

ELAIS-N1 radio map at $\sim 1''$

Towards sub-arcsecond resolution

Jurjen de Jong

Deep field symposium 2023

Collaborators:

R. van Weeren, F. Sweijen, R. Oonk

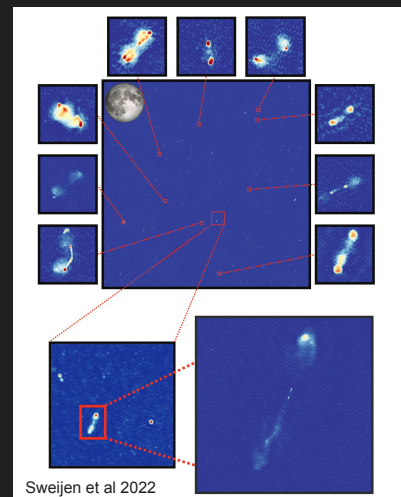


Universiteit
Leiden

Previously

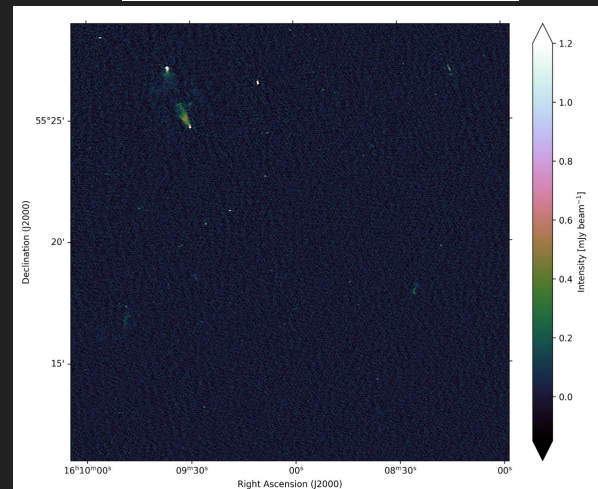
- ❖ First 8h 0.3" image from Lockman Hole

→ Sweijen et al 2022
(the myth, the man, the legend)



- ❖ First 8h $\sim 1''$ deep field image from ELAIS-N1

→ Ye et al. in prep



Ye et al. in prep

Goals

Intermediate

8h image at $\sim 1.2''$

subarcsec

8h image at $\sim 0.4''$

Goals

Intermediate

8h image at $\sim 1.2''$

32h image at $\sim 1.2''$

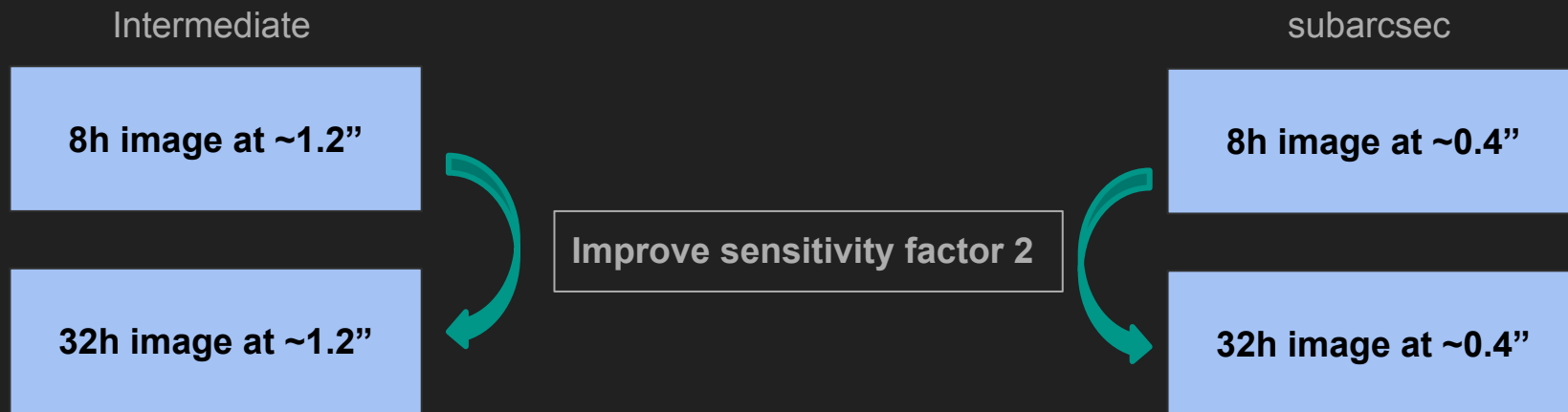
Improve sensitivity factor 2

subarcsec

8h image at $\sim 0.4''$

32h image at $\sim 0.4''$

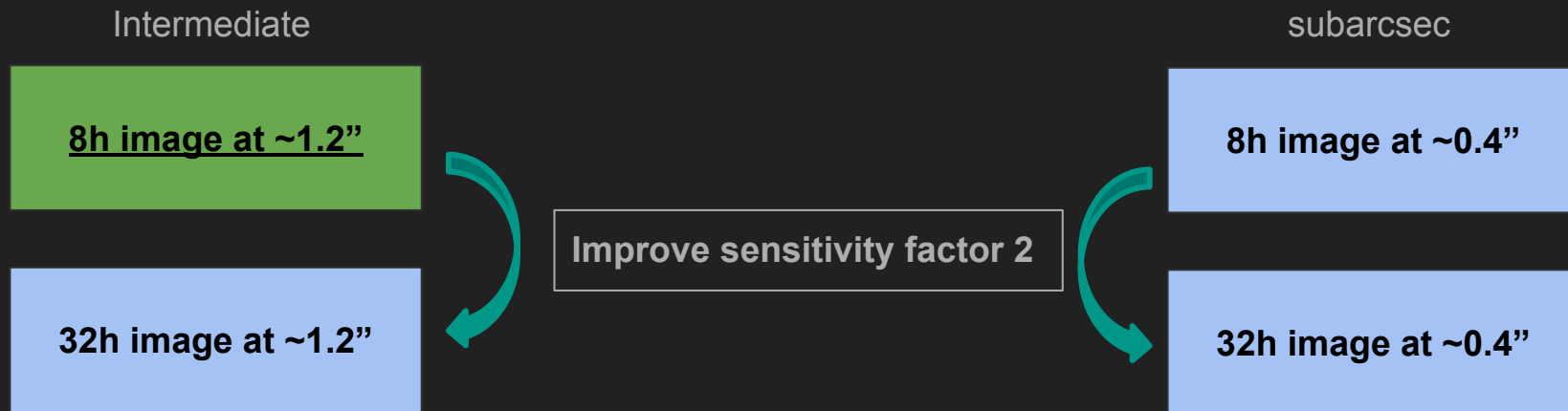
Goals



Substeps

- ❖ **More automation**
- ❖ **Improve imaging speed**

Goals



Substeps

- ❖ More automation
- ❖ Improve imaging speed

Calibration

1. Prefactor (initial corrections)
2. DDF (6" resolution [LoTSS quality])
3. Subtract (make field smaller)
4. First VLBI step

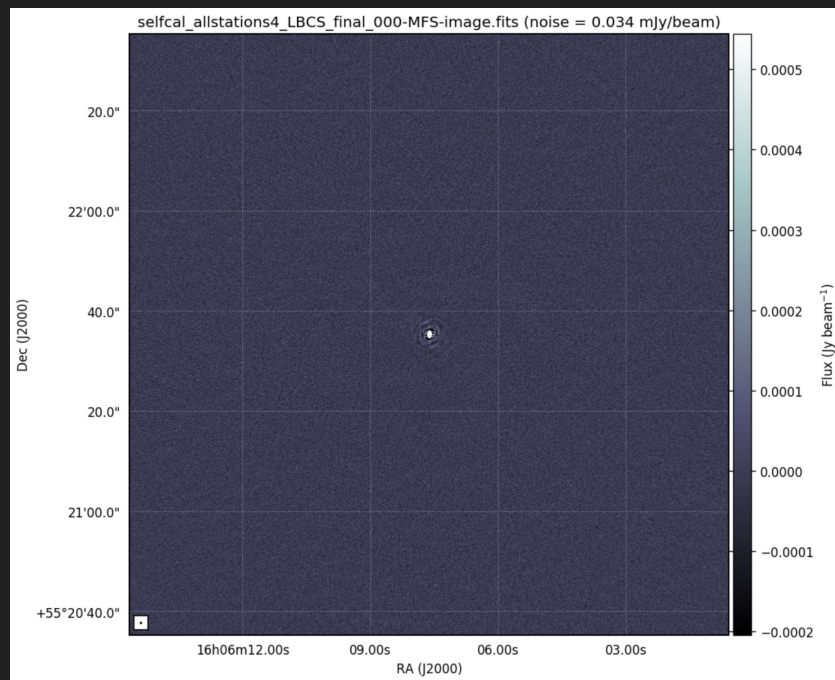
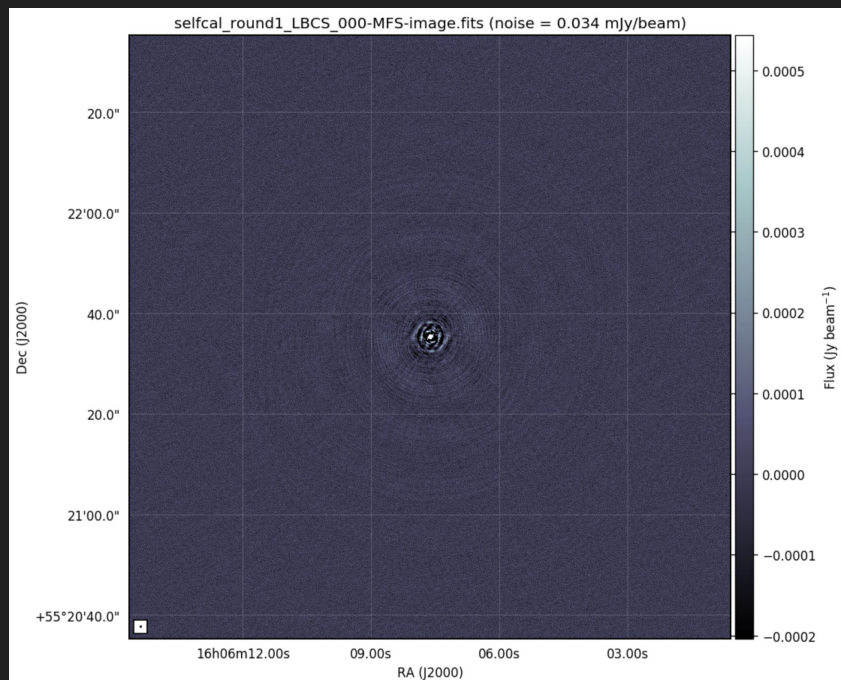
Calibration

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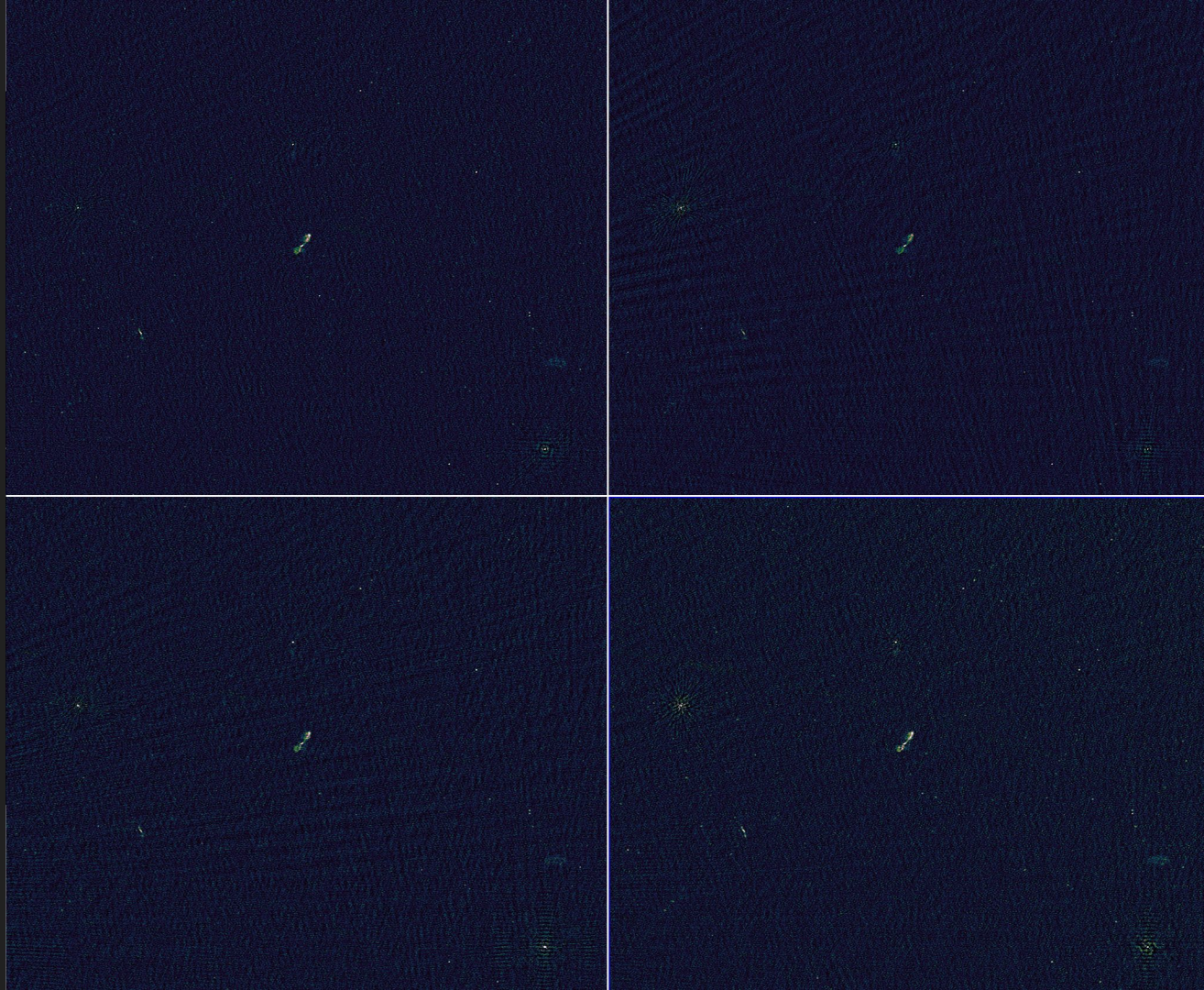


In-field delay calibrator

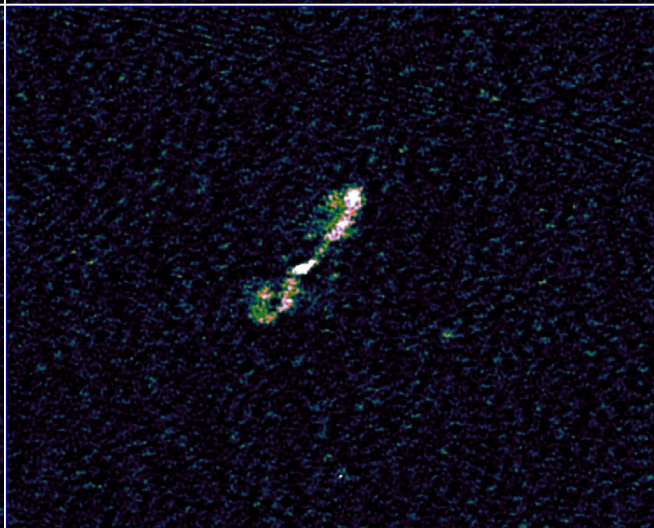
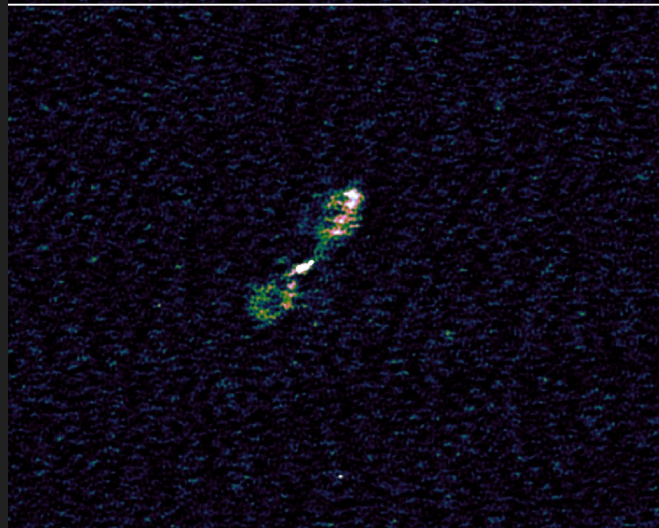
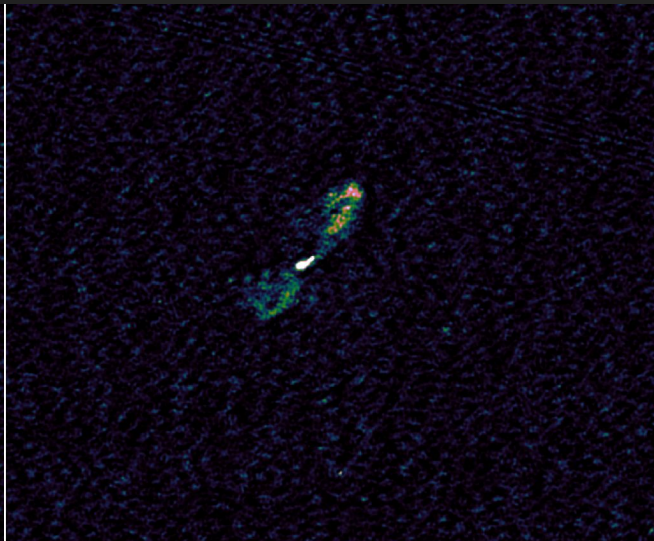
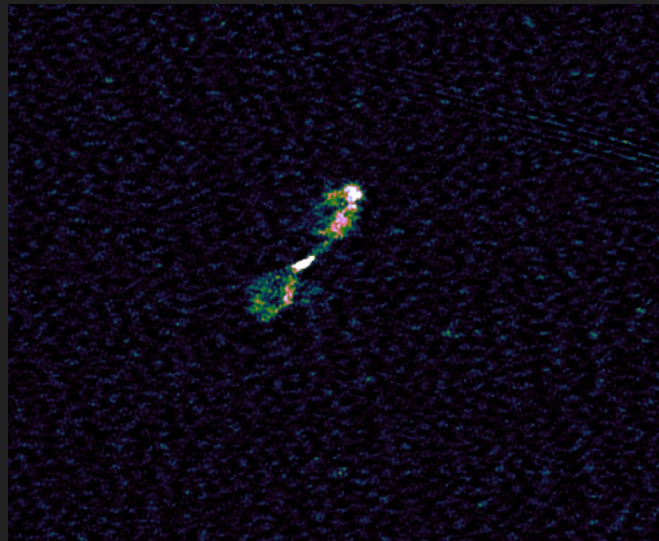
Direction-independent calibration



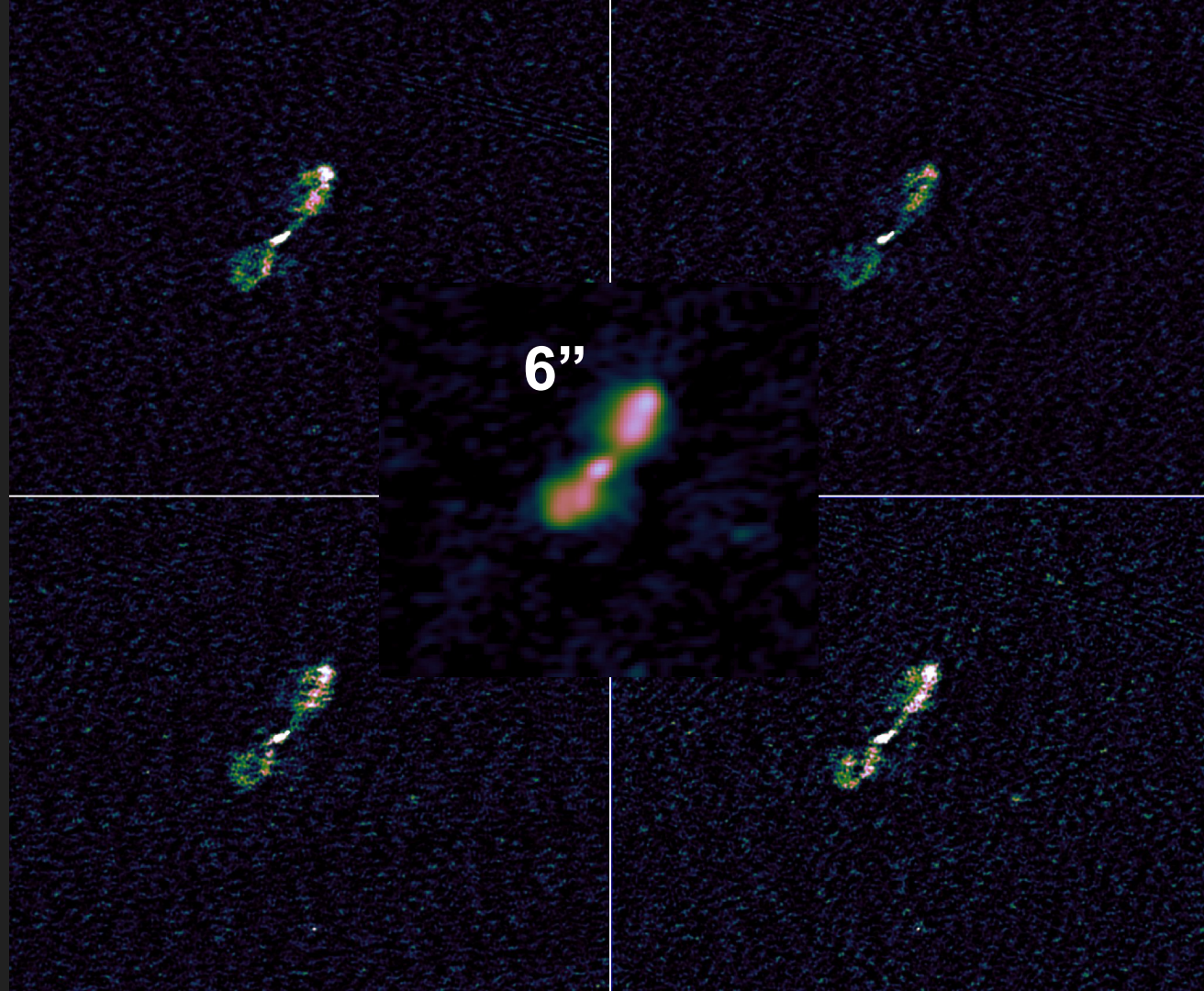
Direction
independent
images (1")



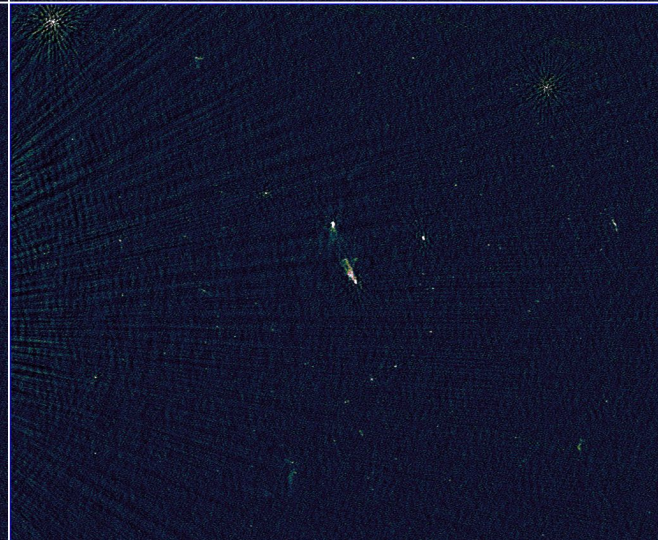
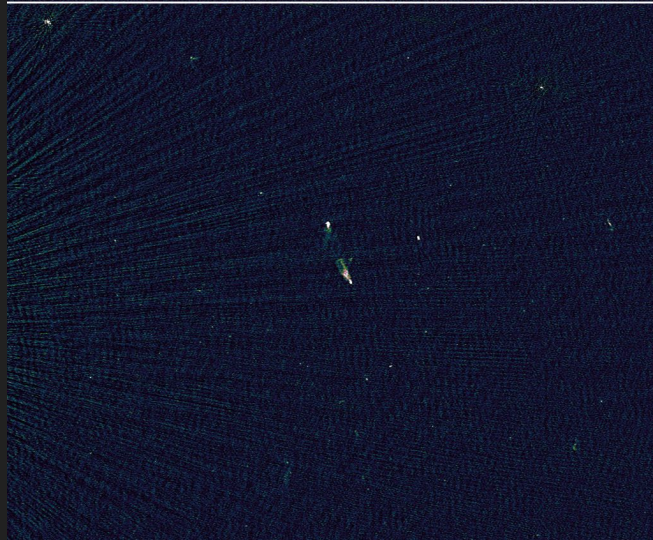
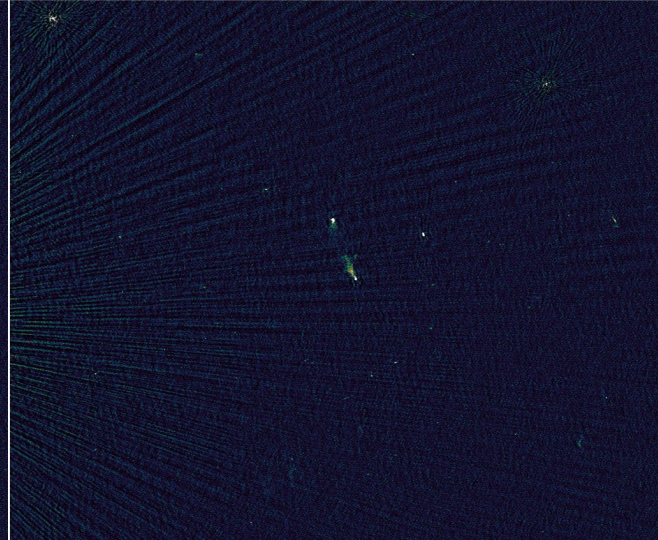
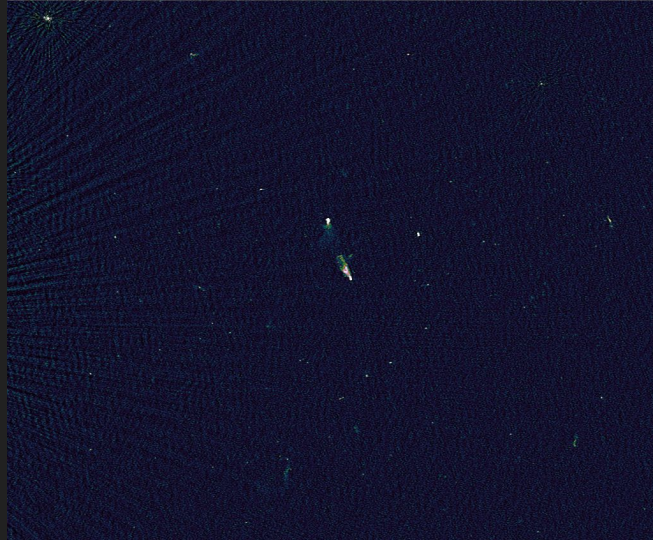
Direction
independent
images (1")



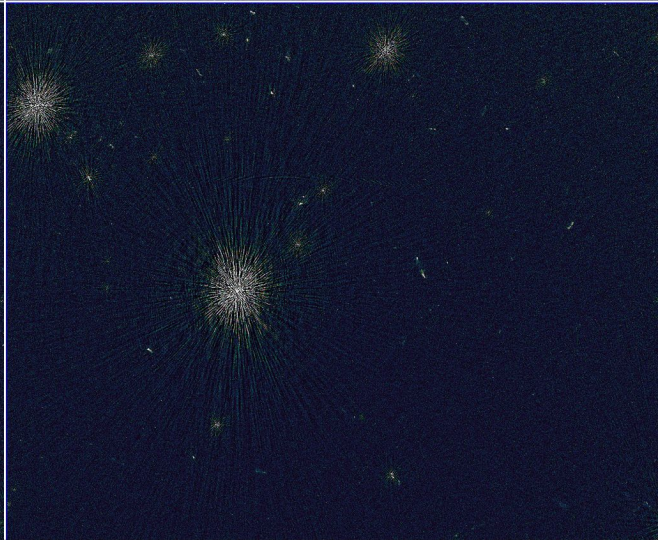
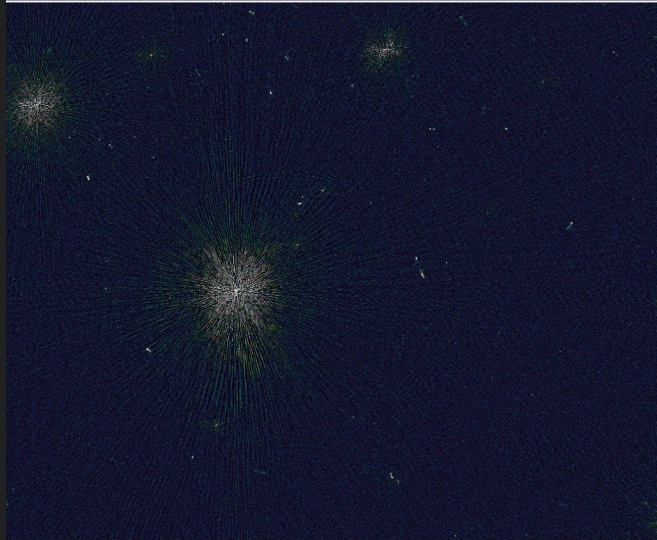
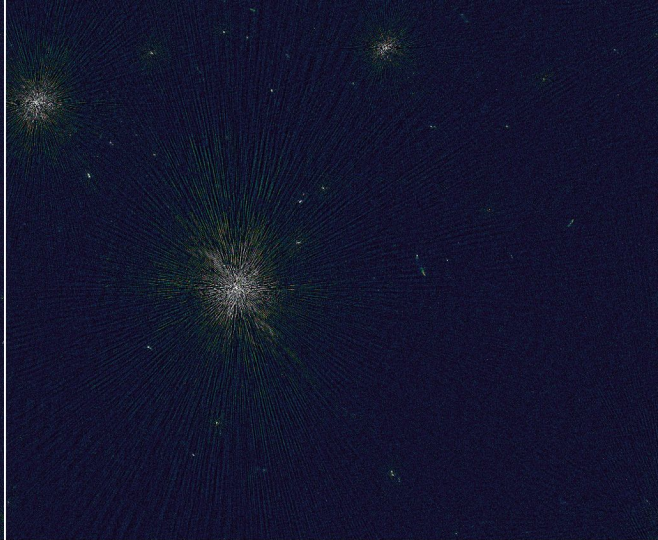
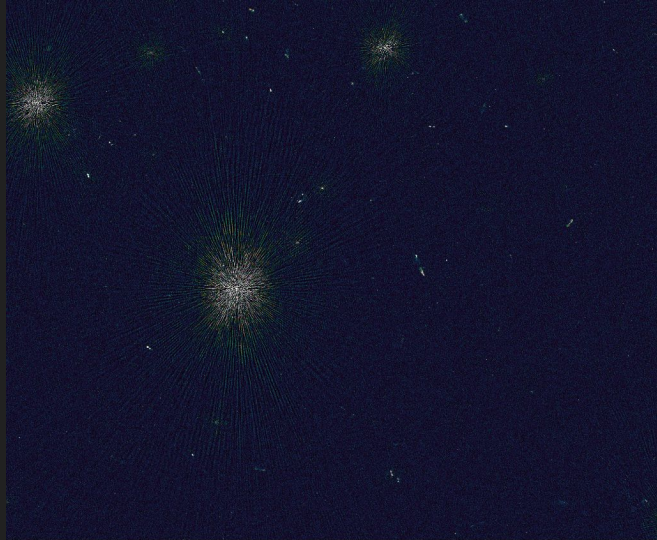
Direction
independent
images (1")



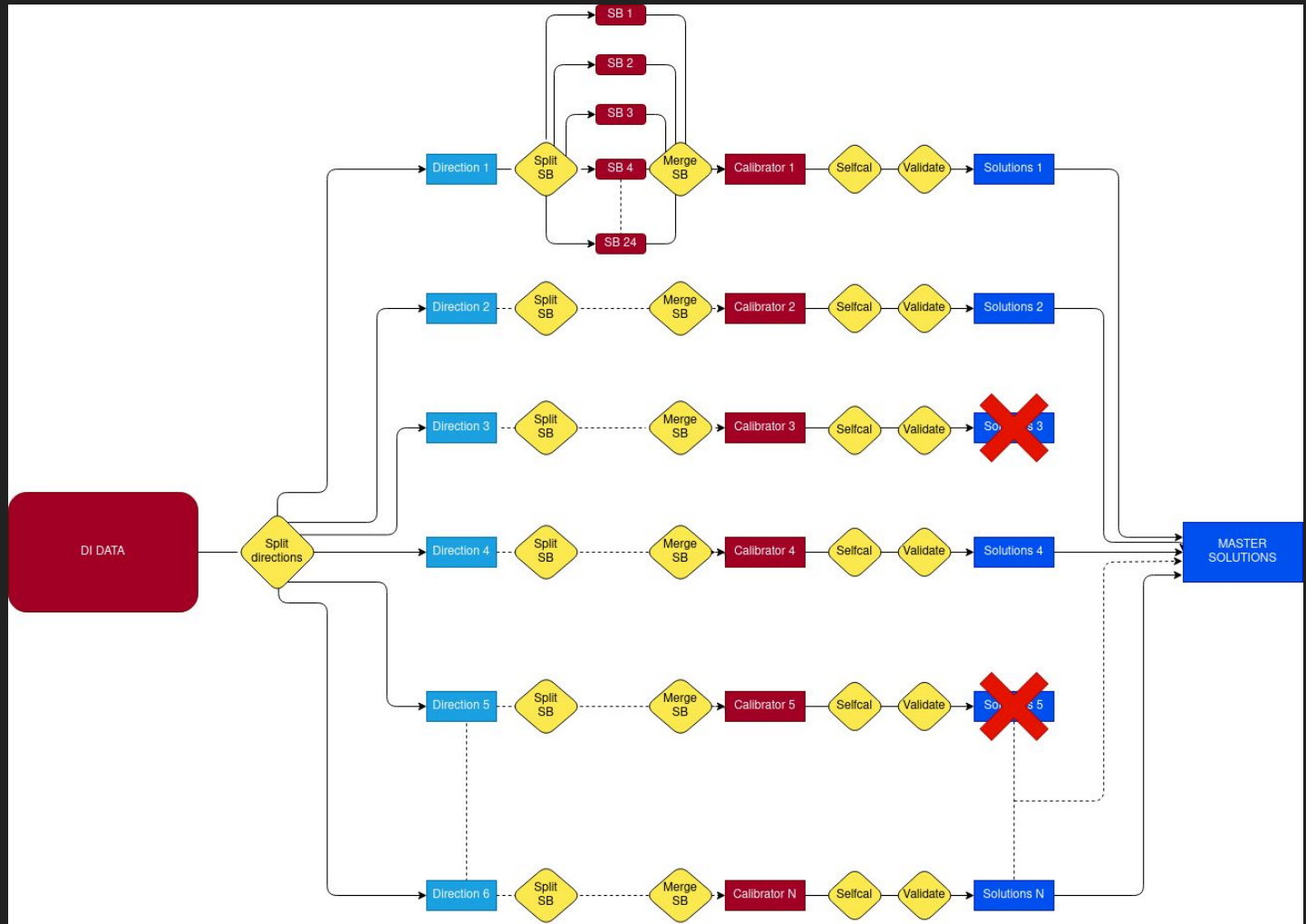
Direction
independent
images (1")



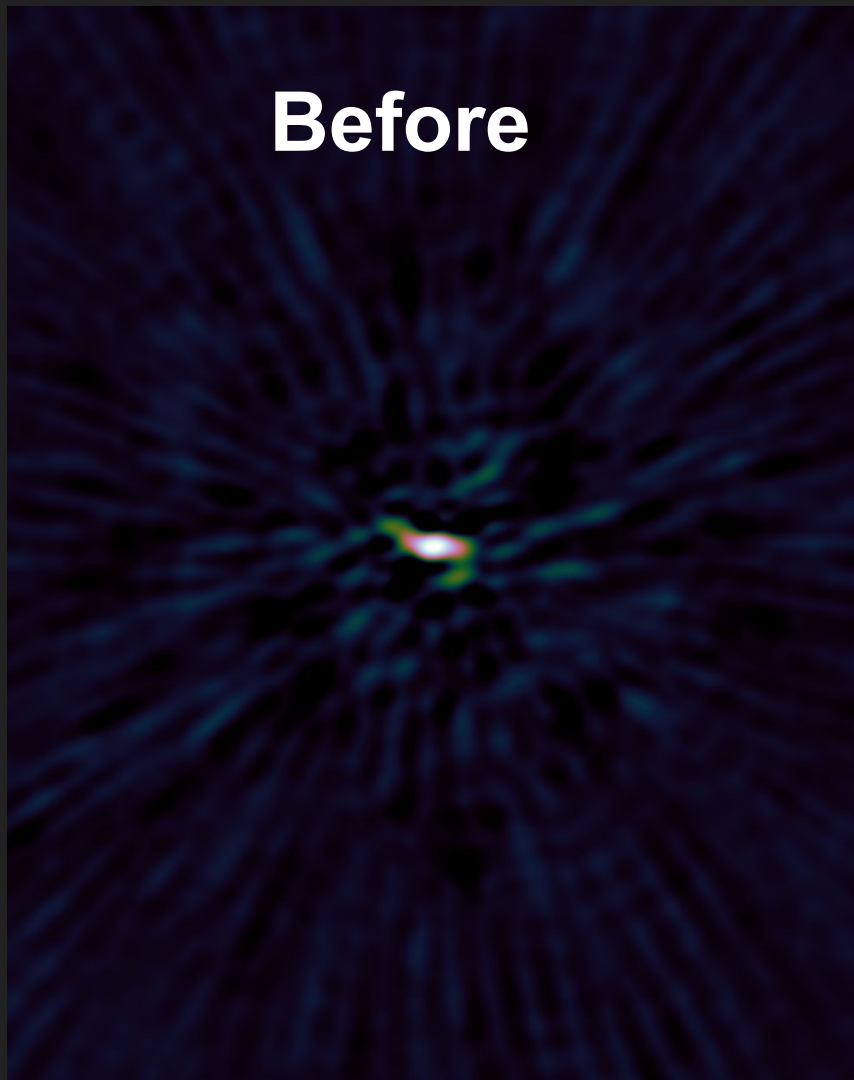
Direction
independent
images (1")



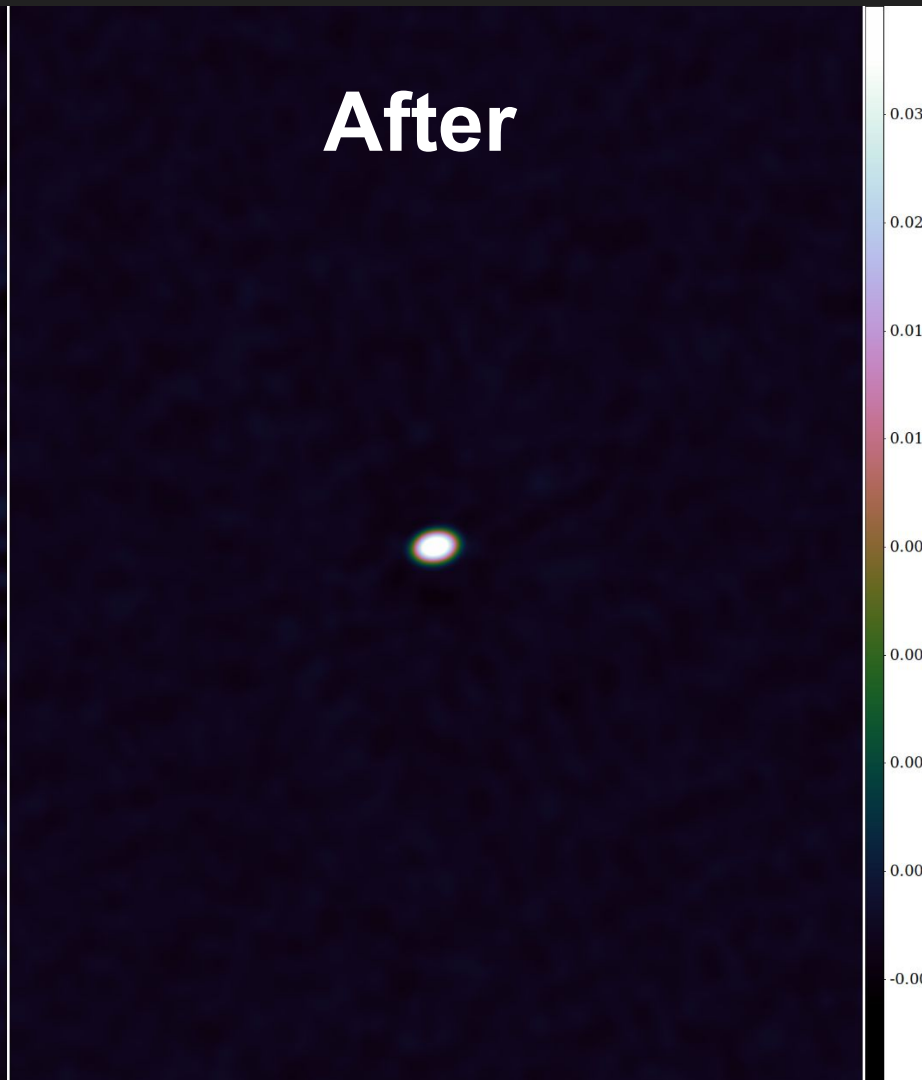
Choose calibrators



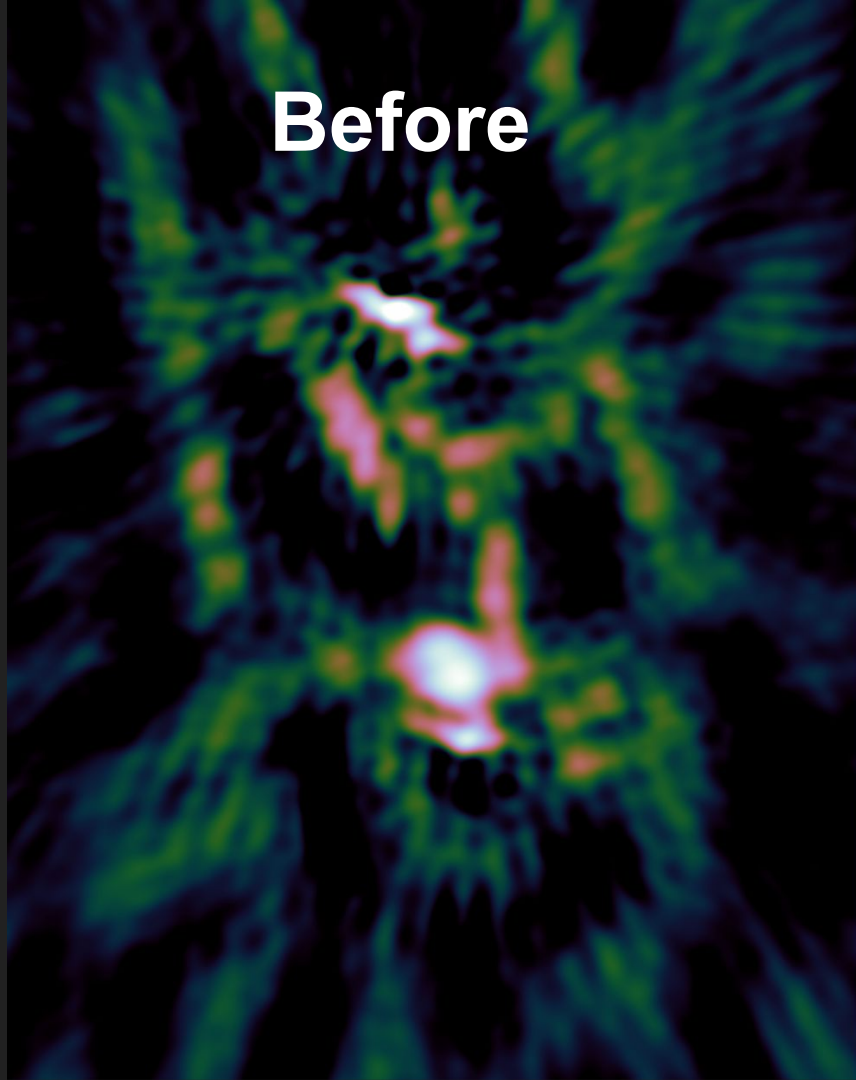
Before



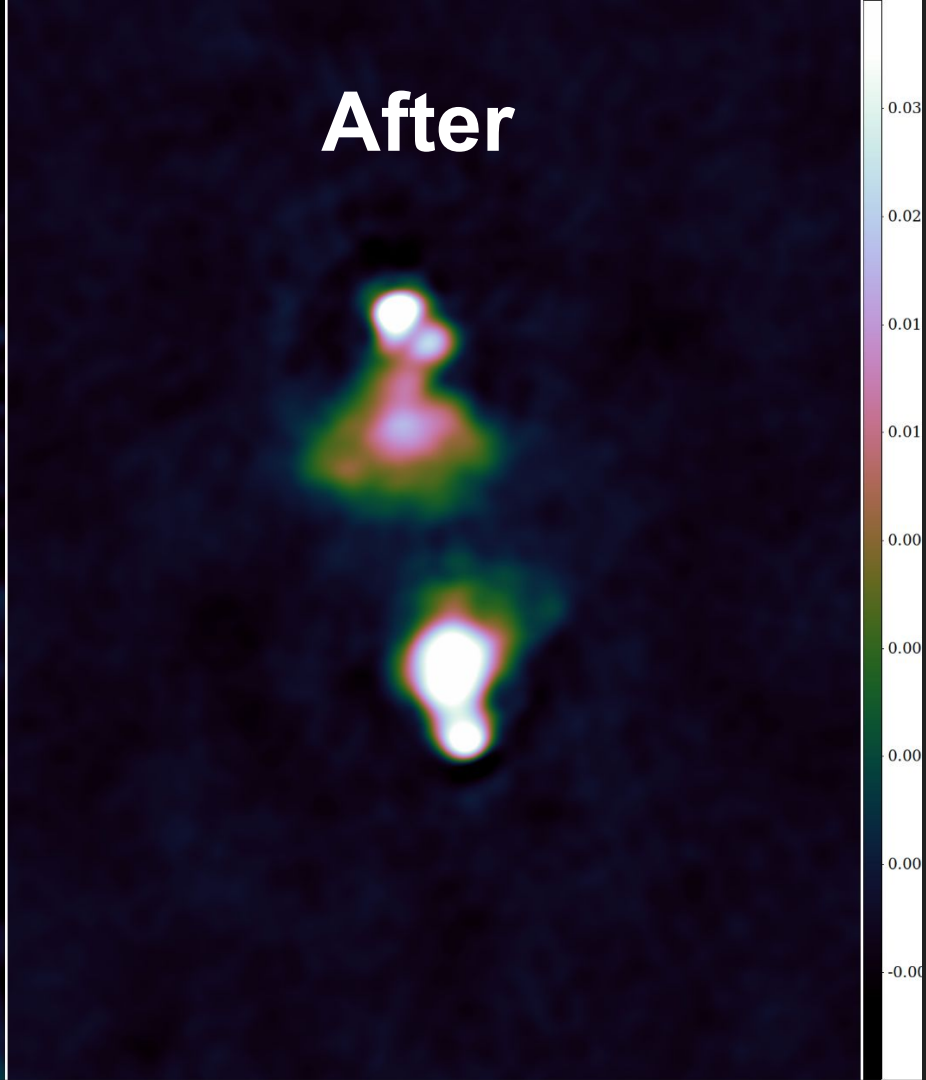
After



Before



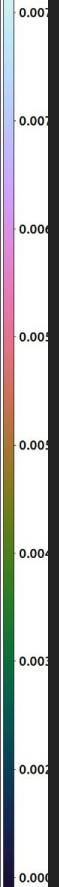
After



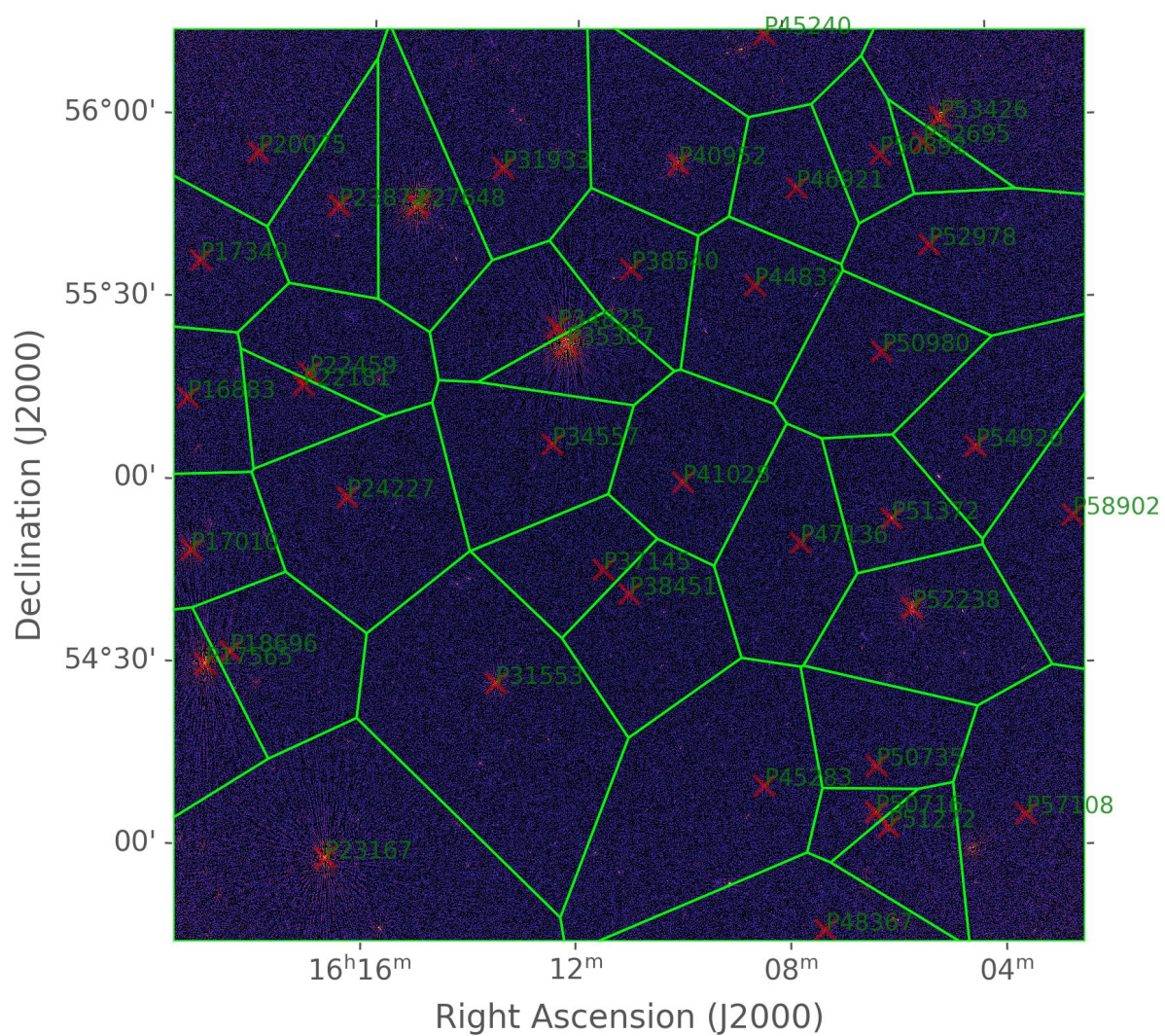
Before



After

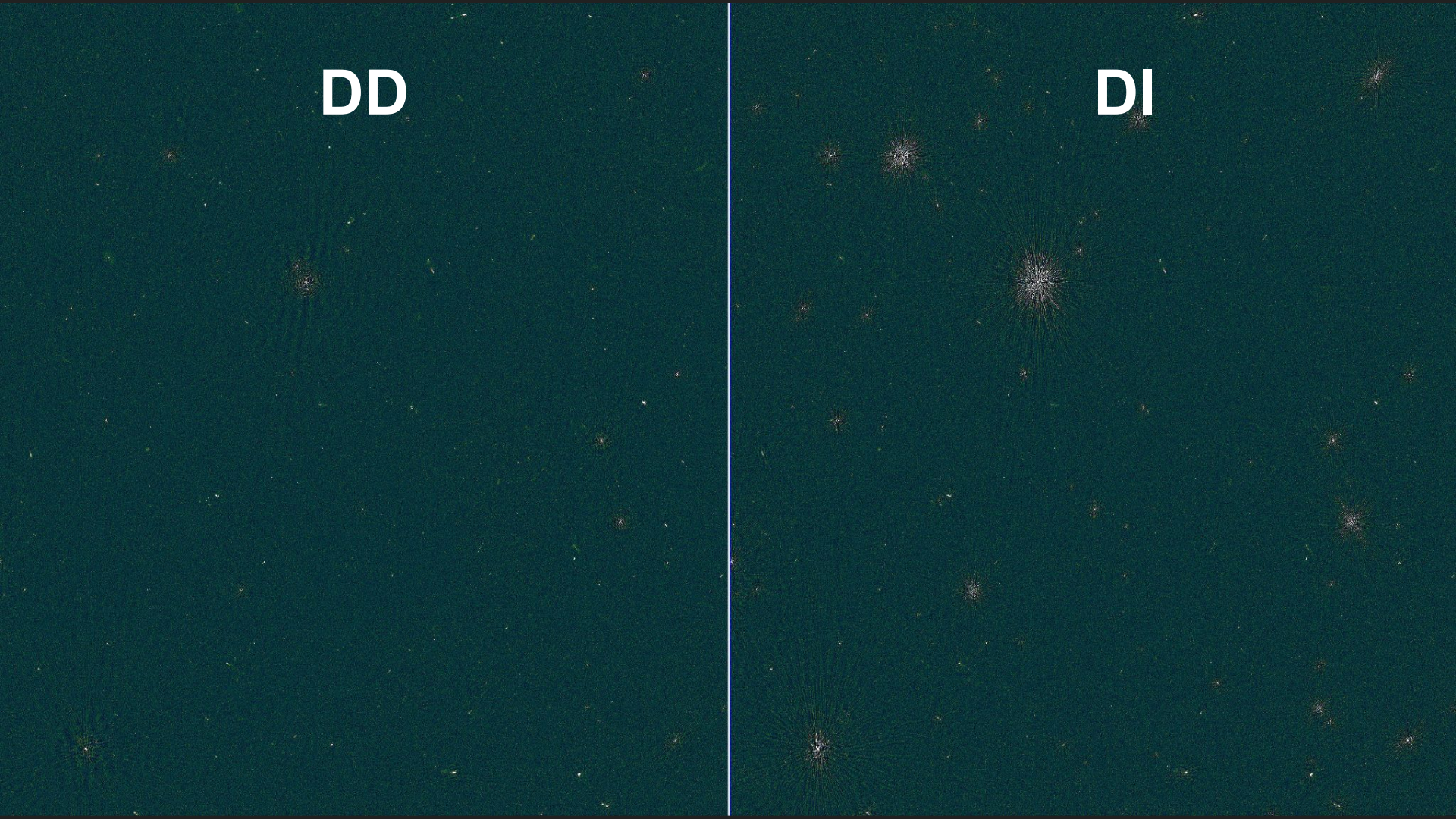


Facets



DD

DI



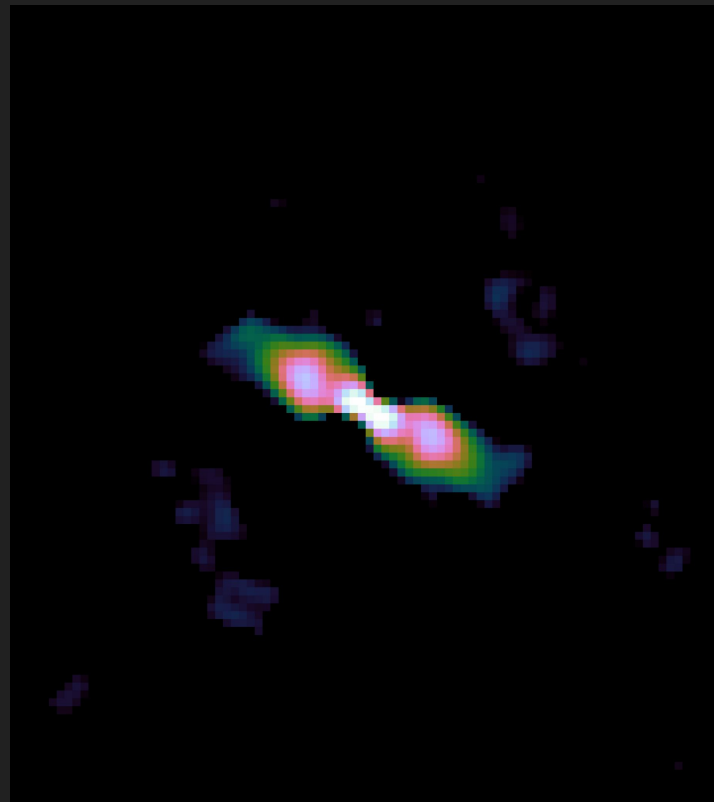
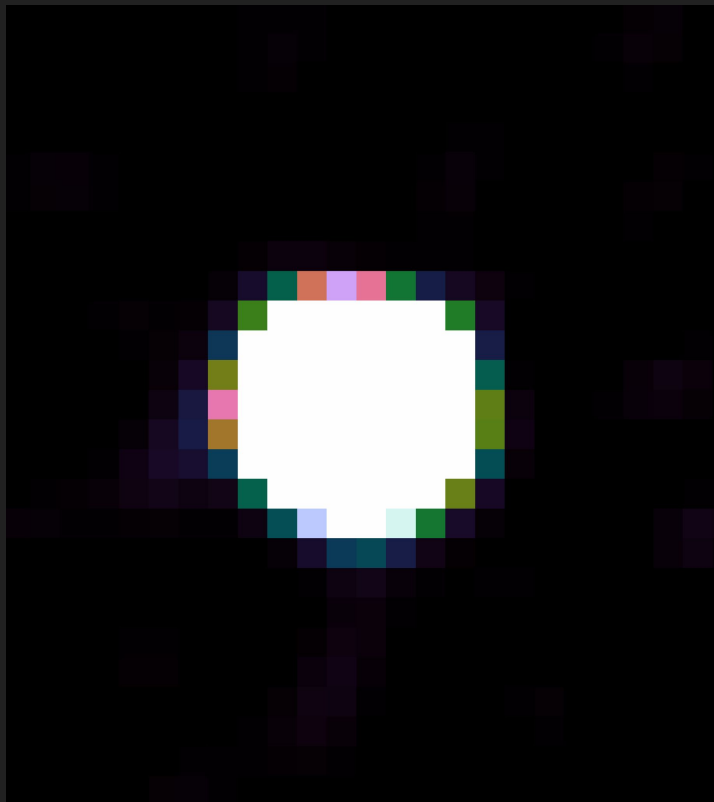
DD

Micrograph DD shows a dark green field with sparse, faint starburst patterns. A single prominent starburst is visible near the top center, and several smaller, less distinct ones are scattered throughout the field.

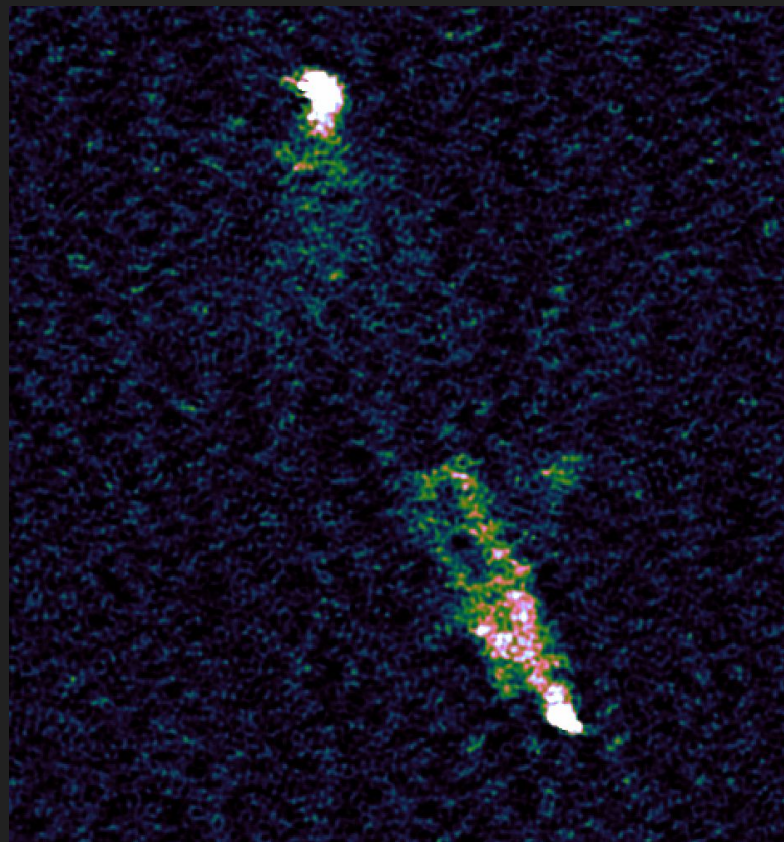
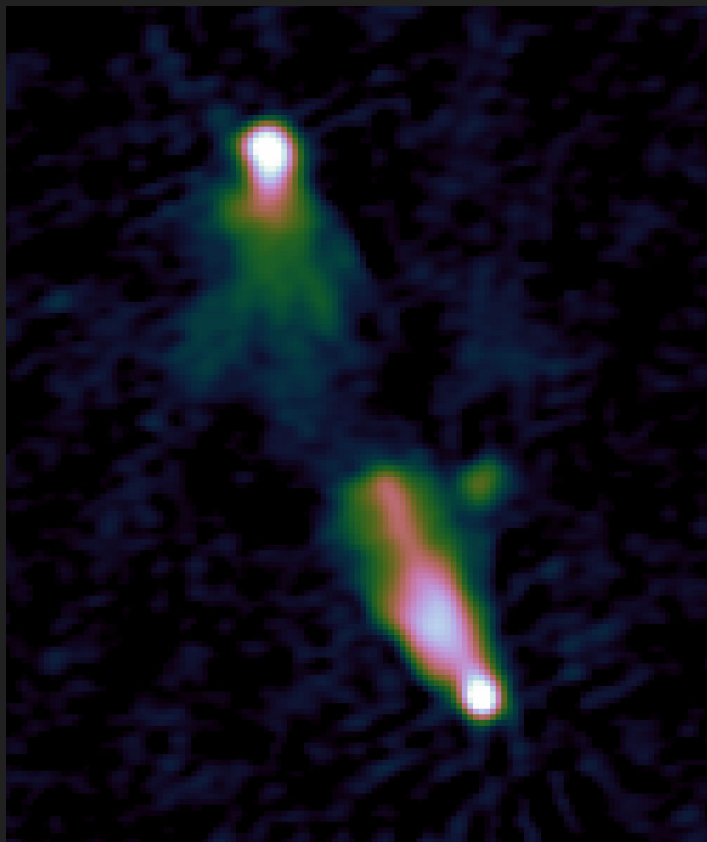
DI

Micrograph DI shows a dark green field with numerous bright starburst patterns. These patterns are more numerous and more distinct than in DD, with several large, well-defined starbursts and many smaller ones scattered across the field.

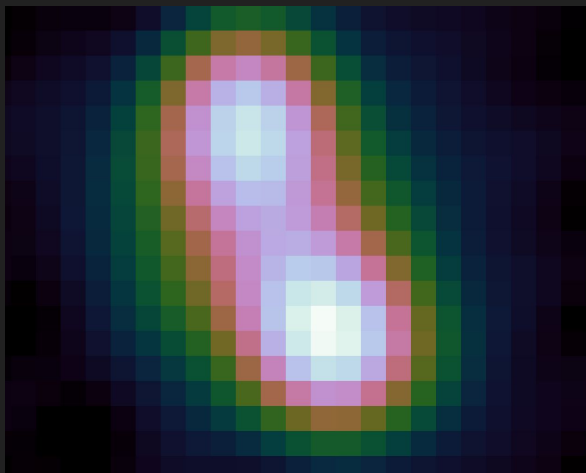
6" versus 1"



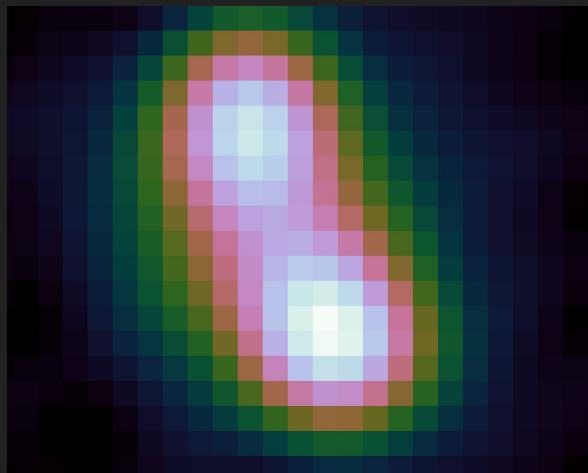
6" versus 1"



6"



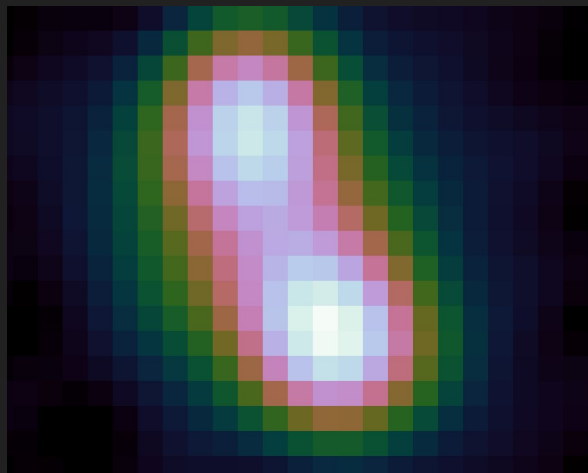
6"



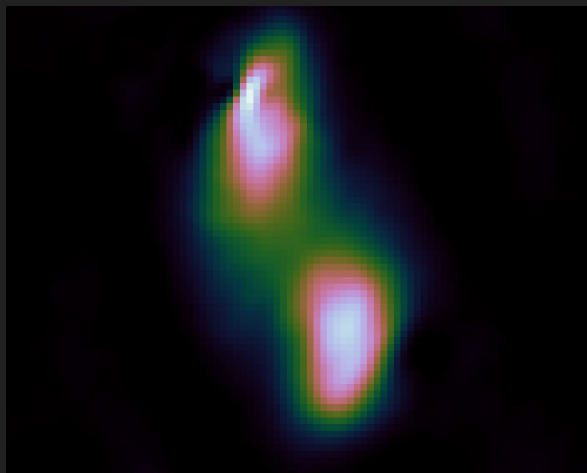
1.2"



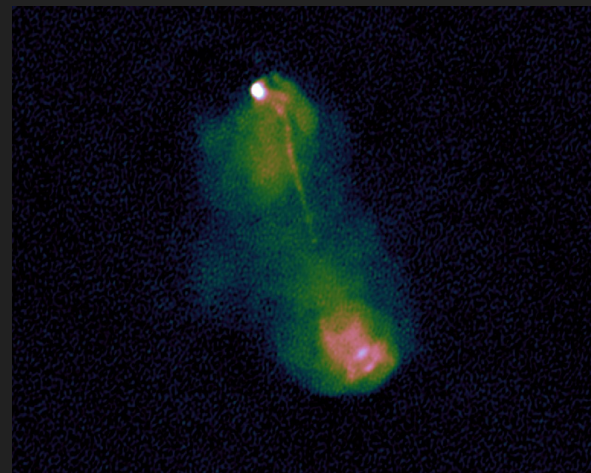
6"



1.2"



0.3"

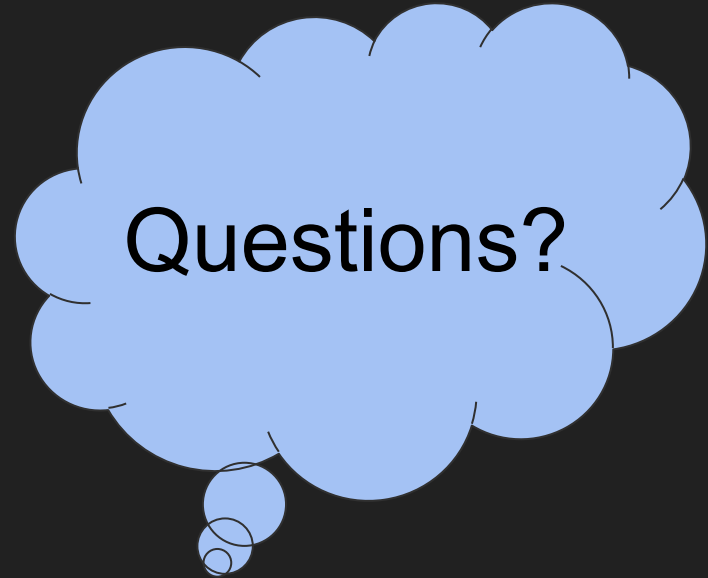


Future steps

- Make $\sim 1''$ with 4 nights
- Make subseconds with 1 night
- Make subarcseconds with 4 nights?
- Work on automation
 - delay calibrator selection
 - DD calibrator selection

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Acknowledgement

This presentation is part of the project CORTEX (NWA.1160.18.316) of the research programme NWA-ORC which is (partly) financed by the Dutch Research Council (NWO). This work made use of the Dutch national e-infrastructure with the support of the SURF Cooperative using grant no. EINF-6218. This work is co-funded by the EGI-ACE project (Horizon 2020) under Grant number 101017567.