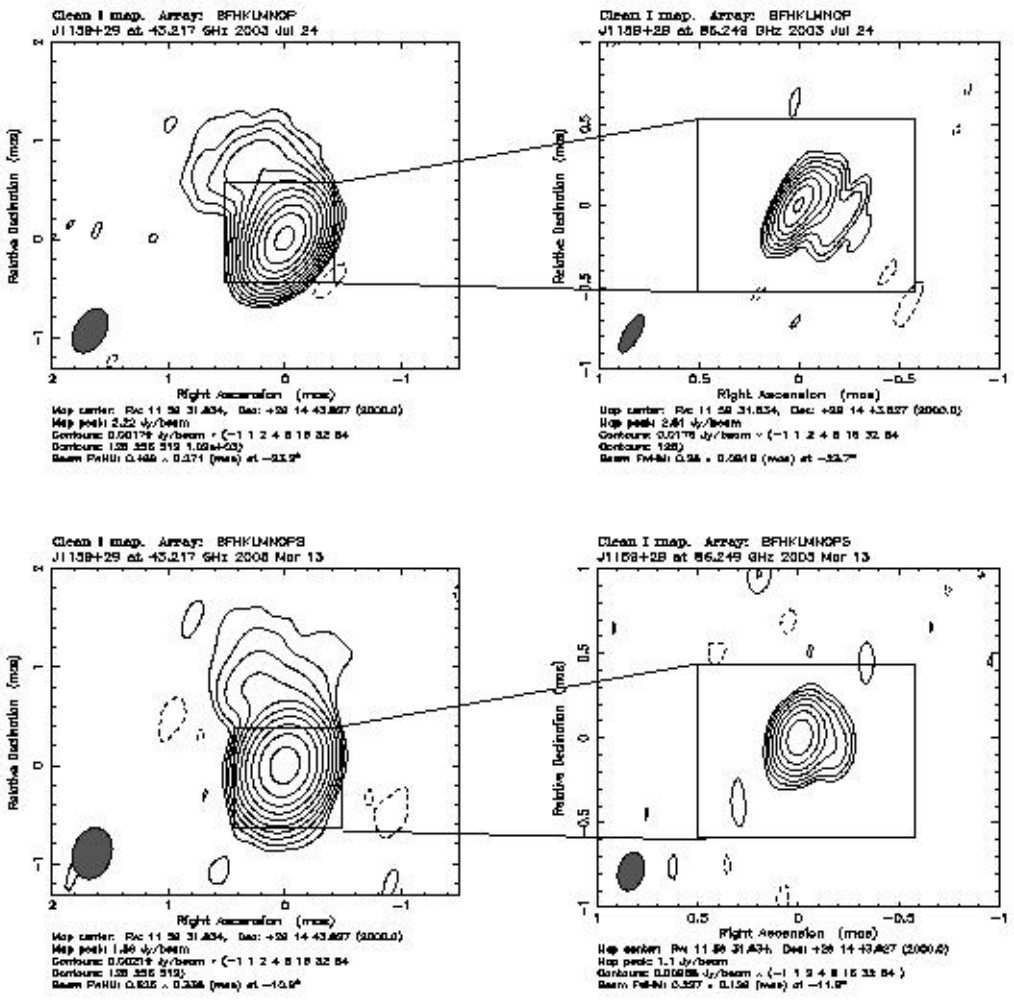
86GHz (3mm)

Resolution~0.1mas

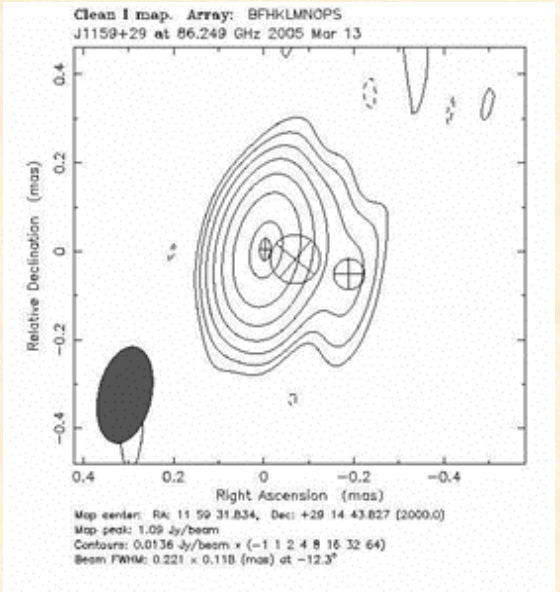
Peak:0.4~2.5 Jy/Beam

Jet P.A.~ southwest???

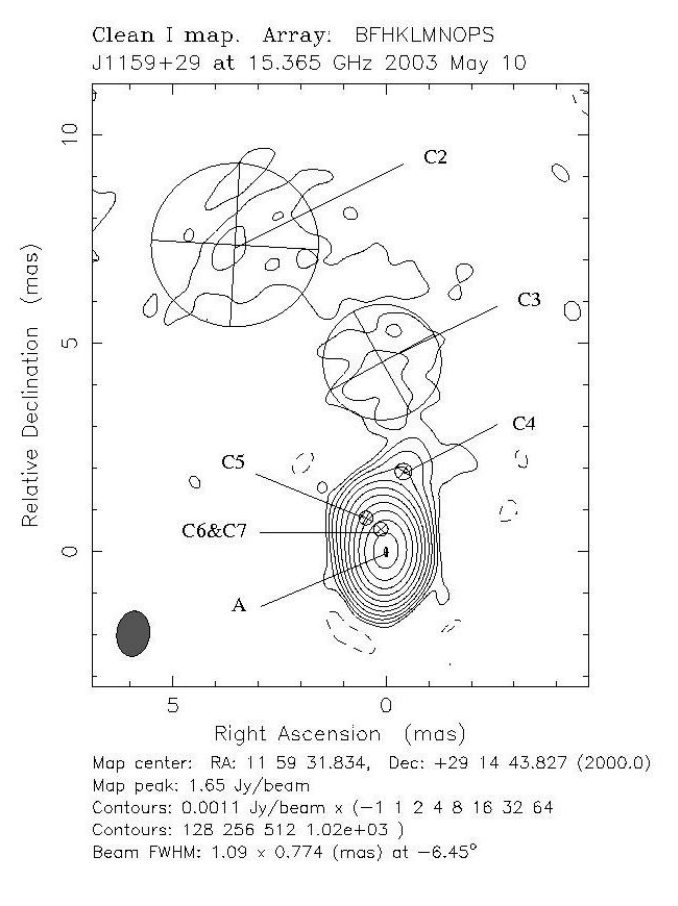
2.Our latest observation



86GHz: There is a huge misalignment of the jet between 86GHz and lower frequencies. And which component is the real " core" is still undetermined.



3. 2cm and 7mm model fit results



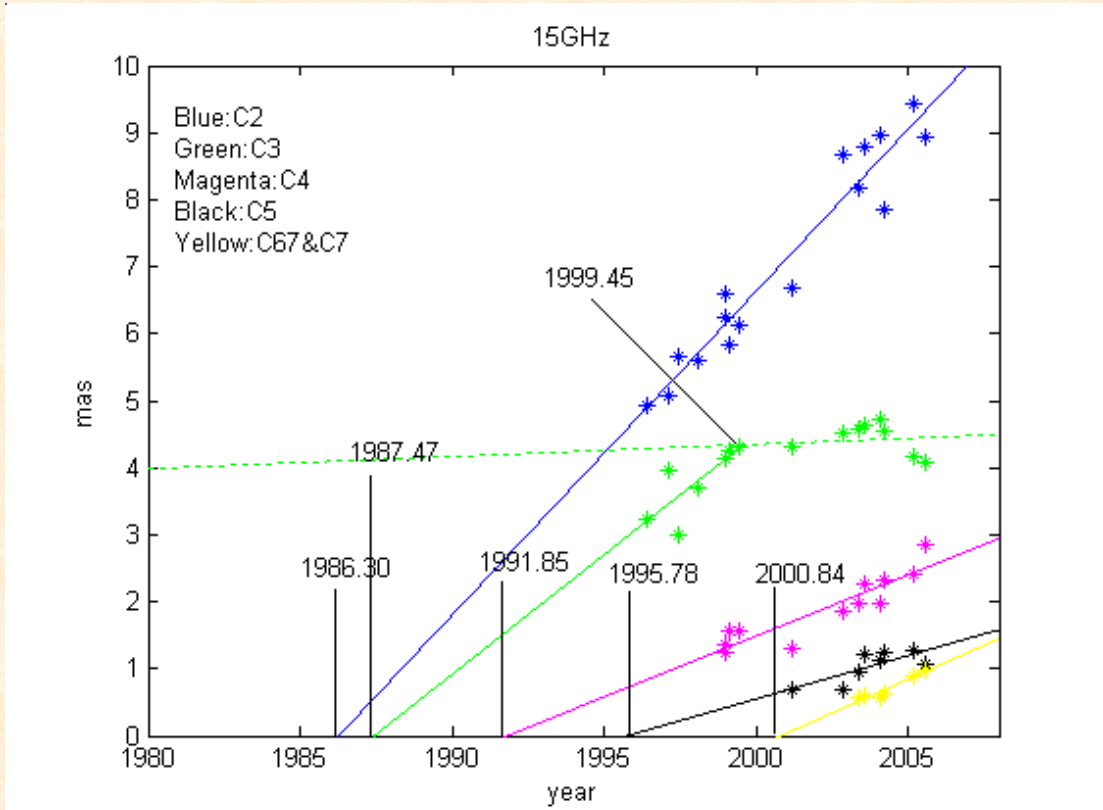
C2:0.48mas/year

C3 before1999.45:0.36mas/year

C3 after 1999.45:~0

C4:0.18mas/year; C5:0.13mas/year ;

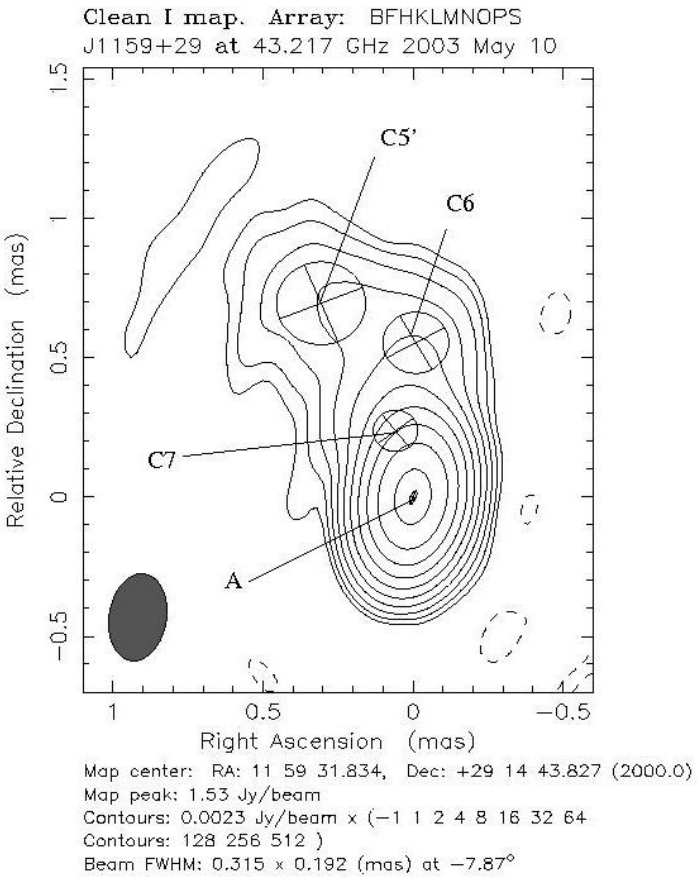
C6&C7:0.20mas/year



Jet component :C2,C3,C4,C5,C6&C7

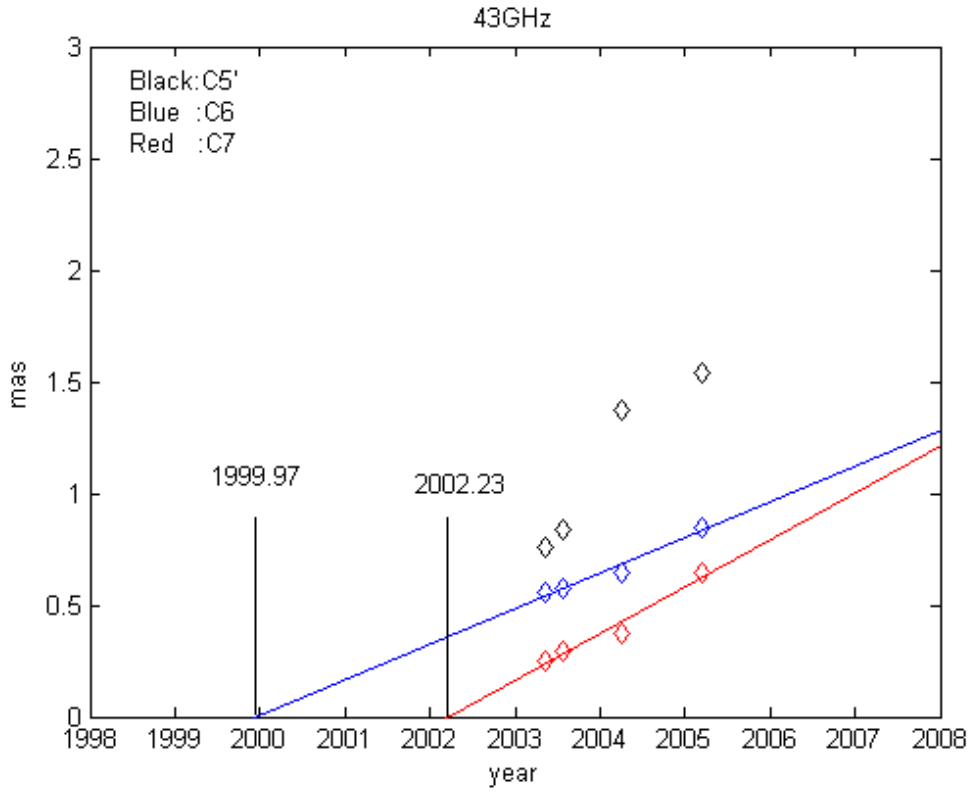
Core component: A

3. 2cm and 7mm model fit results



C6:0.16mas/year

C7:0.21mas/year



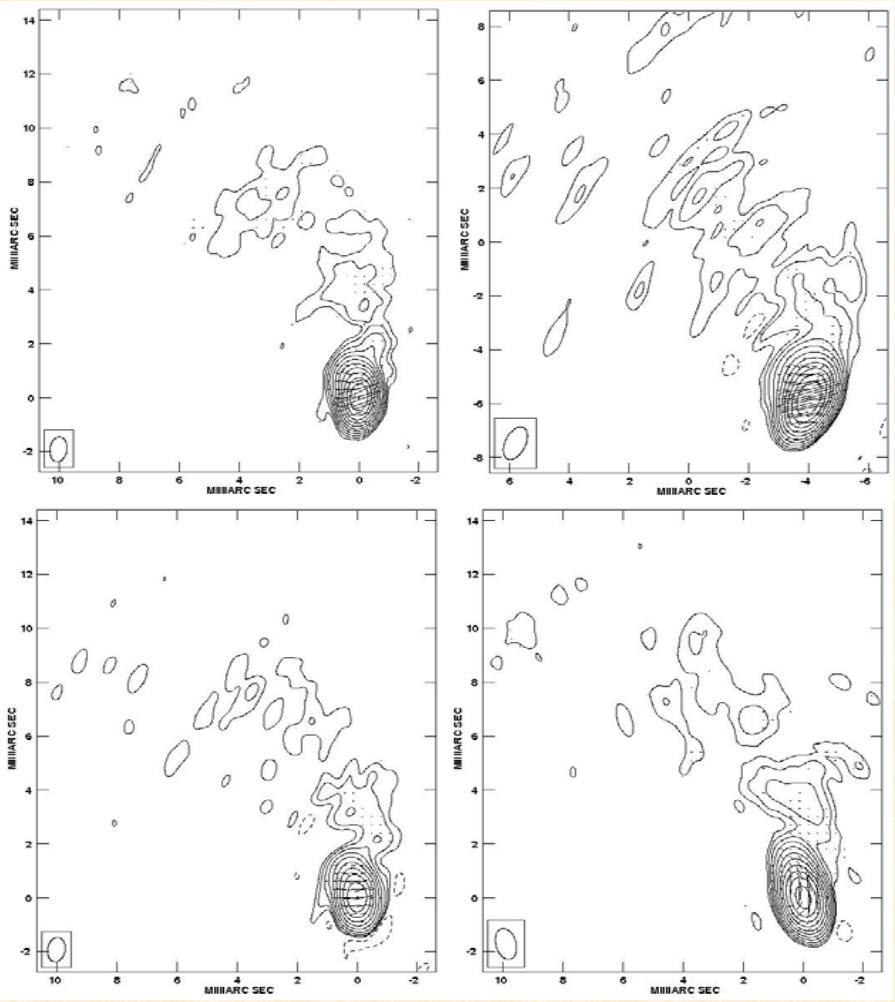
Jet component :C5',C6,C7

Core component: A

4. Polarization Structure

Epoch	Freq. (GHz)	I flux (Jy)	P flux (mJy)	%POL
May 2003	15	1.93	36.8	1.9
	43	1.79	38.7	2.2
July 2003	15	2.18	42.8	2.0
	43	2.42	43.8	1.8
April 2004	15	0.73	19.1	2.6
	43	0.60	8.1	1.4
March 2005	15	1.47	25.5	1.7
	43	1.72	?	?

4. Polarization Structure

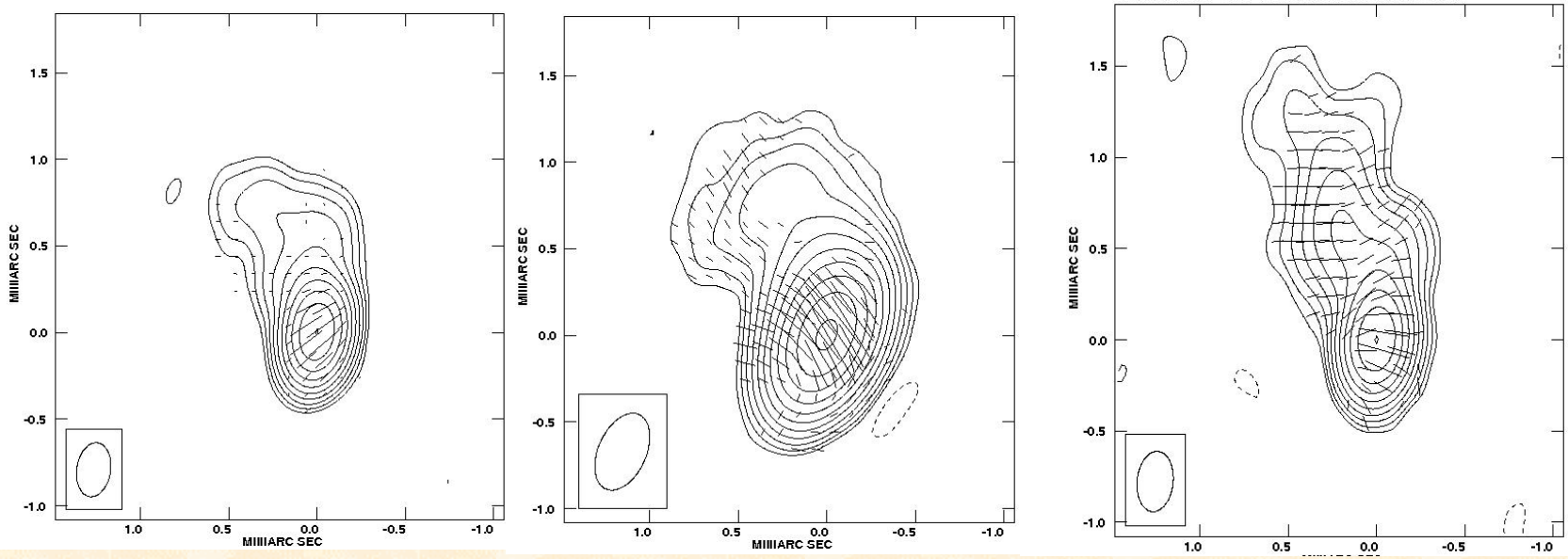


15GHz (2cm):
In the first 3 epochs, the polarization structure is rather steady, and most polarized flux exists in the inner core

And the orientation of the last epoch suddenly became perpendicular to the other 3 epochs. some new components might come out at that time, but the scale is beyond the resolution at 15GHz.

4. Polarization Structure

43GHz (7mm):
Compare with 15GHz ,the EVPA is more parallel to the jet direction. Under the limit resolution, the VLBI core in fact is a mixture of optical thick component (core) and optical thin components (jet).And if here comes out a new bright jet component, the percentage of the optical thin components will get higher, and so the polarization structure is dominated by the optical thin components which can not be resolved by our array.



5.Future scientific analyses

1. Try to distinguish the core component in 86GHz.

2. Make a further annualize of the helical motion of the jet component. Study the 2-dimensional proper motion of every component.

3. Try estimating the rotation measure and the orientation of B-field

*** Our main challenge is the narrow IF separation in one frequency. It's only 8MHz.**

5.Future scientific analyses

3.Try estimating the rotation measure and the orientation of B-field

$$\chi = RM\lambda^2$$

(1)Try deriving the order of magnetic field from the flux at turnover frequency

$$F_{\nu m} \propto B^{-\frac{1}{2}}$$

(2)Deriving the electron number density

$$RM \propto \int n_e B \cos\theta dl$$

(3) Input parameters to test the model of the jet structure
Helical?

- That's all !Thanks for your listening!
- Special thanks to Dr.L.Gurvits and his help.
- If you have any question or comments, just e-mail me!
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