

# Probing the polarized innermost structure of the relativistic jet 4C +01.28

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Forschungsgemeinschaft  
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Collaborators: A. Alberdi, E. Ros, M. Kadler, F. Rösch, J. Kramer, J. Röder, S. von Fellenberg, M. Janssen, F. Eppel, M. Wielgus, C. Fromm, et al.

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# Outline

- Introduction

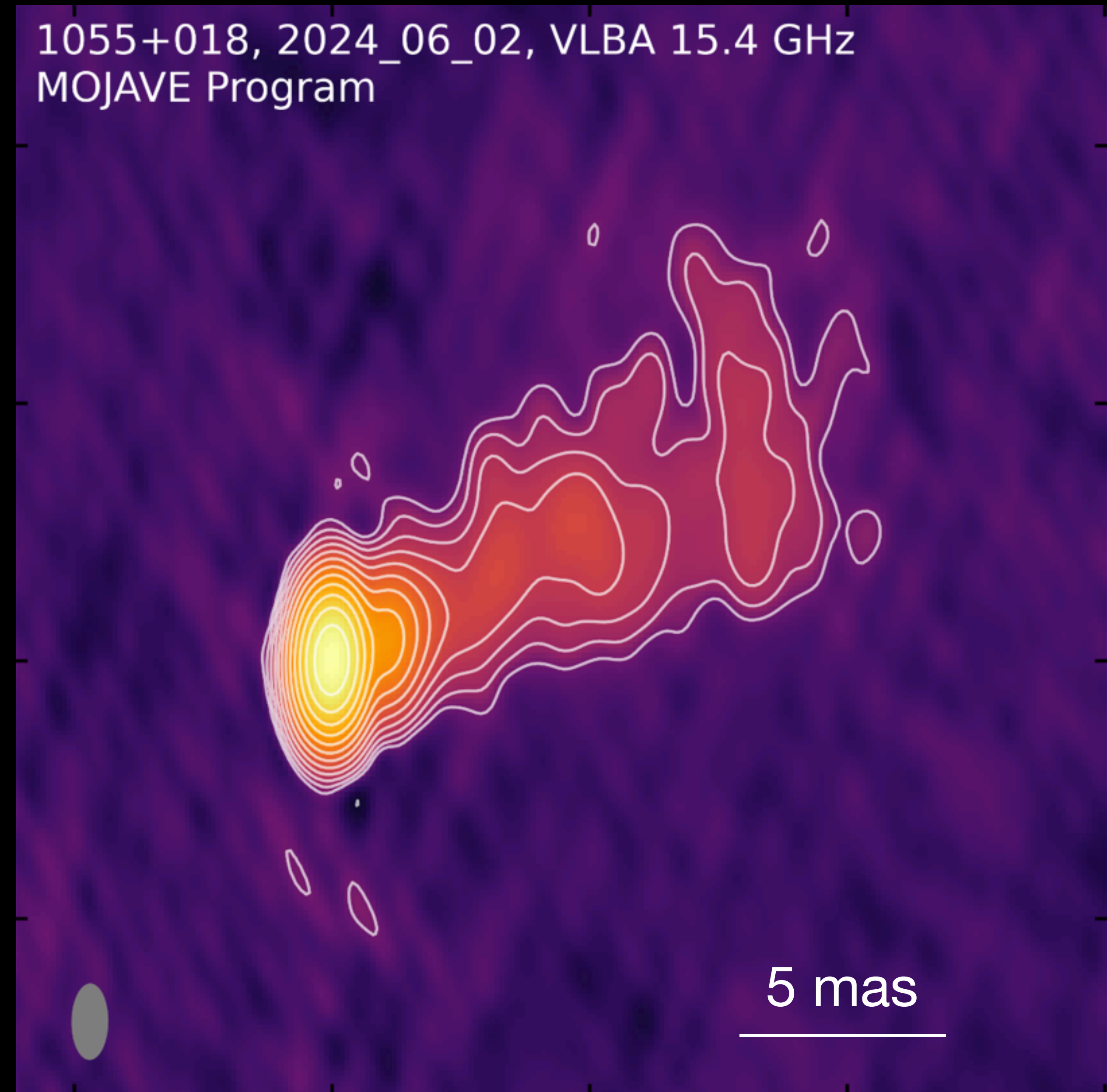
- The source: 1055+018 (aka 4C +01.28)
- Why is this source interesting?

- Preliminary results from VLBI observations

- Conclusions

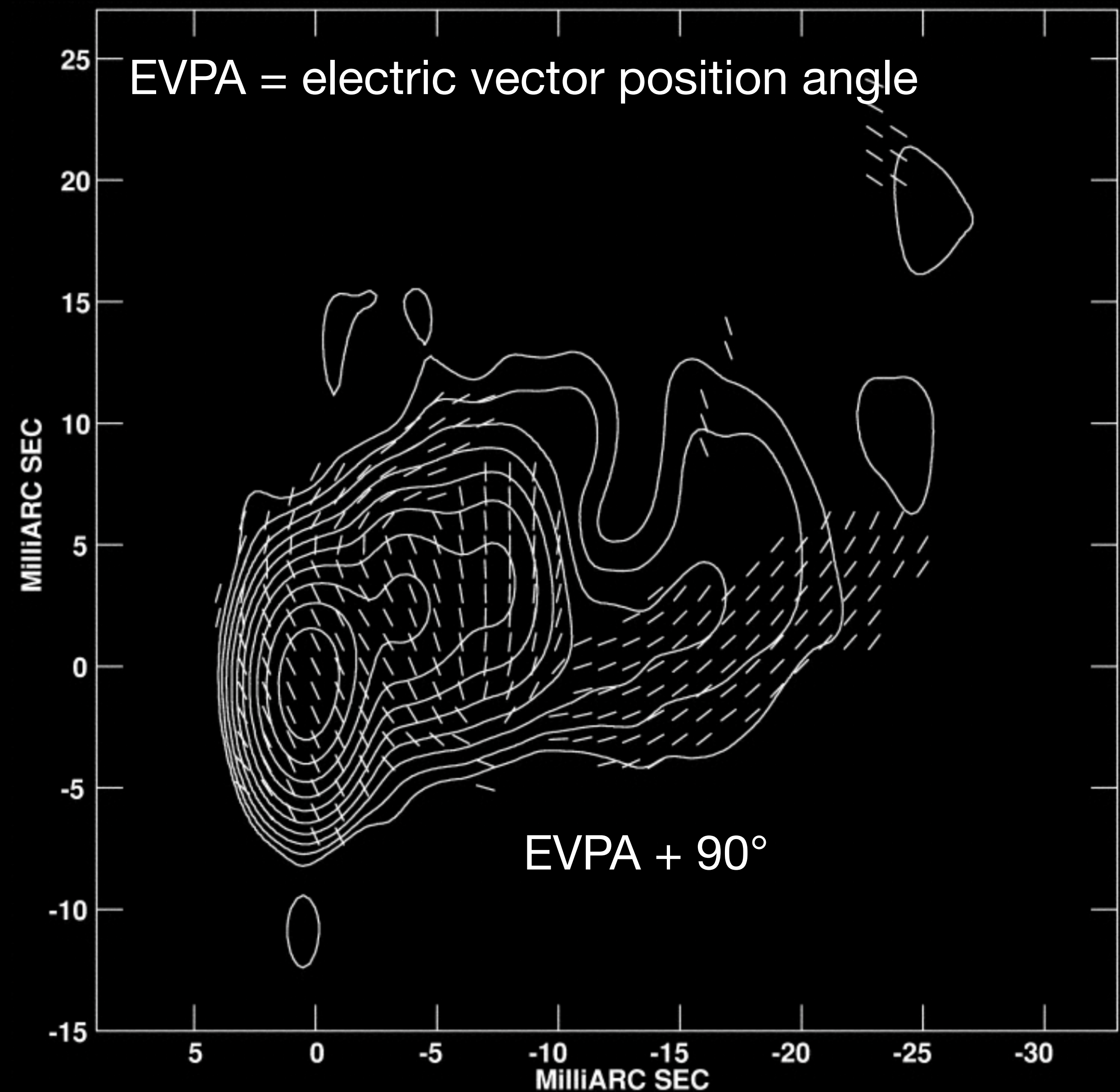
# The source: 1055+018

- Classified as a **FSRQ** (Lister & Homan 2005; Véron-Cetty & Véron 2010)
- Redshift of  $z = 0.89$  (Jorstad et al. 2017)
- **High radio-gamma correlation** (Rösch et al., in prep.)
- Very high levels of **fractional polarization** (15 and 43 GHz)



# Spine-sheath structure

5 GHz observations performed with the VLBA + single VLA antenna

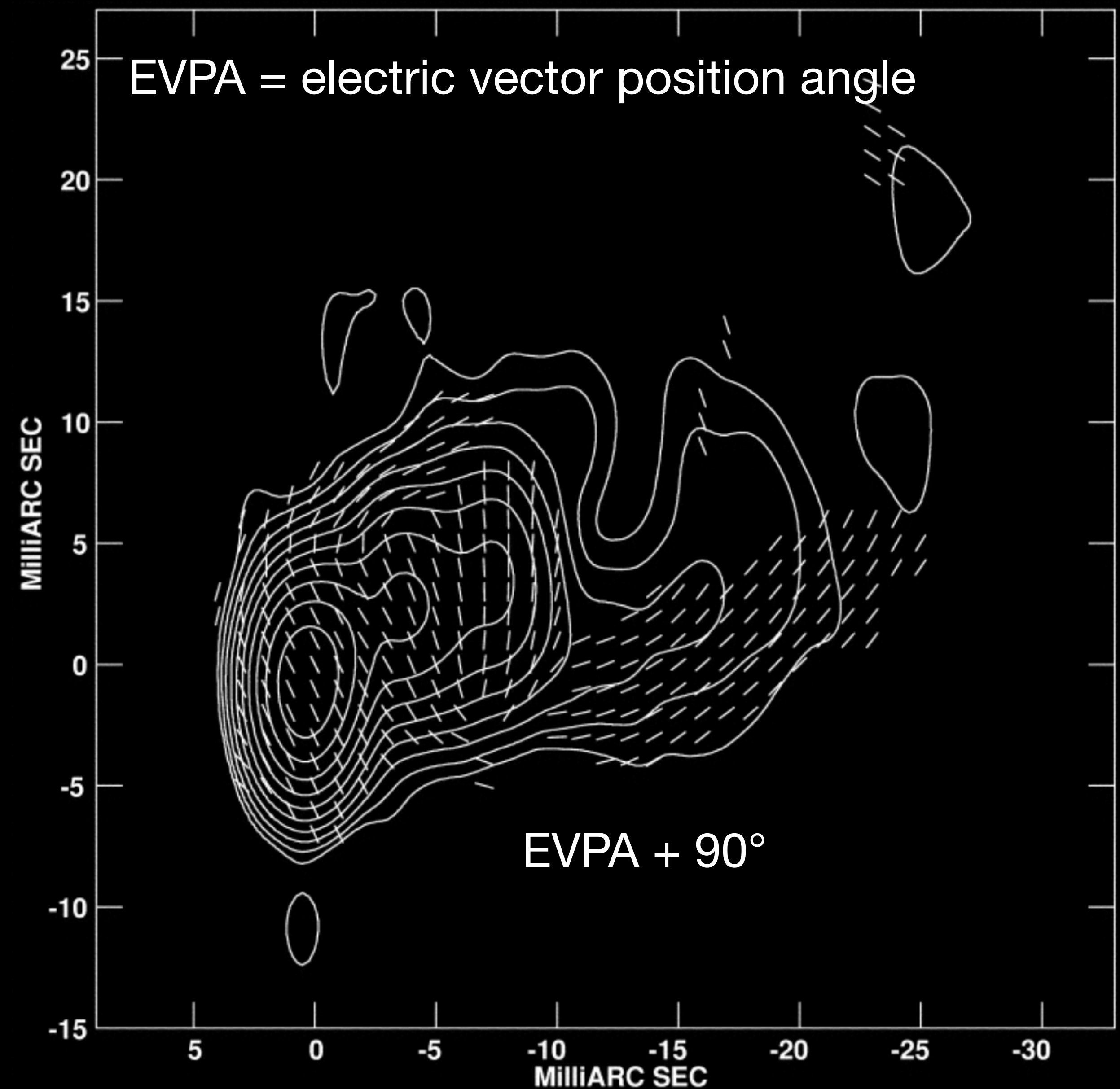


Attridge et al. 1999

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5 GHz observations performed with the VLBA + single VLA antenna

Central spine with magnetic field perpendicular to the jet axis and the sheath with parallel magnetic field



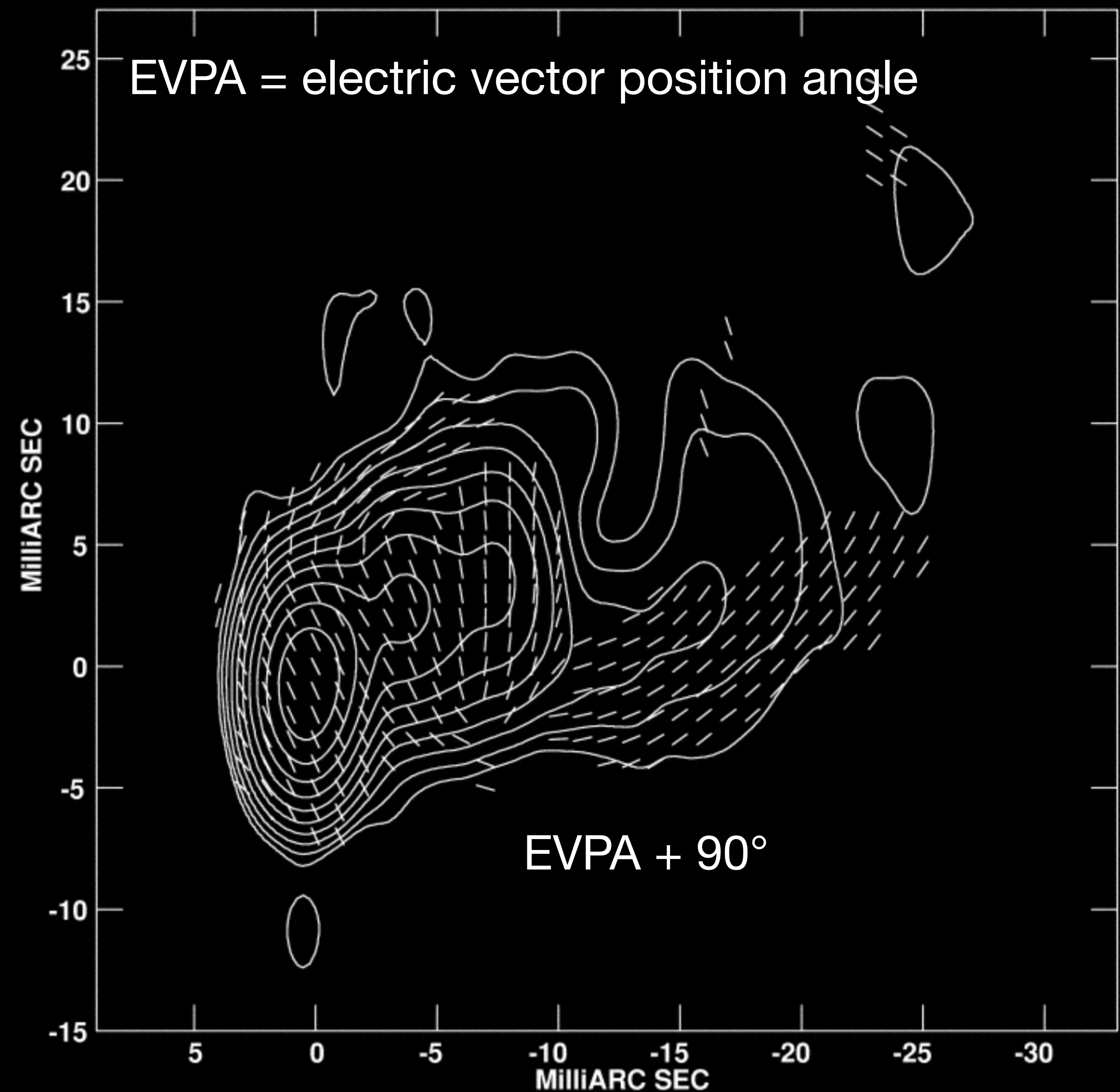
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Is such a polarized structure still visible closer to the jet injection point?

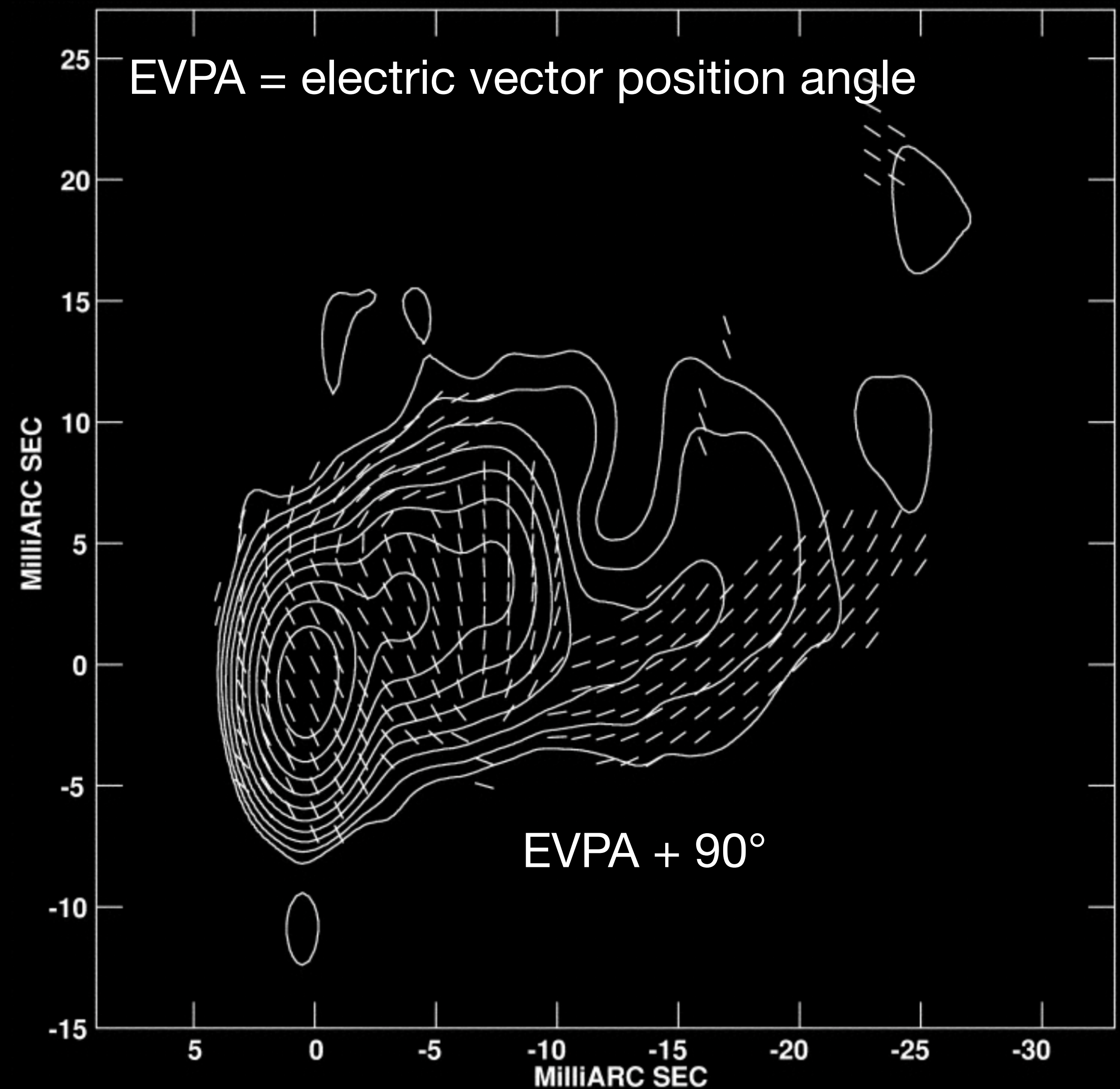


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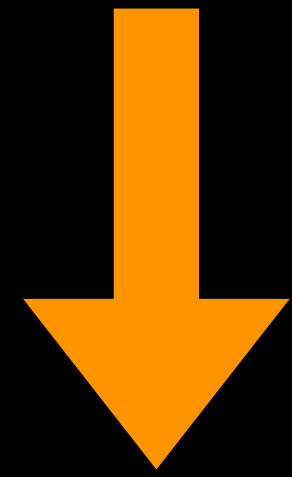
- Global mm-VLBI array (GMVA) observations at 86 GHz
- Event Horizon Telescope (EHT) observations at 230 GHz



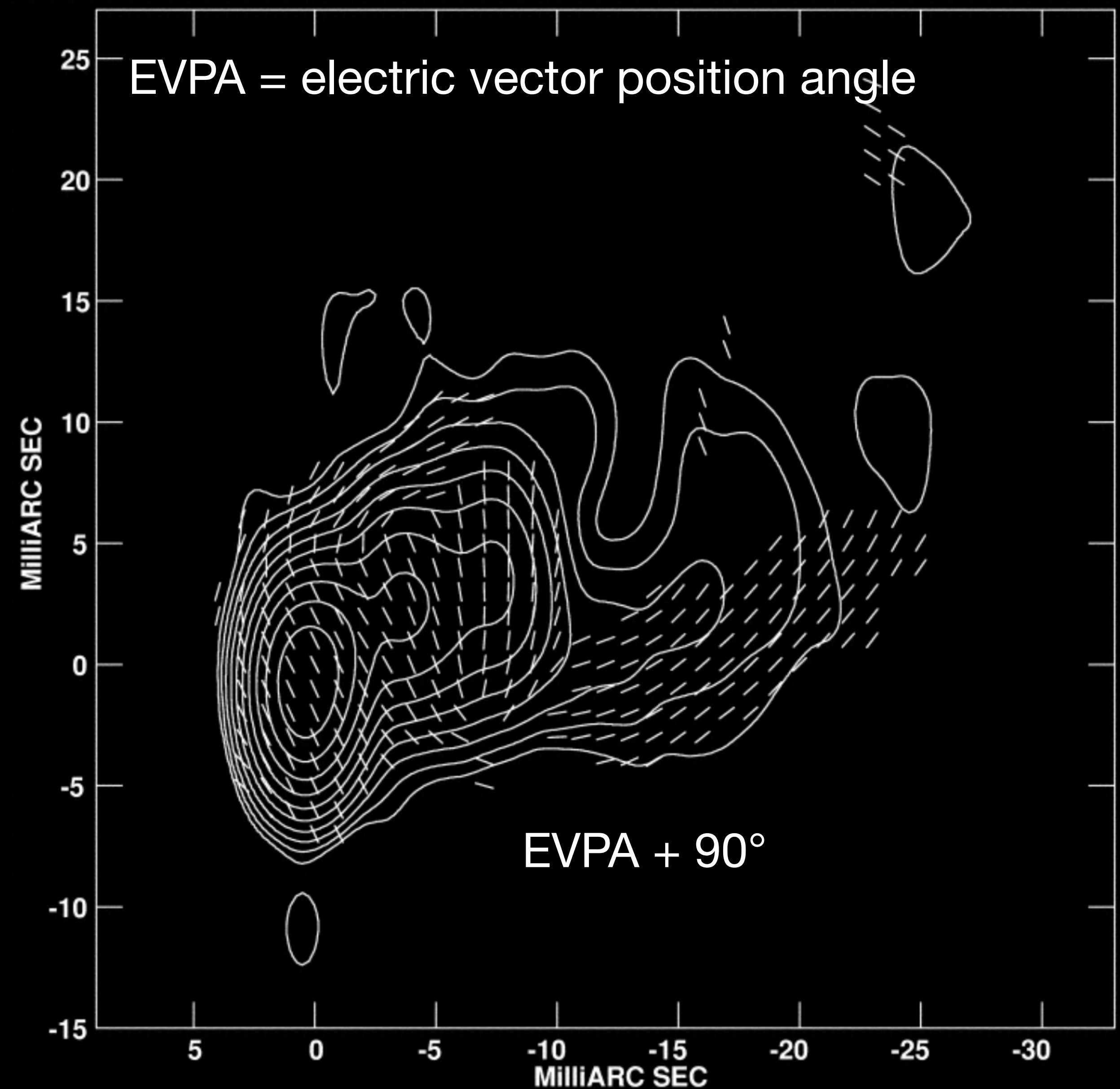
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# Spine-sheath structure

Is such a polarized structure still visible closer to the jet injection point?



Important opportunity to explore the nature of magnetic fields in the relativistic jets and their role in the jet formation processes!



Attridge et al. 1999



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# PI-GMVA observations of 1055+018

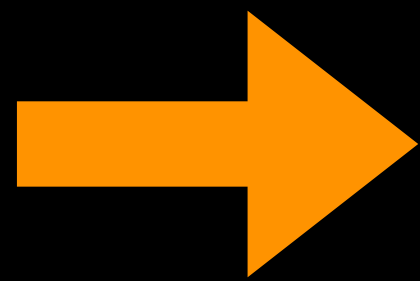
Available observations at 86 GHz:

- 29.09.2014
- 30.09.2016
- 02.04.2017
- 01.10.2017
- 15.04.2018

# PI-GMVA observations of 1055+018

## Available observations at 86 GHz:

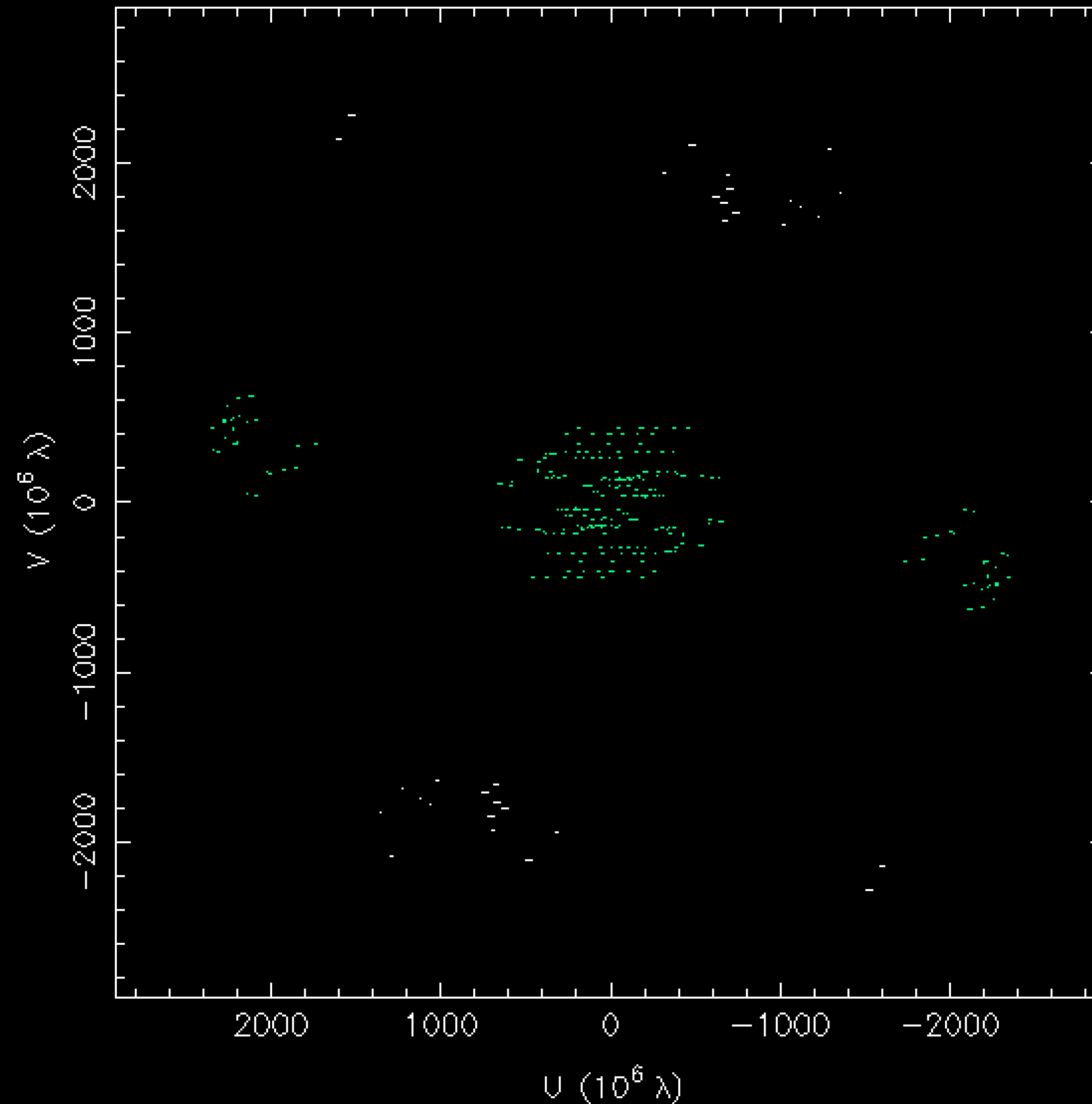
- 29.09.2014
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- 15.04.2018



Edit all channels.

1055+018 at 86.267 GHz in I 2017 Apr 02

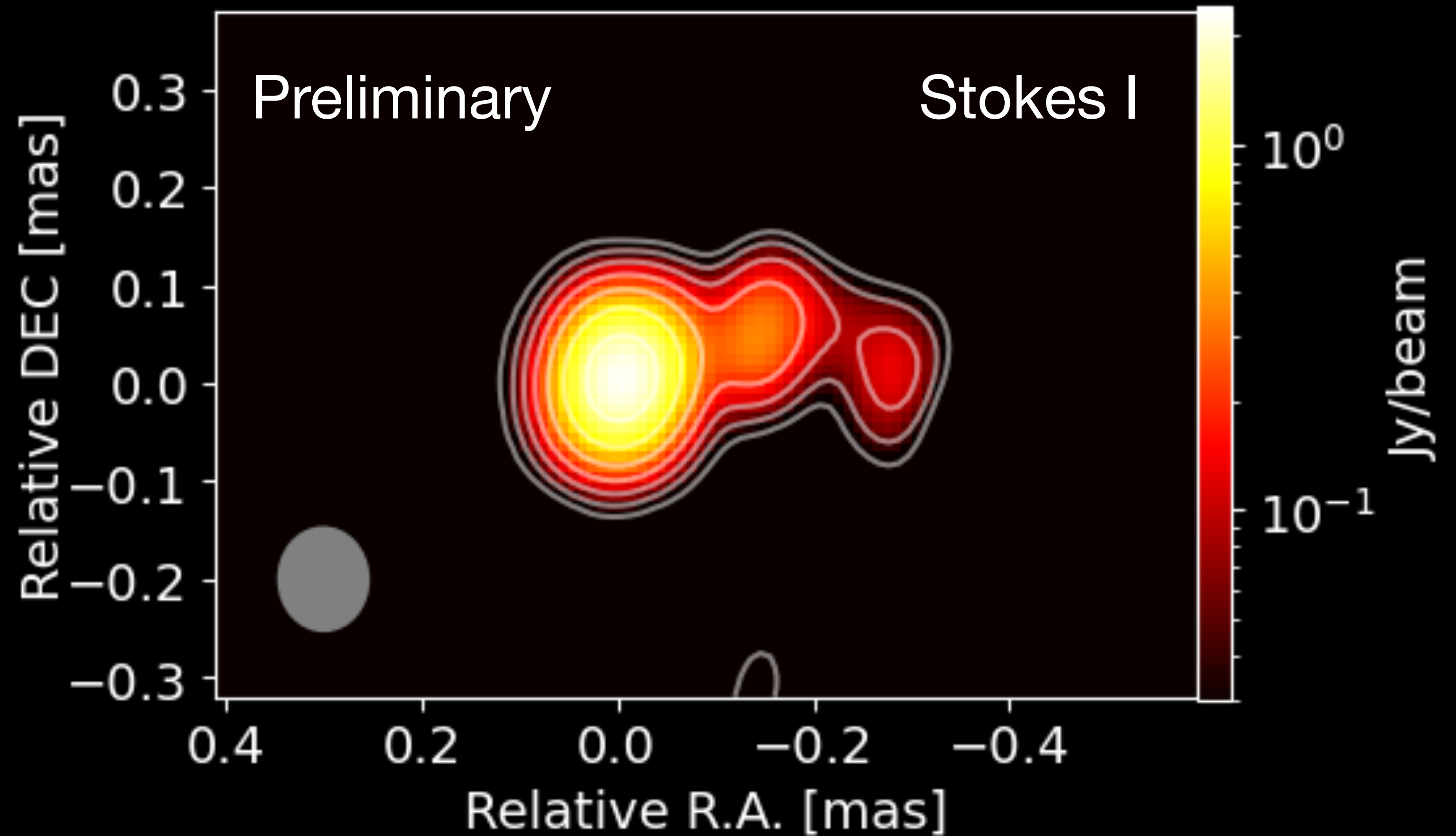
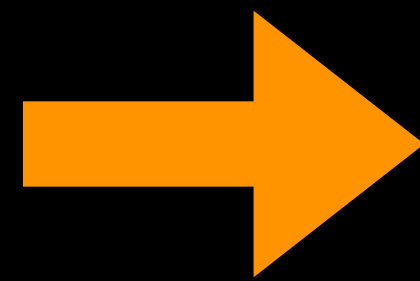
1:AA



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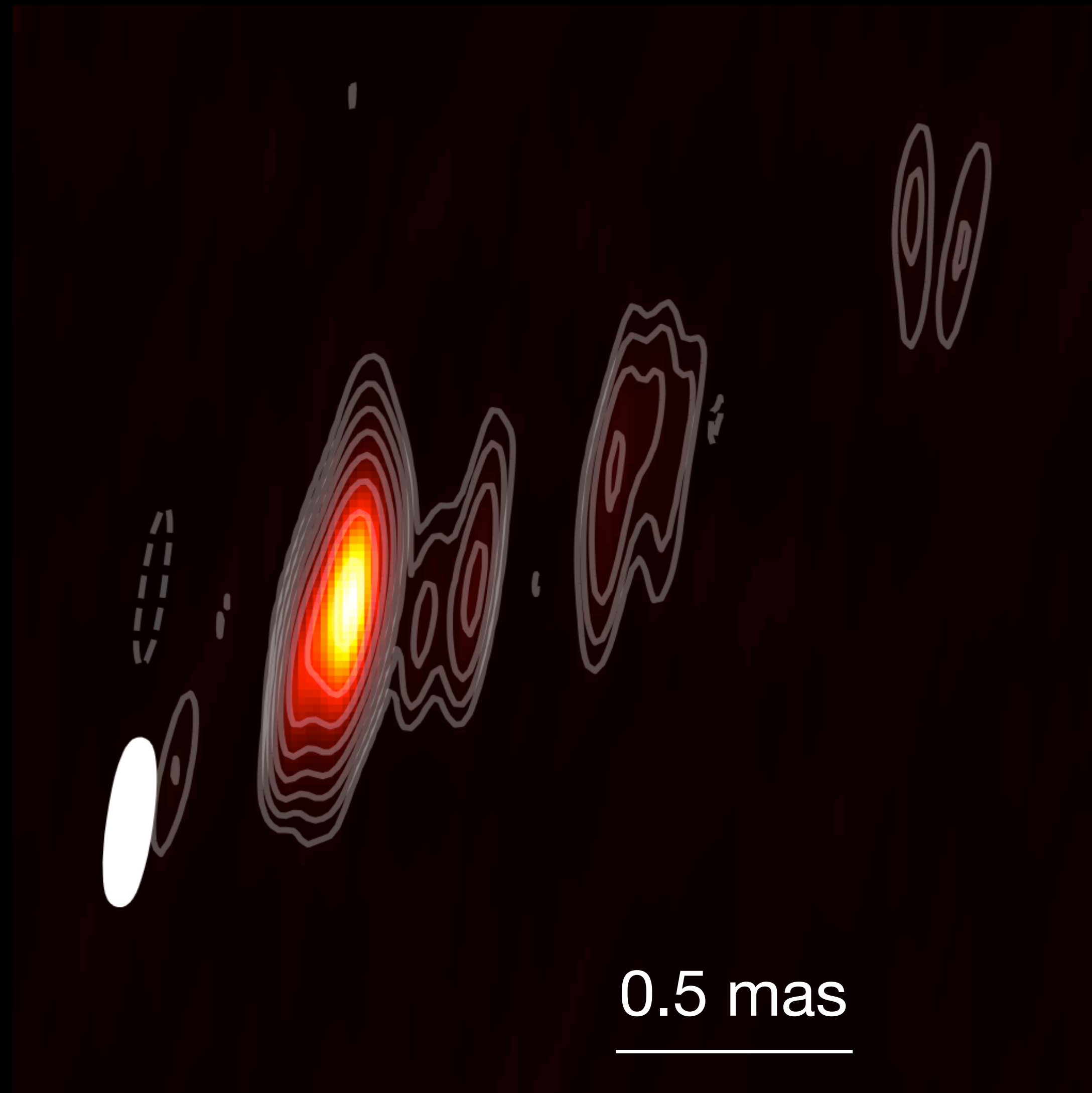
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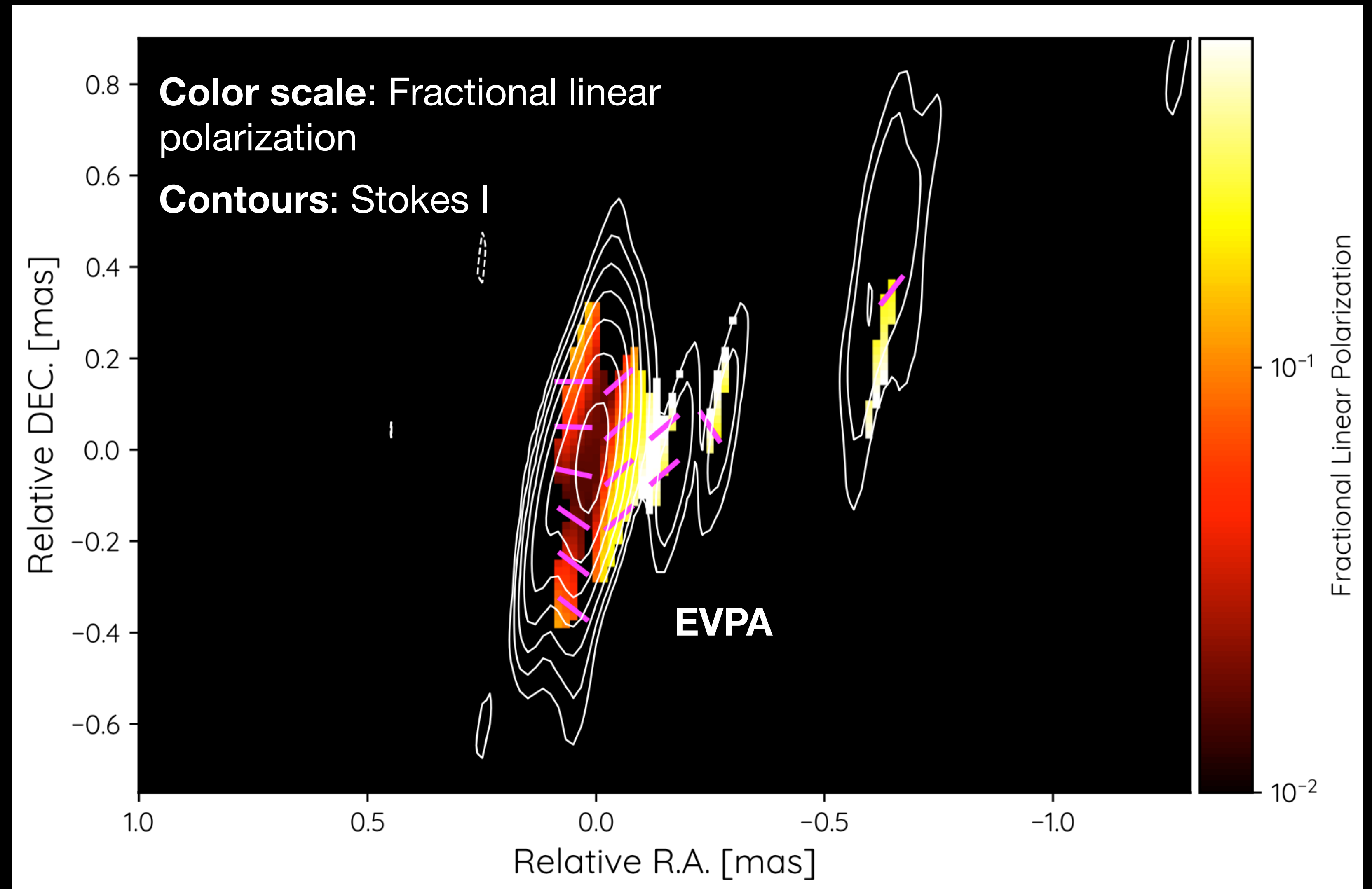
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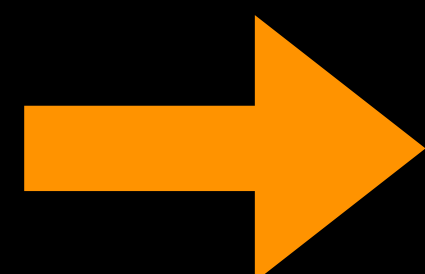
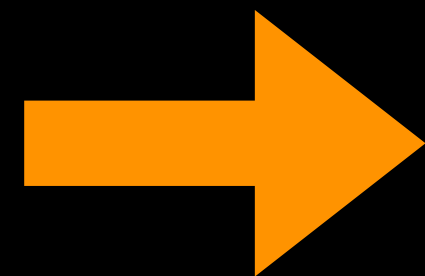
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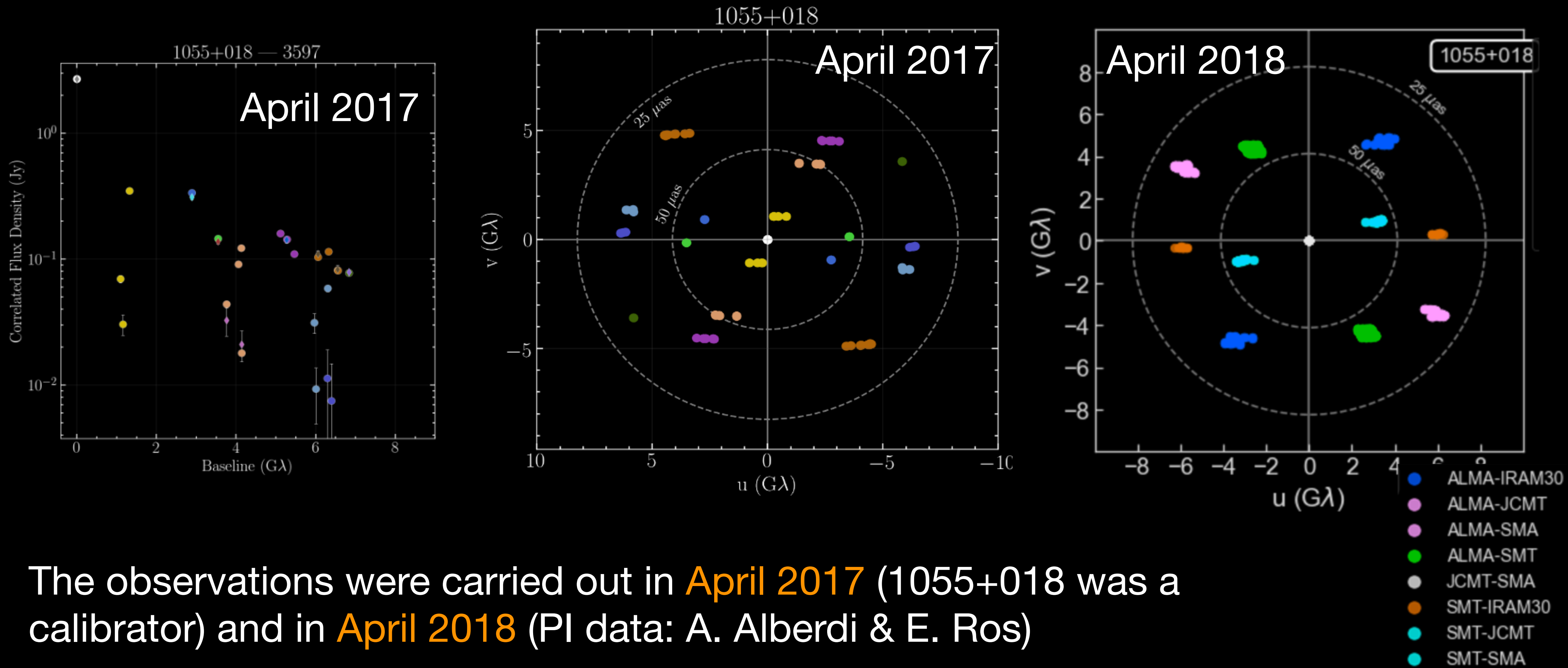
- 01.10.2017

- 15.04.2018



Quasi-simultaneous EHT observations!

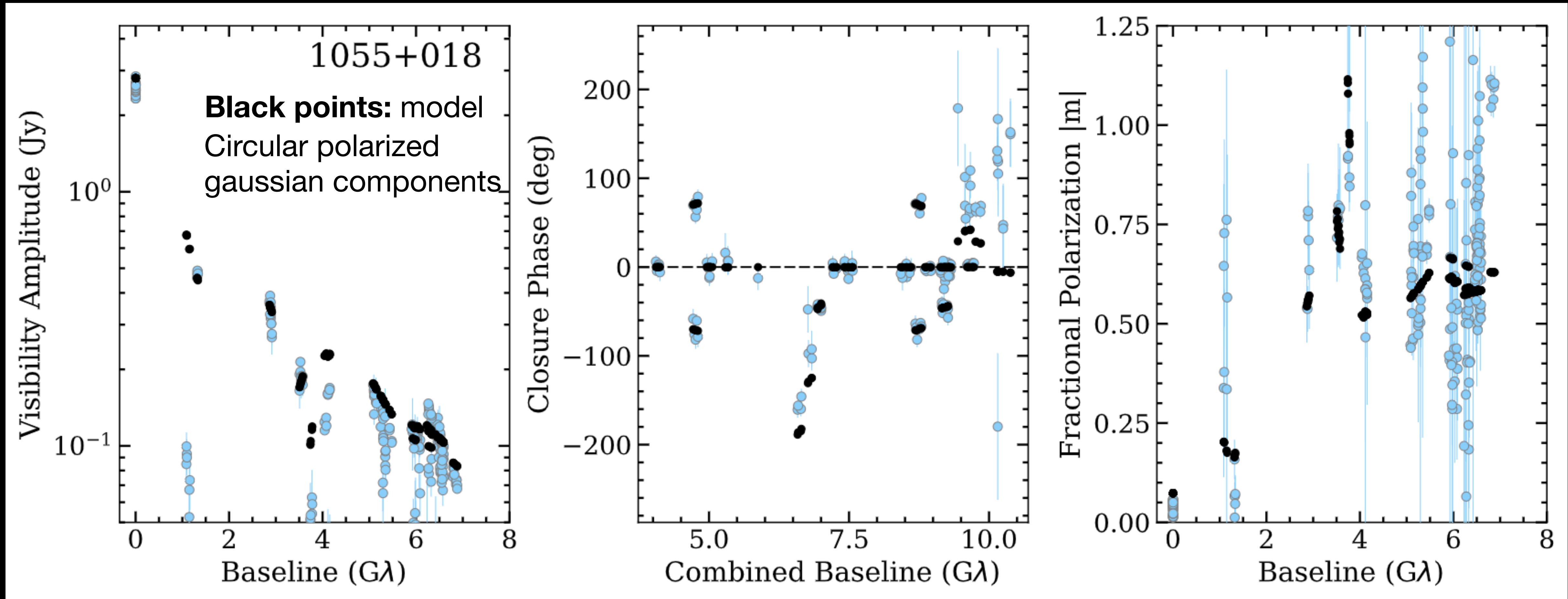
# EHT observations - (u-v) coverage



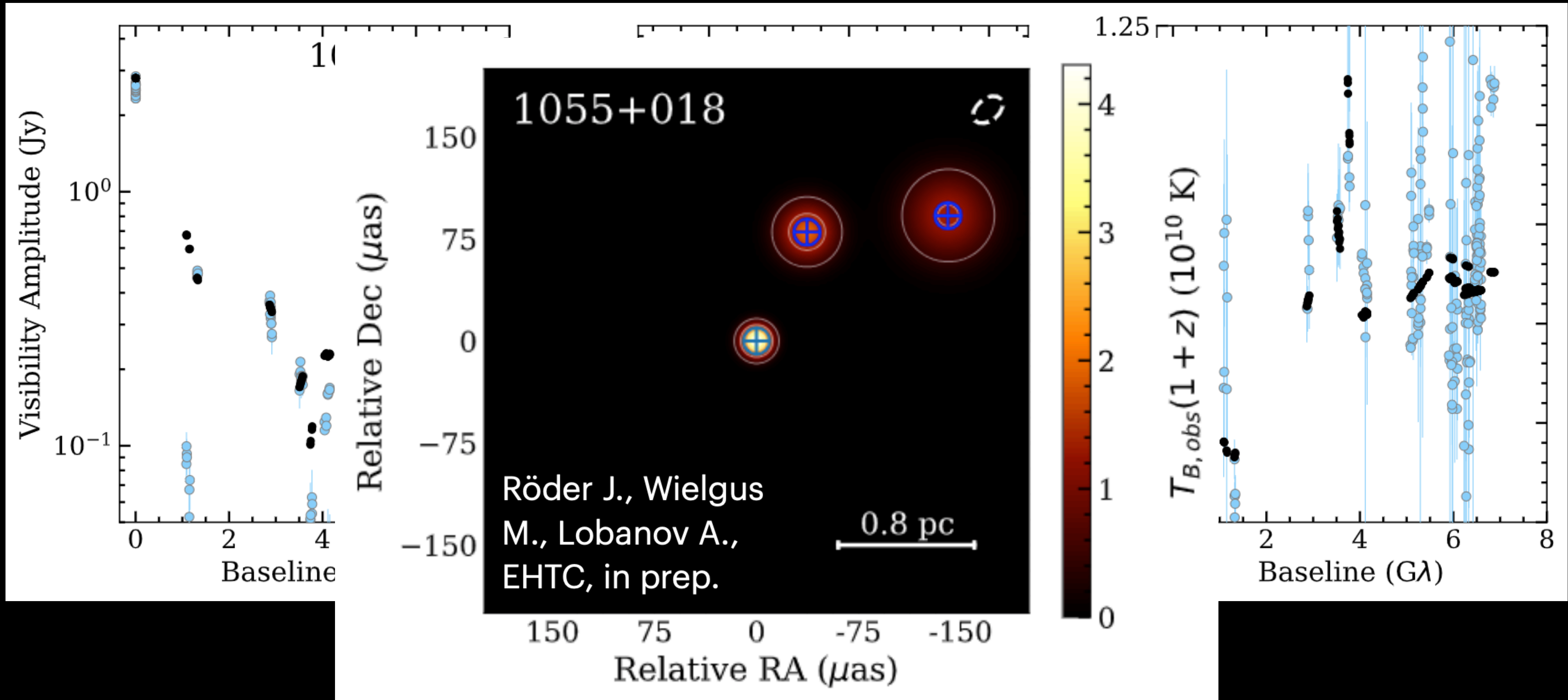
The observations were carried out in **April 2017** (1055+018 was a calibrator) and in **April 2018** (PI data: A. Alberdi & E. Ros)



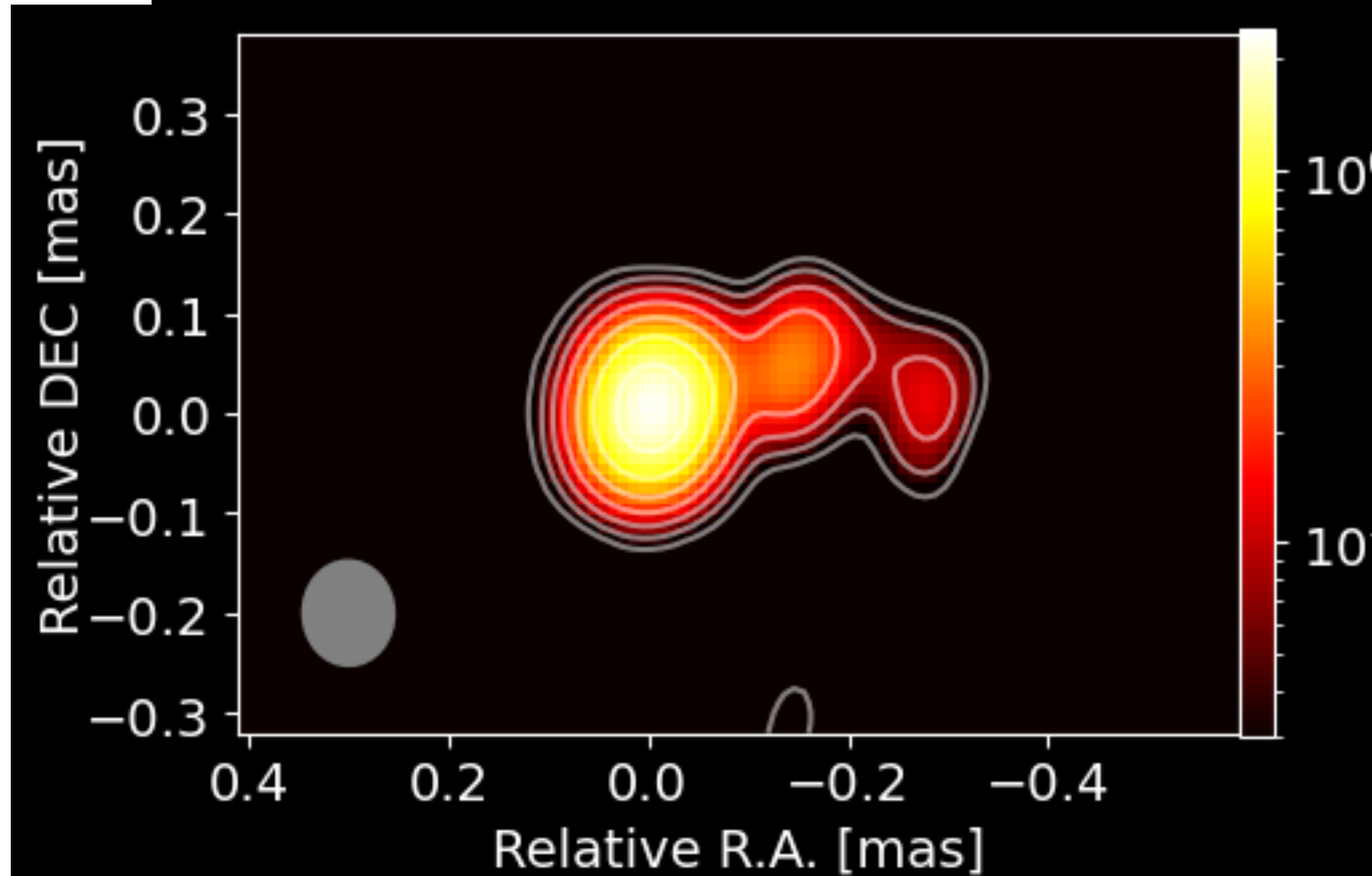
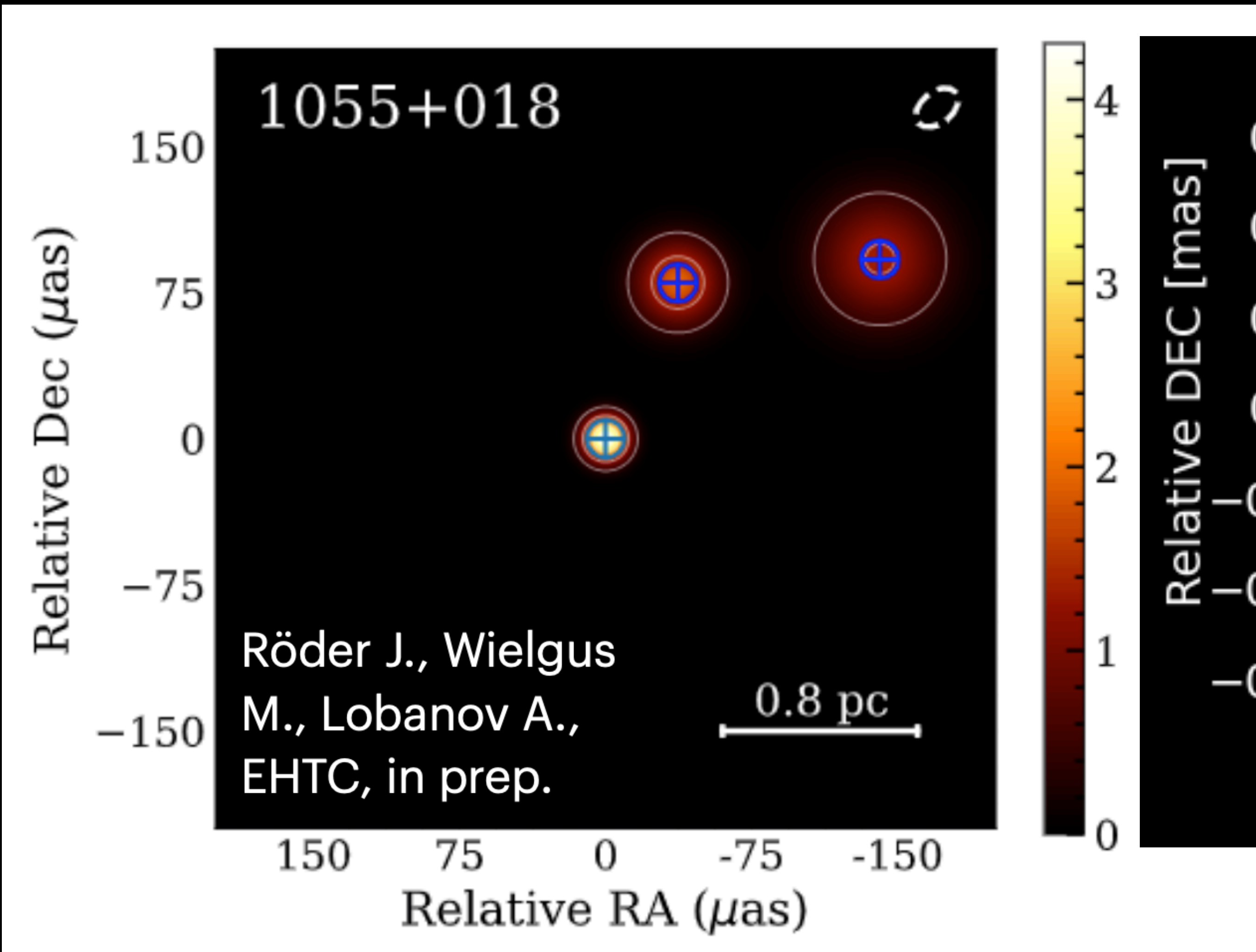
# EHT 2017 observations - results



# EHT 2017 observations - model fitting results



# EHT 2017 observations - results



# Conclusions

- **4C +01.28** is a highly interesting source. Thanks to its VLBI observations it provides us a unique chance to explore **the role of magnetic fields in the jet launching mechanisms**
- The combination of **quasi-simulations GMVA and EHT observations** allow us to explore the **physical properties of innermost jet region at the highest resolution up to date**
- **3D RMHD simulations** combined with the **VLBI observations**, will tackle the **physical properties of the jet at the injection point**