EATING VLBI observations of 3C84, Mrk501 and TXS 0506+056

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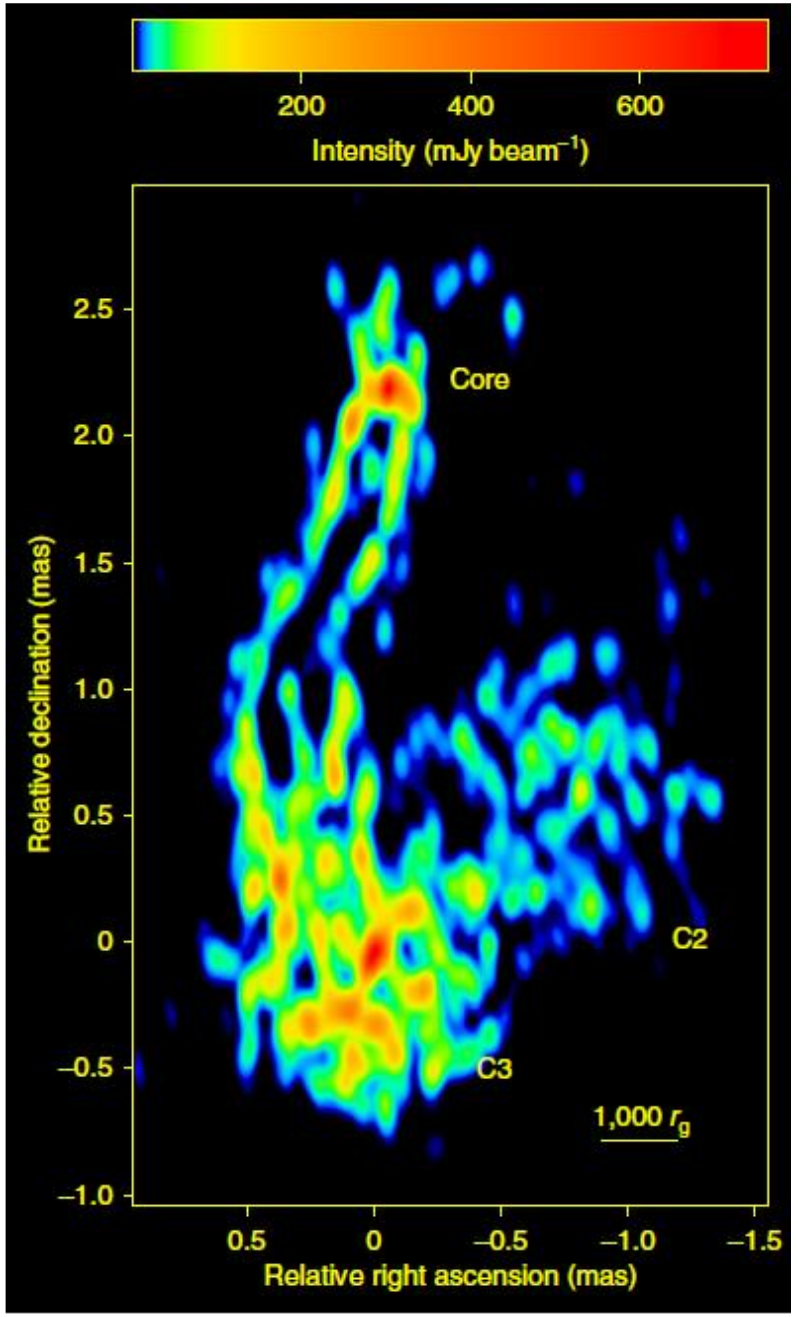
and EATING VLBI members

Motivation

- Imaging nearby AGN with a trans-continental VLBI array at high frequency
- Limb-brightened jets of 3C84, MRK 501, and TXS 0506+056
- Two epochs of pilot observation
- High cadence monitoring project will be followed to study
  - ✓Location of the high-energy emitting region
  - ✓Physical properties of the jet launching and acceleration region (e.g. Giovannini's talk)



Giovaninni+(2018), Nat. Astro.

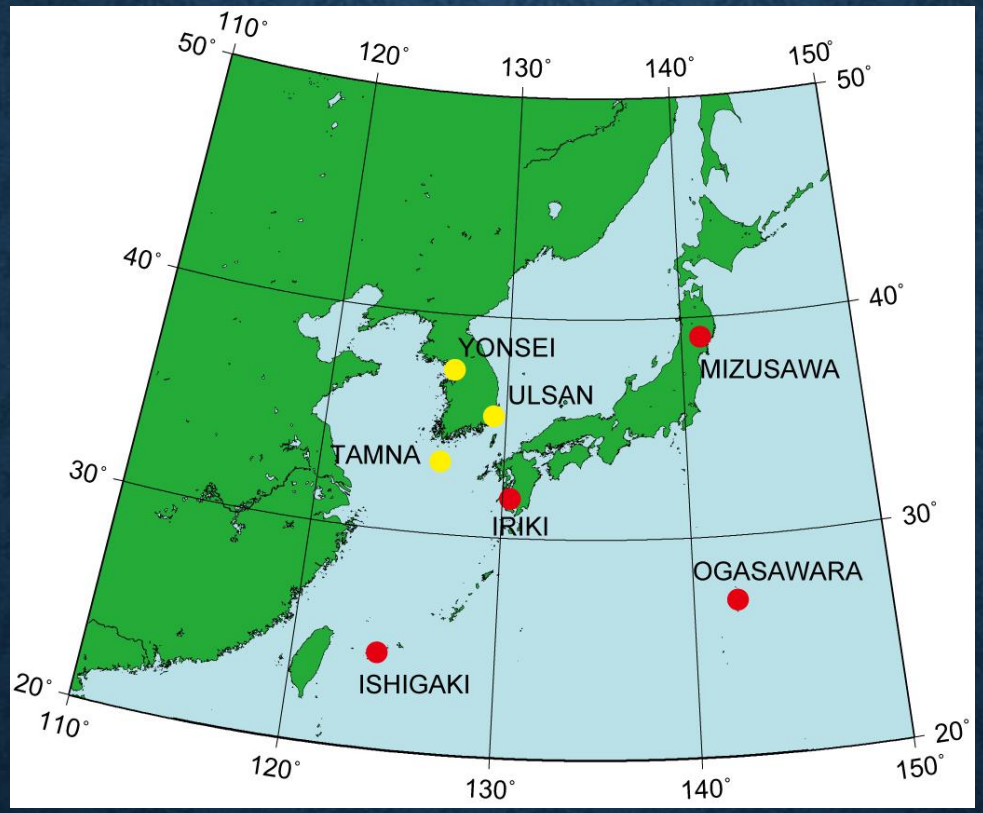
Status

- EATING VLBI
  - Obs. #1 2018-02-02; k18bs02a; in correlation process
  - Obs. #2 2018-05-23; k18bs02b;

VLBI polarization of 3C84
from recent KaVA polarization commissioning

KaVA stands for KVN and VERA joint Array

- 4 20m VERA and 3 21m KVN
- 22 GHz and 43GHz
- Single Polarization
- 1 Gbps (256MHz)
- 500 hours/year of open use
- Call for Proposal deadline
  - June and November 1st

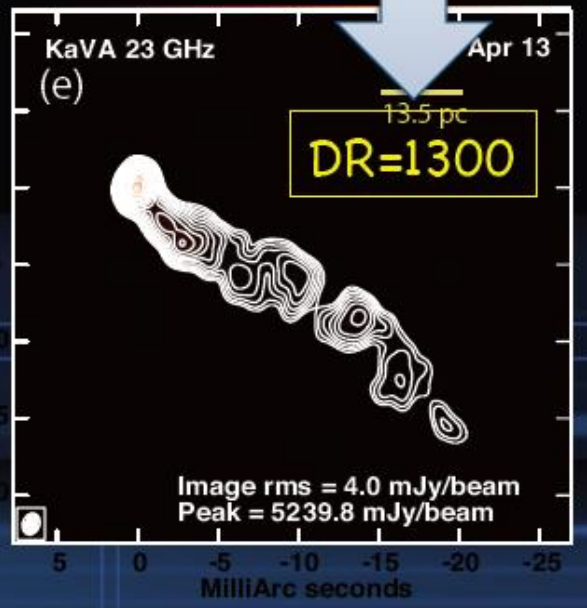


- Science WGs
  - AGN, SF, ES
  - Astrometry (new)
- Large Programs by SWGs
  - 3 Large programs
- Upgrading
  - Bandwidth
  - Polarization
  - Phase referencing

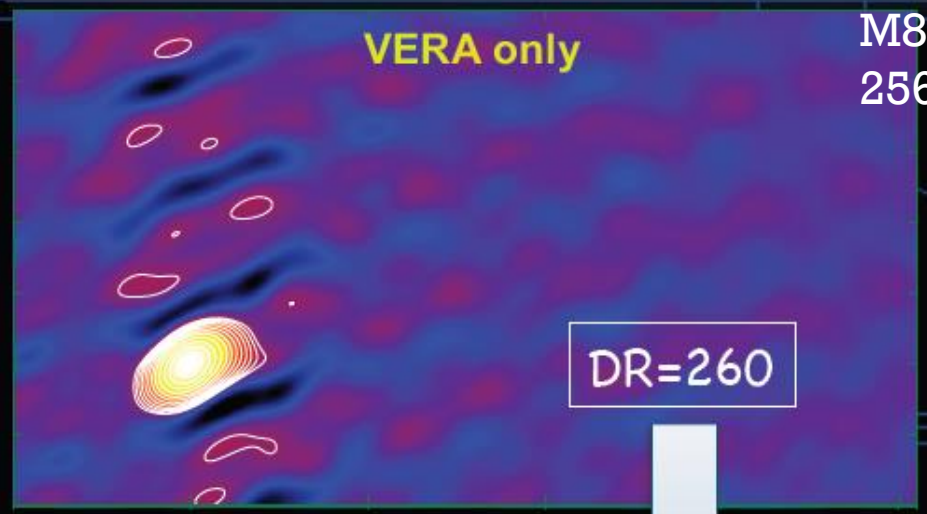
Imaging performance (Niinuma+2014)

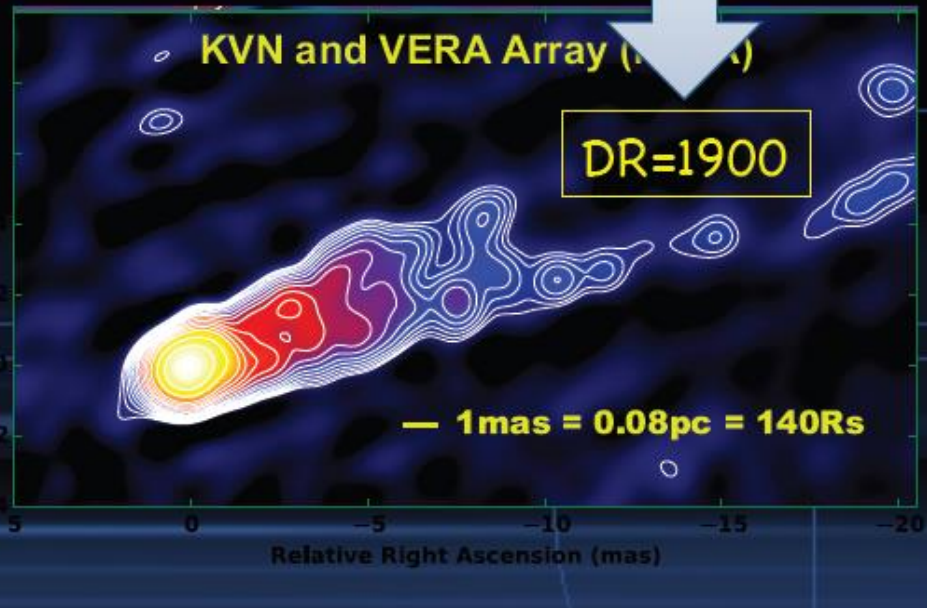
3C273
32MHz

128Mbps test



M87
256MHz



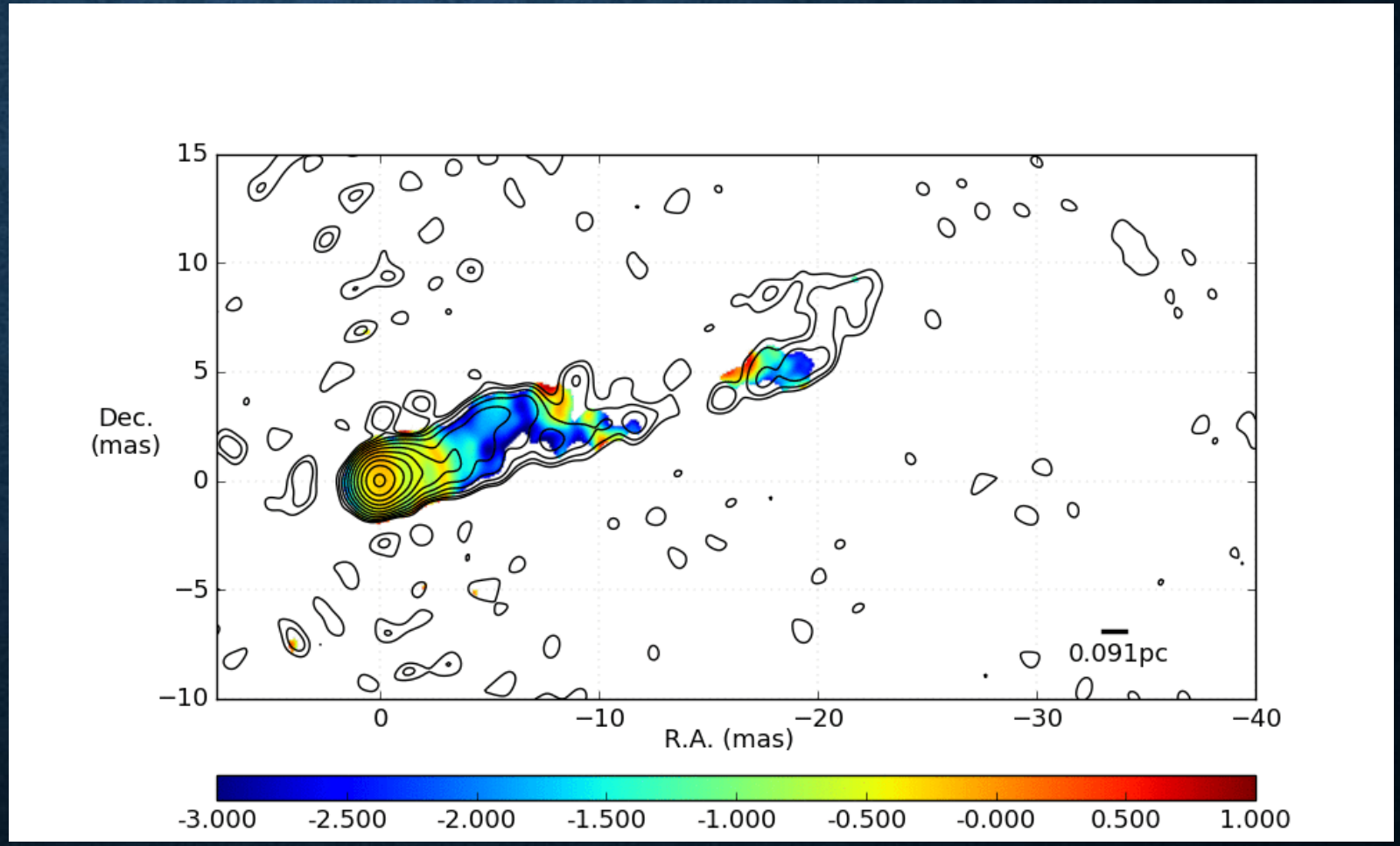


Preliminary result

KaVA M87 movie spectral index movie [Quasi-simultaneous, high-cadence]

KaVA AGN Large program
M87 & Sgr A* since 2016

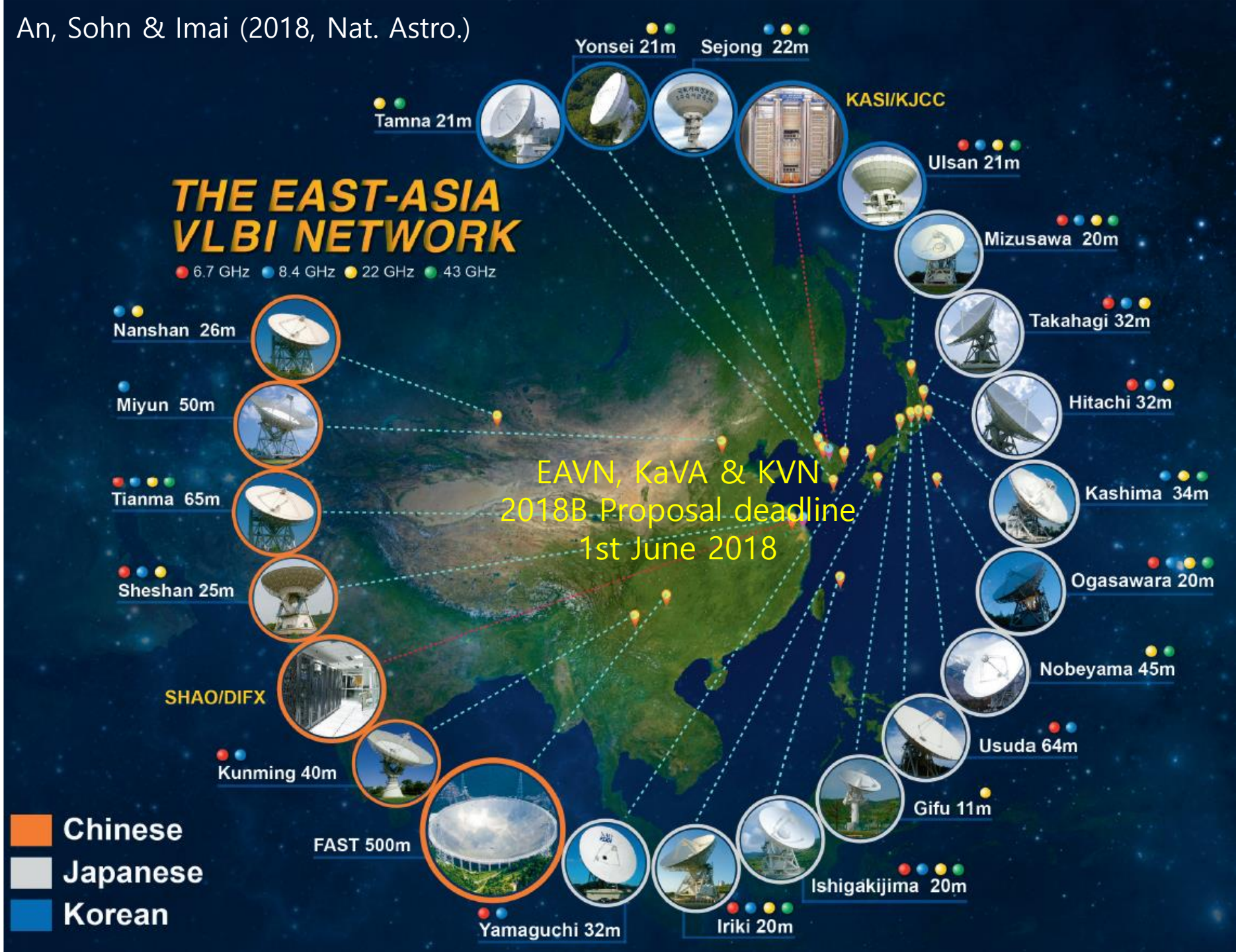
Core-shift is < 0.02 mas which is in agreement with Hada+(2011)



Ro+ in preparation

KaVA is Precursor of EAVN

An, Sohn & Imai (2018, Nat. Astro.)



KaVA Precursor of EAVN

or

Polynesian Drink

A ‘KaVA’ bar in Hilo

KaVA polarization

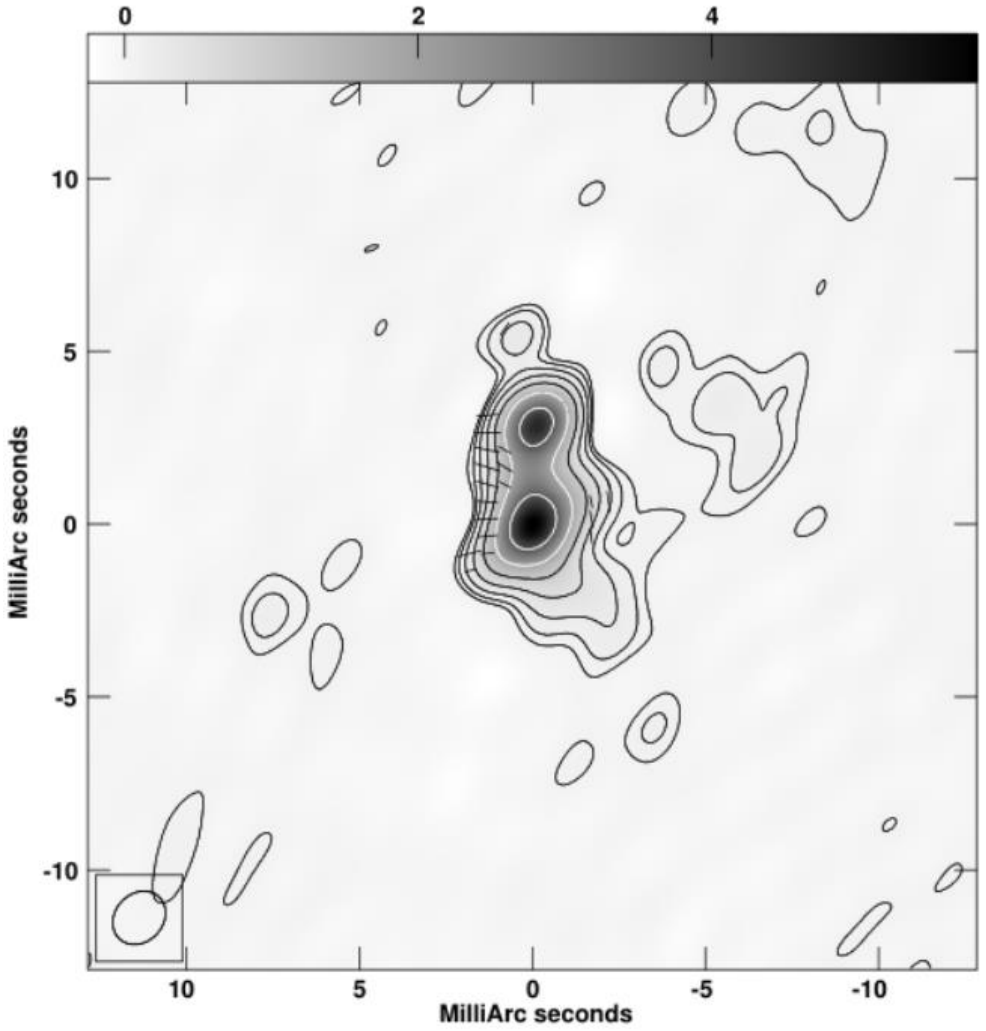
- KVN is capable of polarization observation at 22/43/86/129GHz
- VERA is upgrading for K & Q band polarization
- K band installed
- Q band underway
- Test observations (~ 2018) – mostly 3C84
- Aiming to open in 2019
- Science with commissioning data?

24th February 2018

- 5 KaVA telescopes, 22 hrs
- 22GHz, 16MHz * 8 IF, RCP & LCP
- 3C84, 3C279, 3C454.3, 3C286, …

- 3C84
  - Core peak flux 4.7Jy/beam
  - C3 5.8 Jy/beam
  - Eastern Edge >1.1Jy/beam

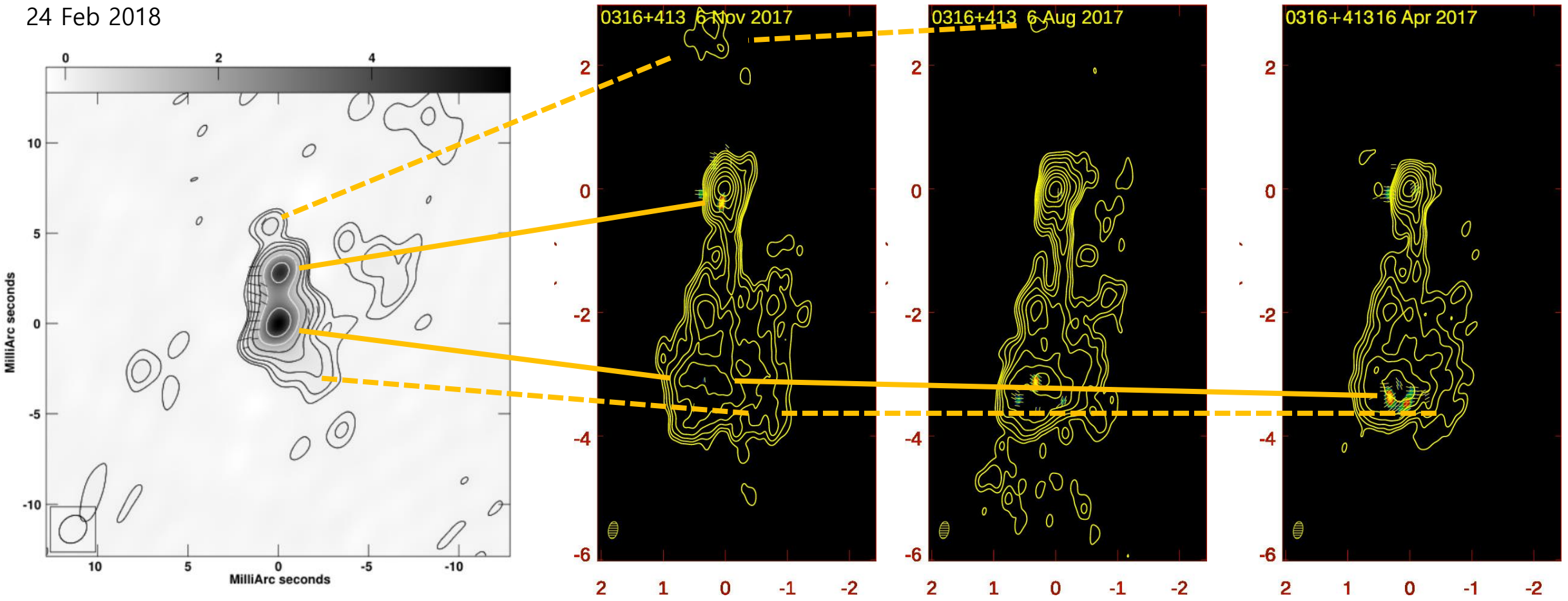
    Its polarized flux ~ 100mJy/beam



First glance. Stokes I looks OK…

- I_P and angle changes a lot in three or four months

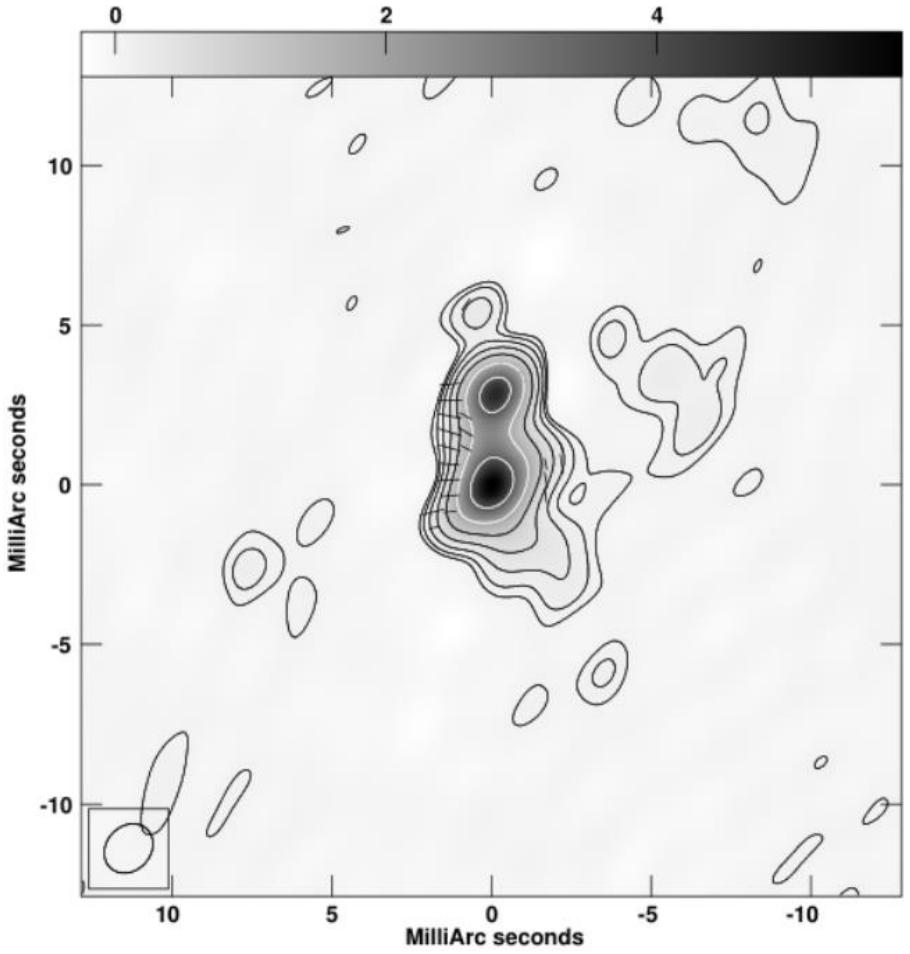
BU Blazar Monitoring data @43GHz



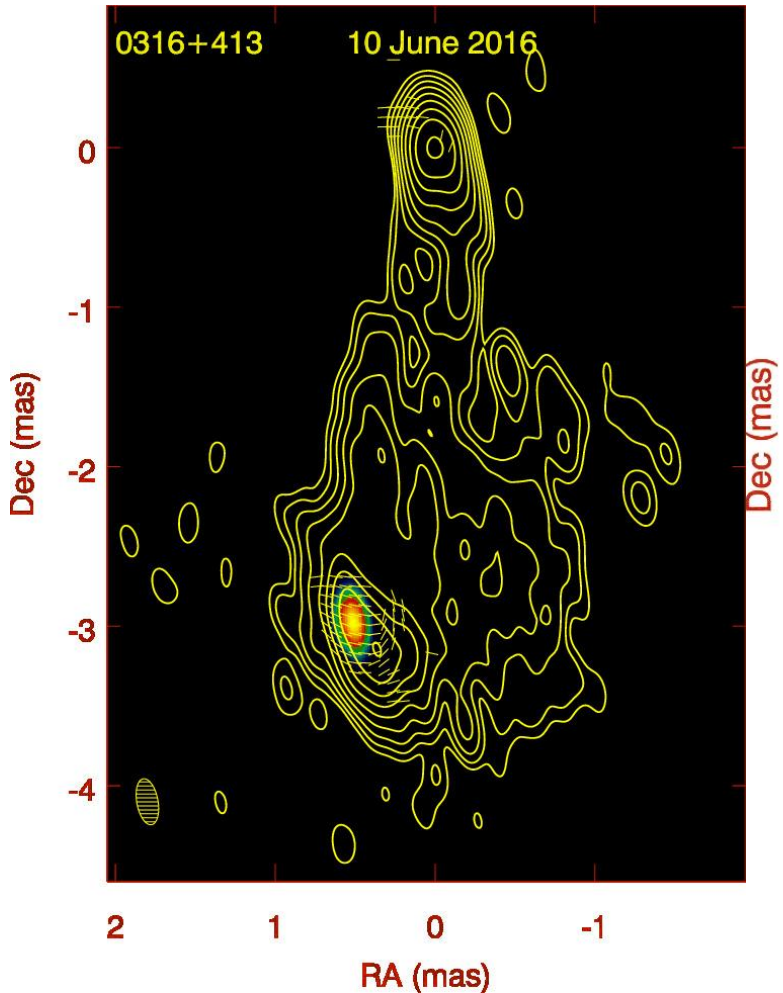
Polarized at eastern limb?

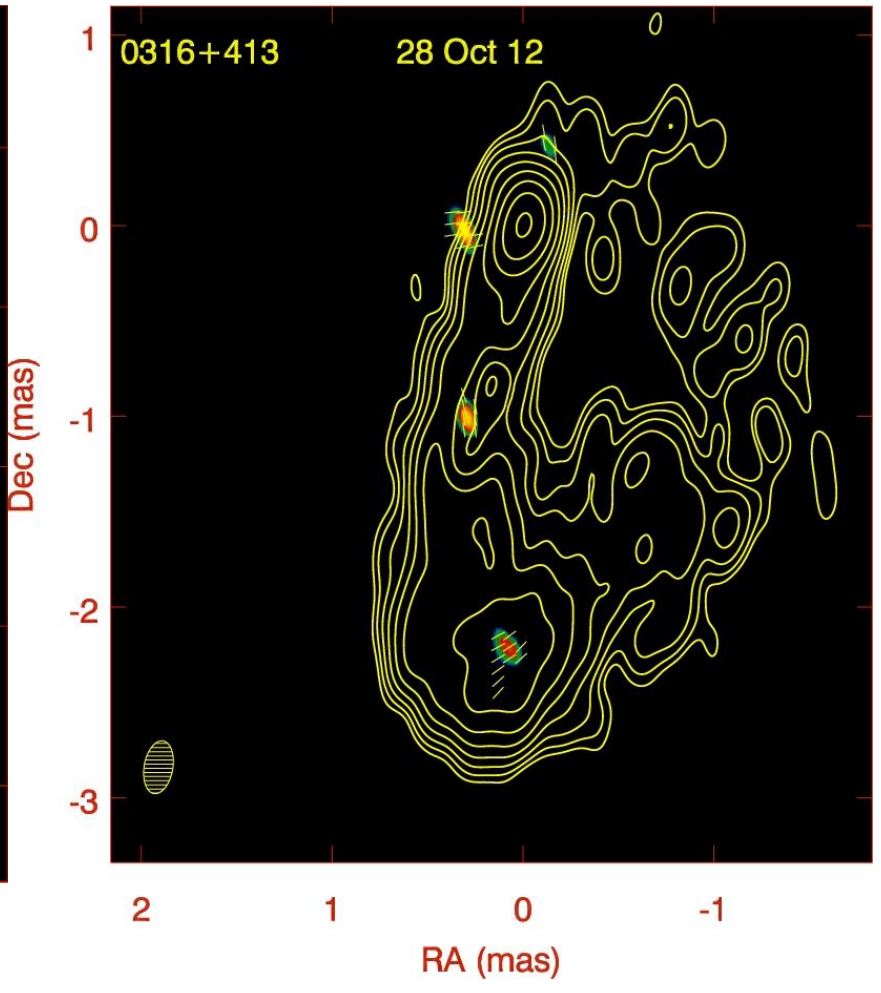
- EVPA 43 GHz ~ 22GHz EVPA? When polarized flux > 50 mJy?
- RM < 10^3 in this region?

24 Feb 2018



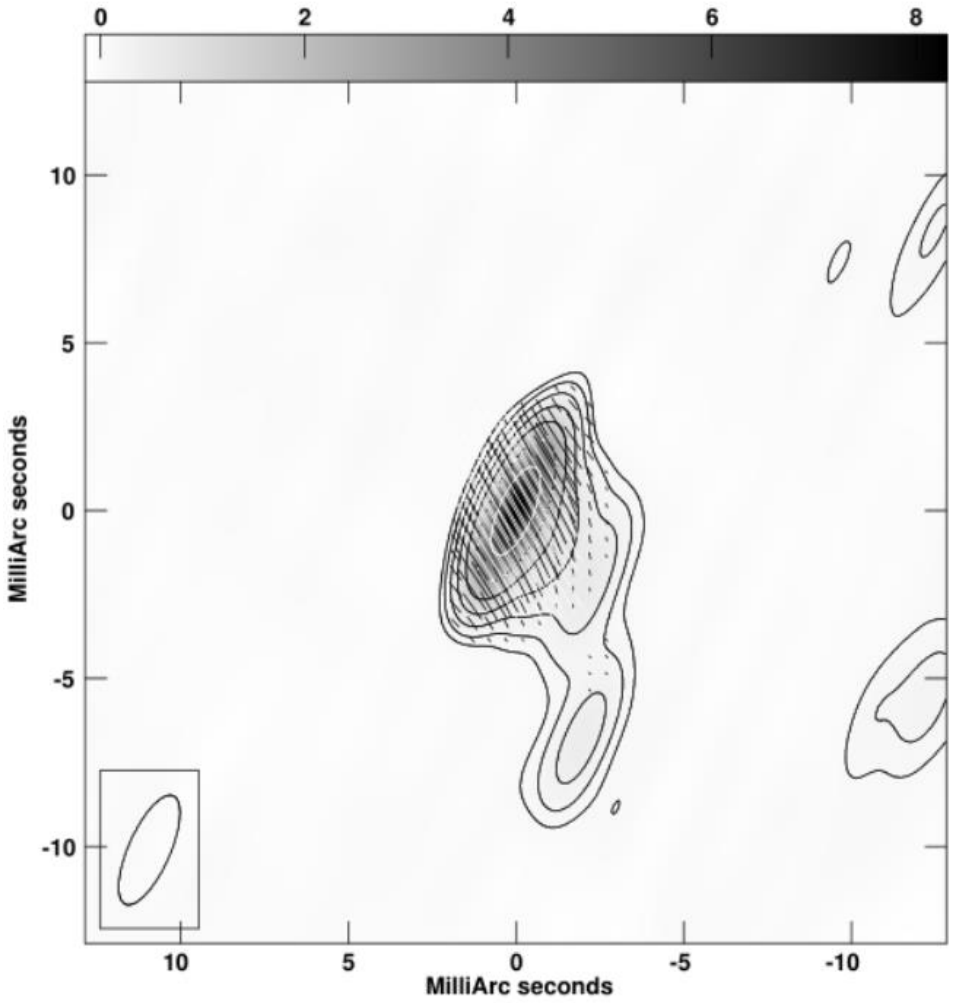
BU Blazar Monitoring data @43GHz



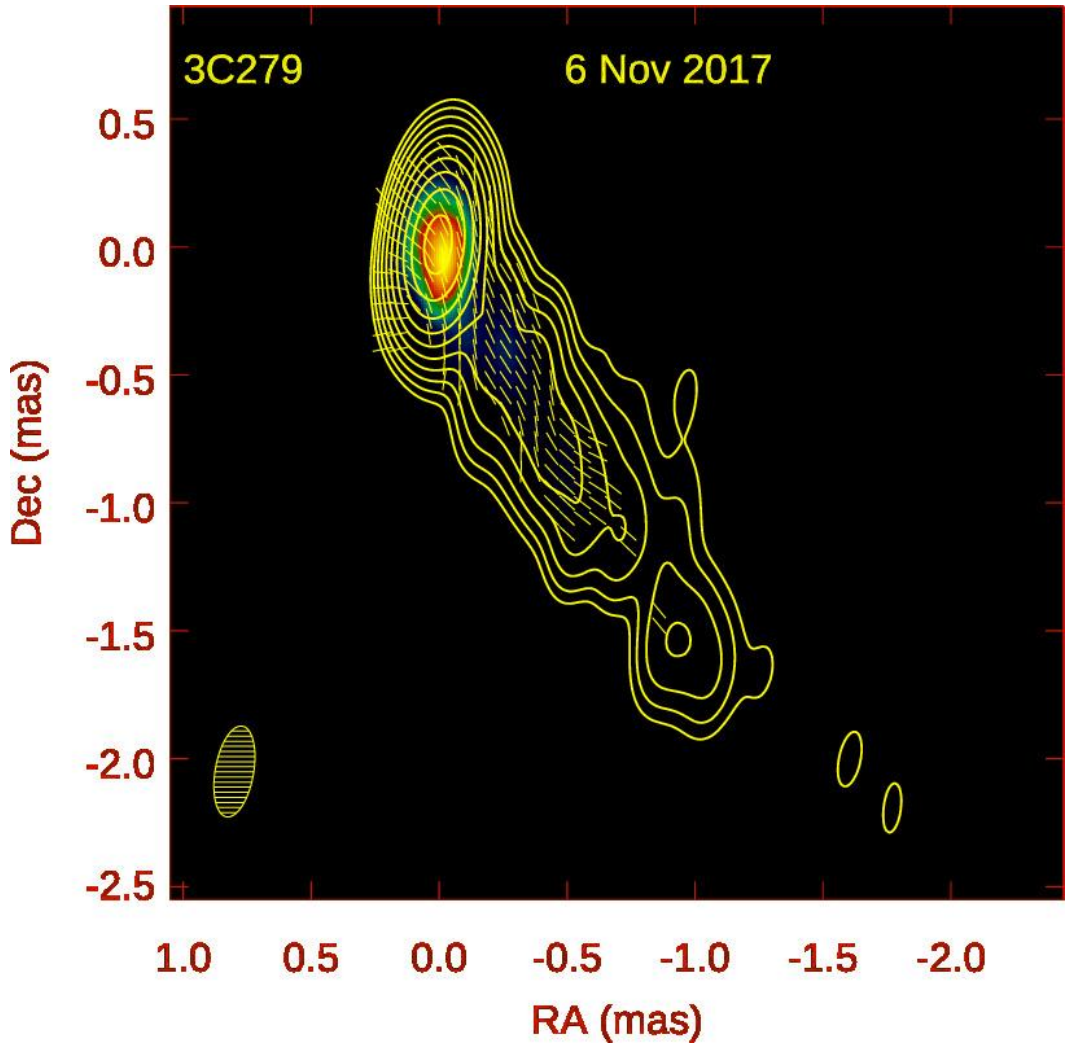


Calibrator 3C279

RM ~ 10^3 (Park+ 2018; KVN)

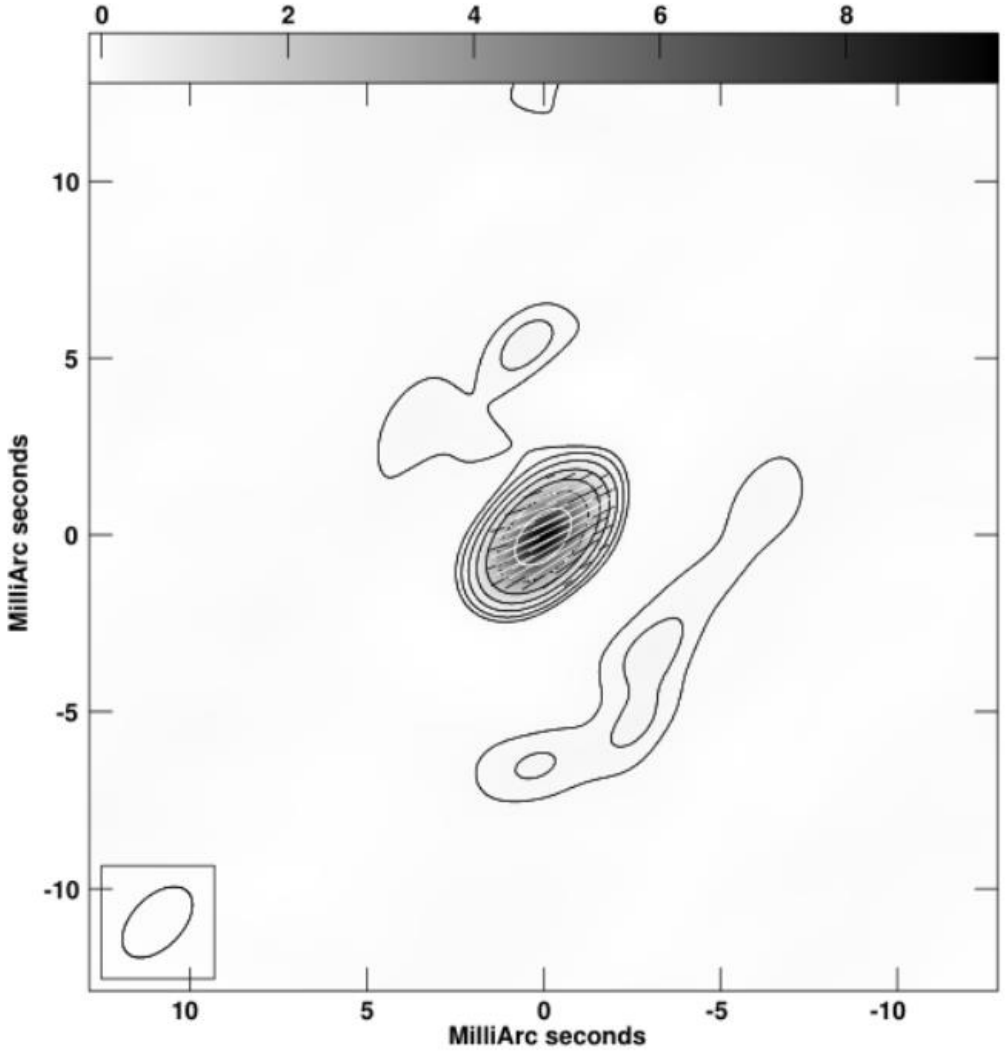


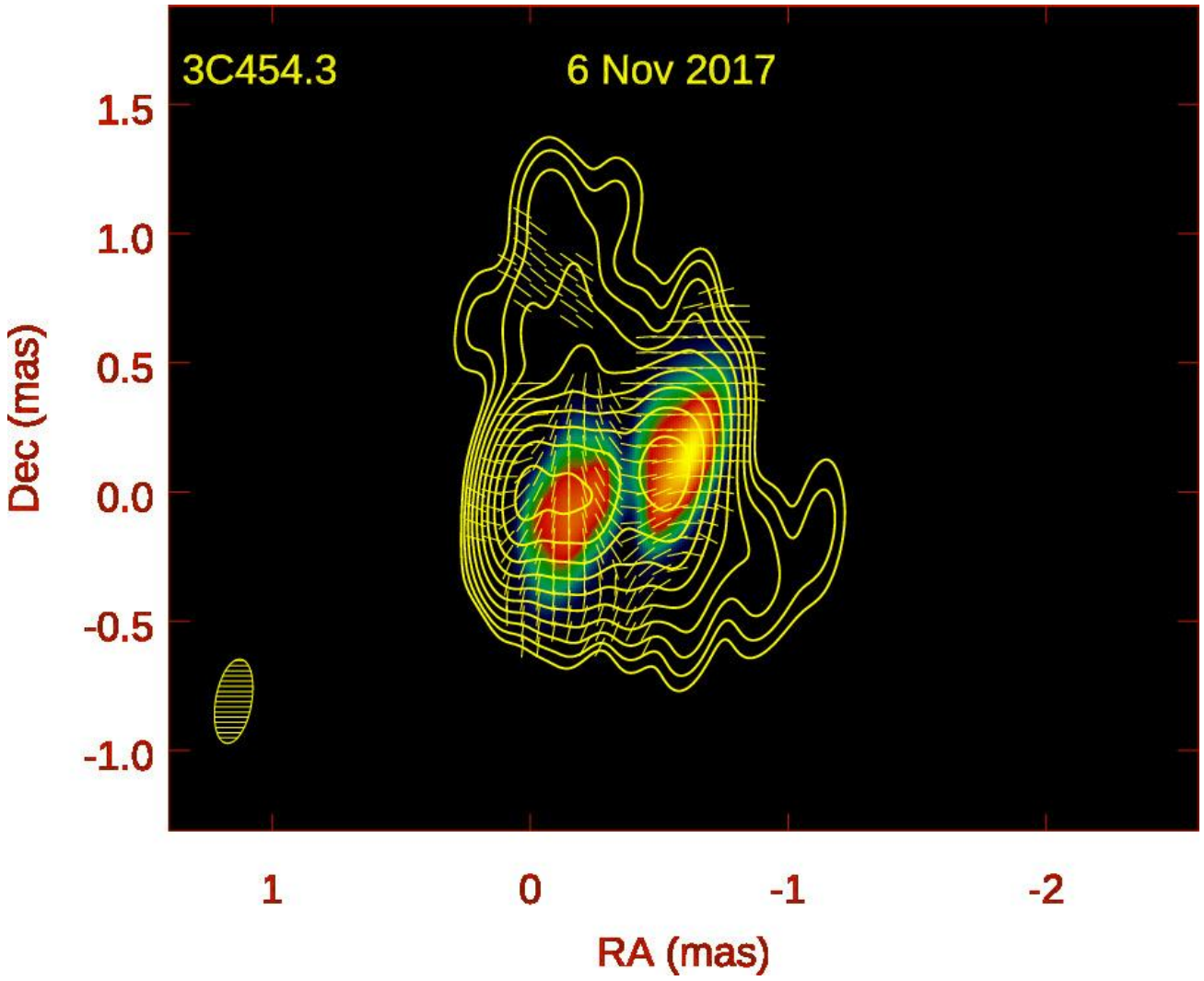
BU Blazar Monitoring Program



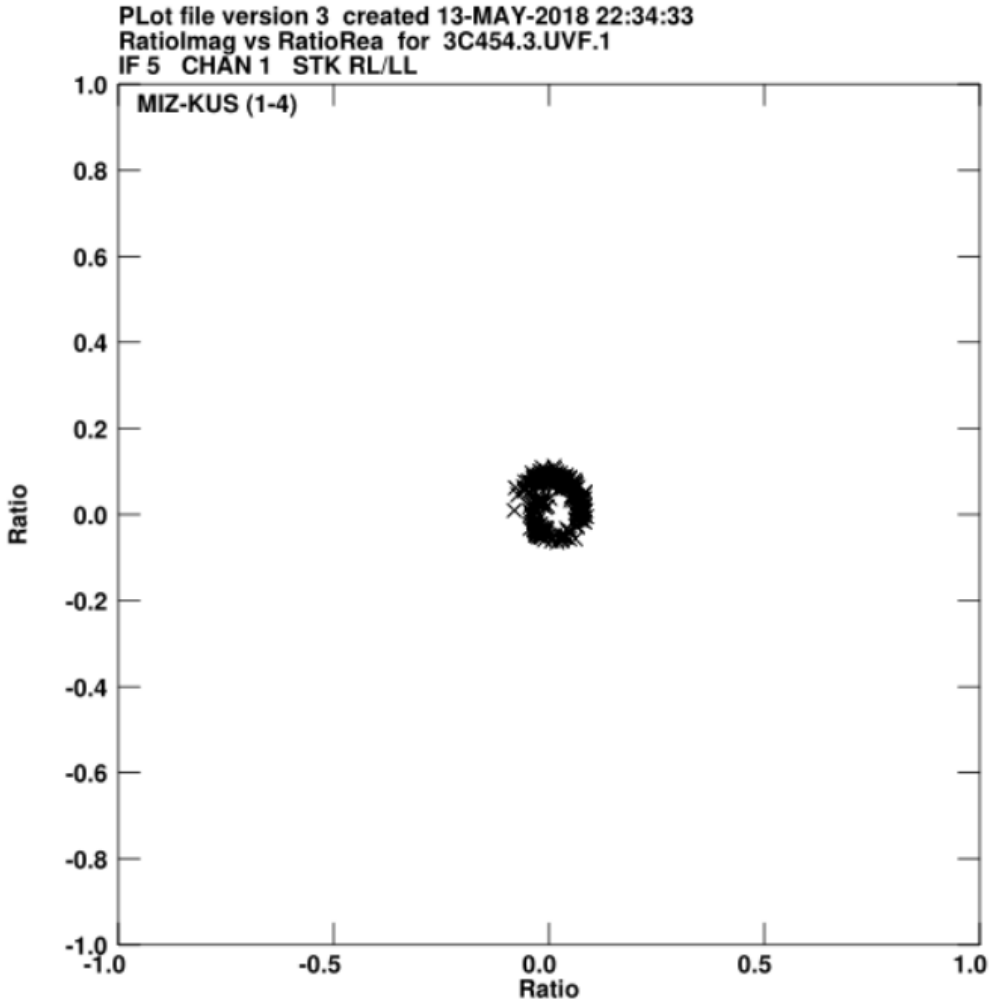
Calibrator 3C454.3

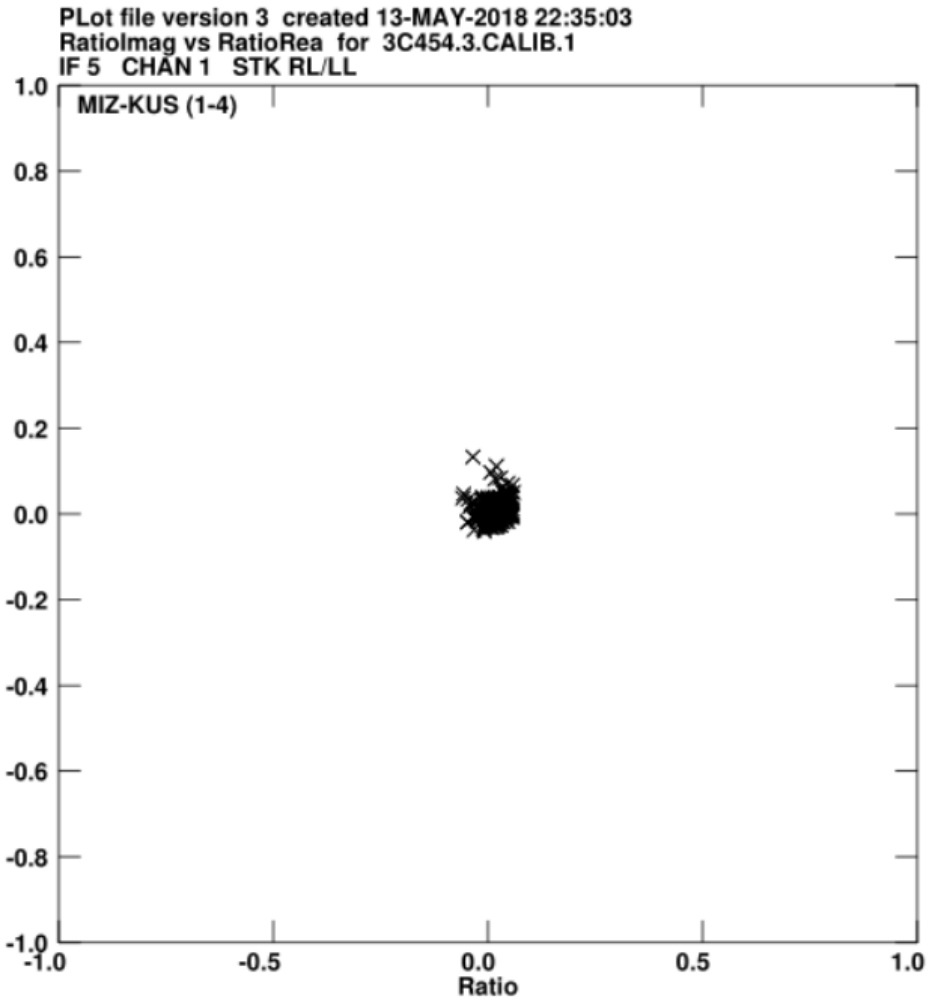
RM > 10^3 (Park+ 2018; KVN)





Polarization cross-talk correction





Summary

- 3C84 K-band polarization image from KaVA K band polarization commissioning data
- Consistent with Boston Blazar Monitoring data
- Polarization enhanced at Eastern Limb?
- EATING VLBI observation in 2018B (two epochs) + 2018A
- KaVA (or EATING VLBI) polarimetry (2019~ + test data)
- Participation of SRT and Tianma