

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

## Towards sub-arcsecond resolution

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Jurjen de Jong

Deep field symposium 2023

**Collaborators:**

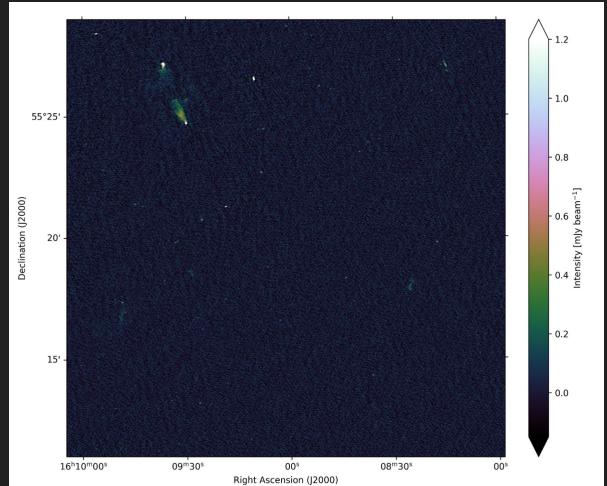
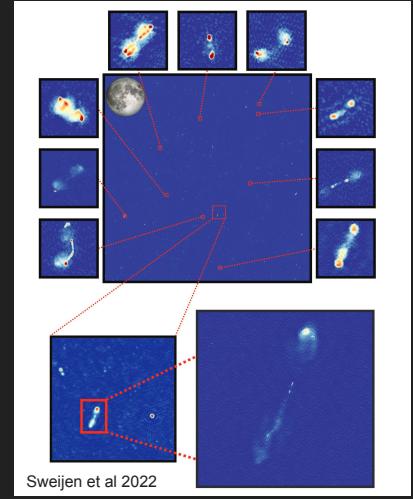
R. van Weeren, F. Sweijen, R. Oonk



Universiteit  
Leiden

# Previously

- ❖ First 8h 0.3" image from Lockman Hole  
→ Sweijen et al 2022  
(the myth, the man, the legend)
- ❖ First 8h ~1" deep field image from ELAIS-N1  
→ Ye et al. in prep



Ye et al. in prep

# Goals

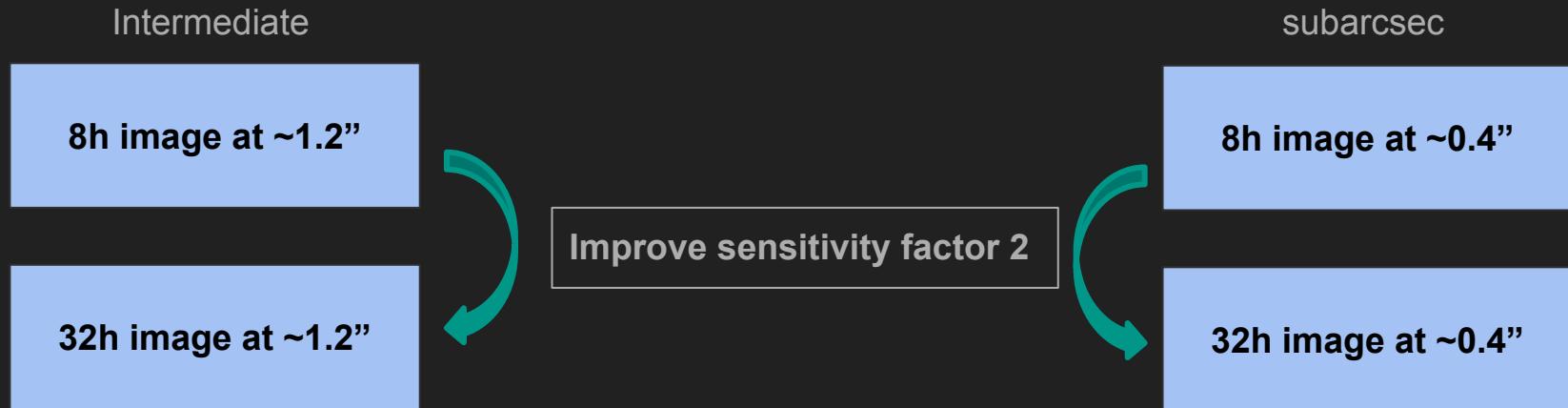
Intermediate

**8h image at ~1.2"**

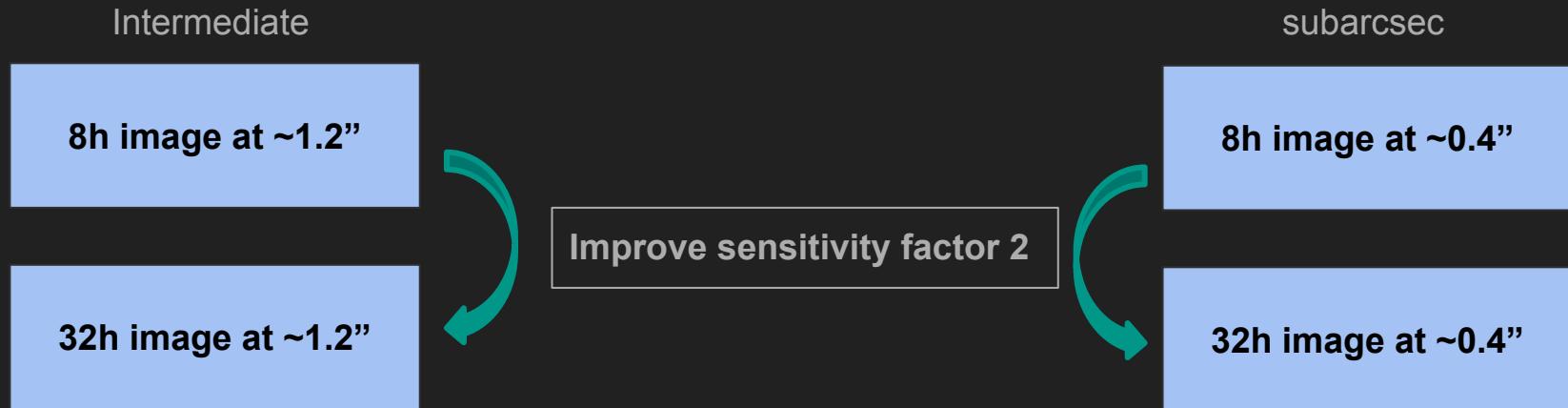
subarcsec

**8h image at ~0.4"**

# Goals



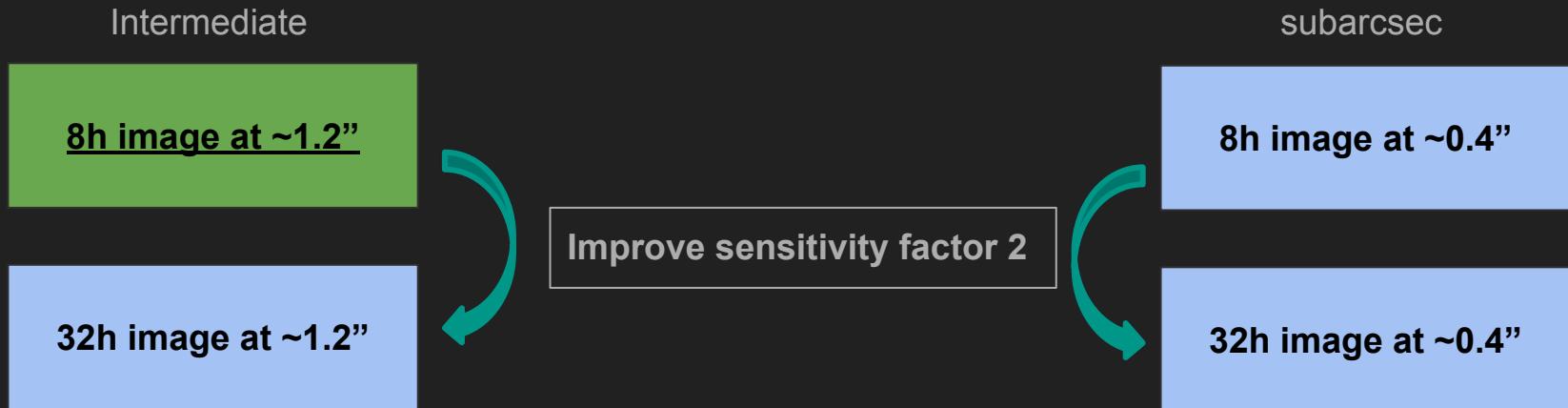
# Goals



## Substeps

- ❖ More automation
- ❖ Improve imaging speed

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- ❖ 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

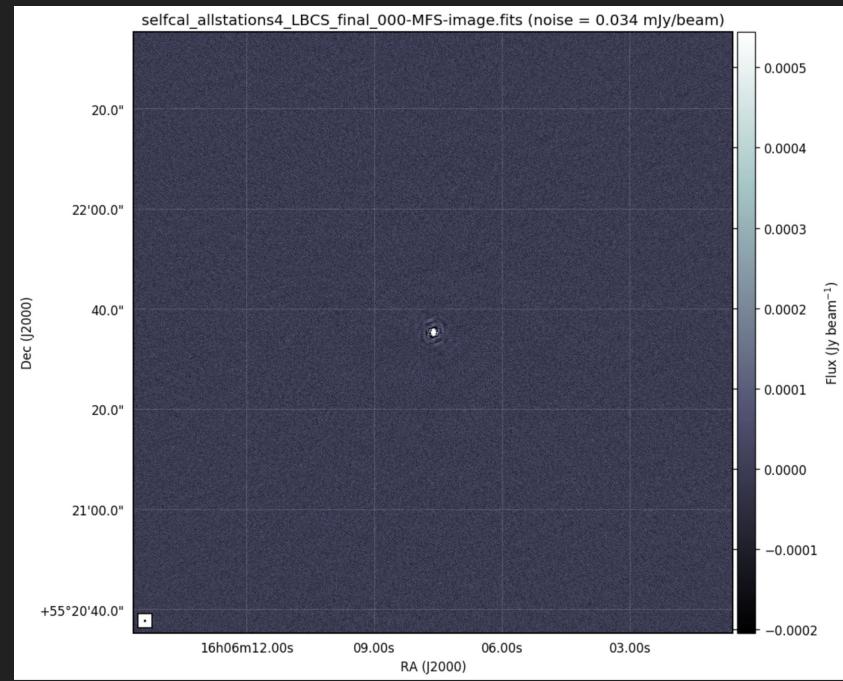
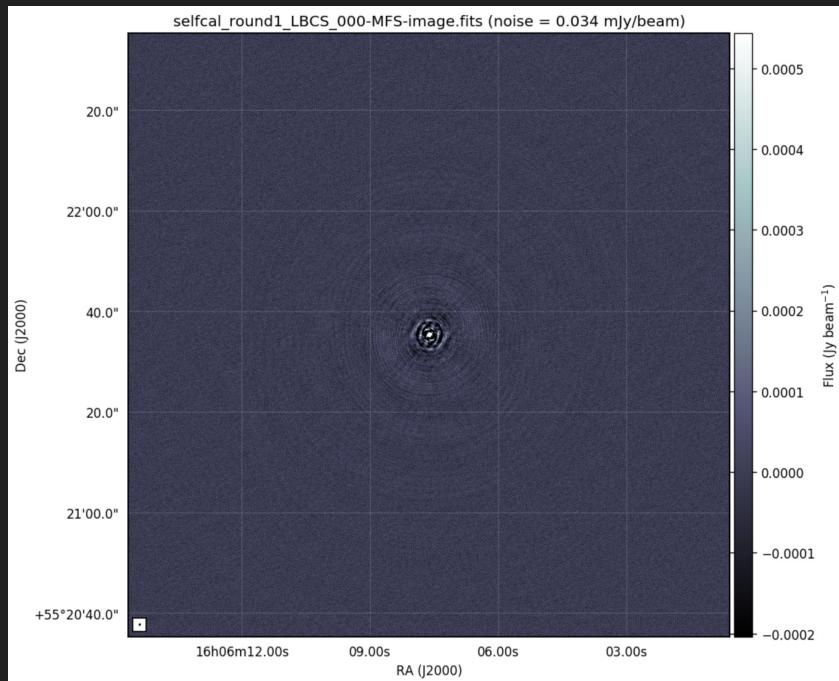
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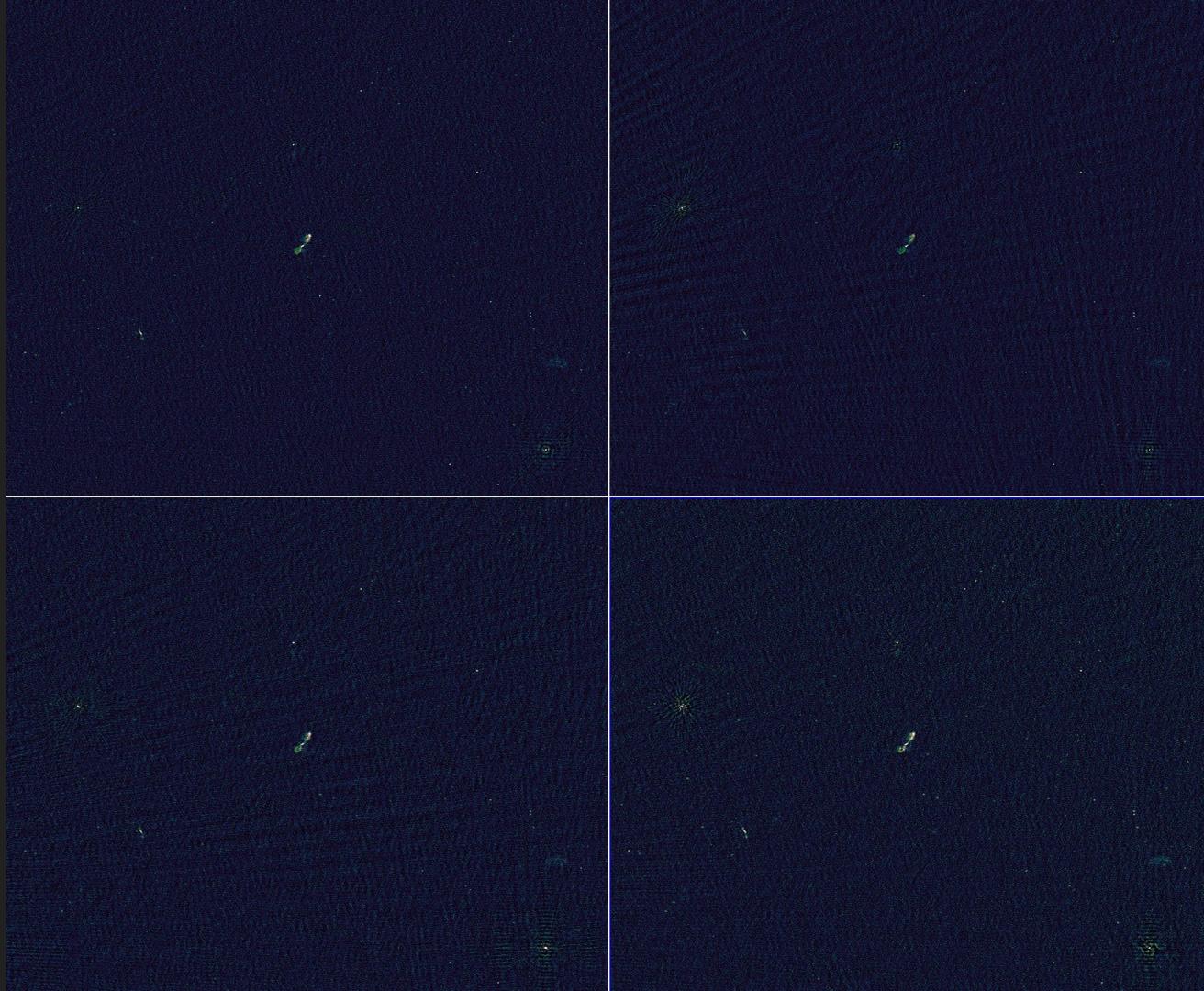


# In-field delay calibrator

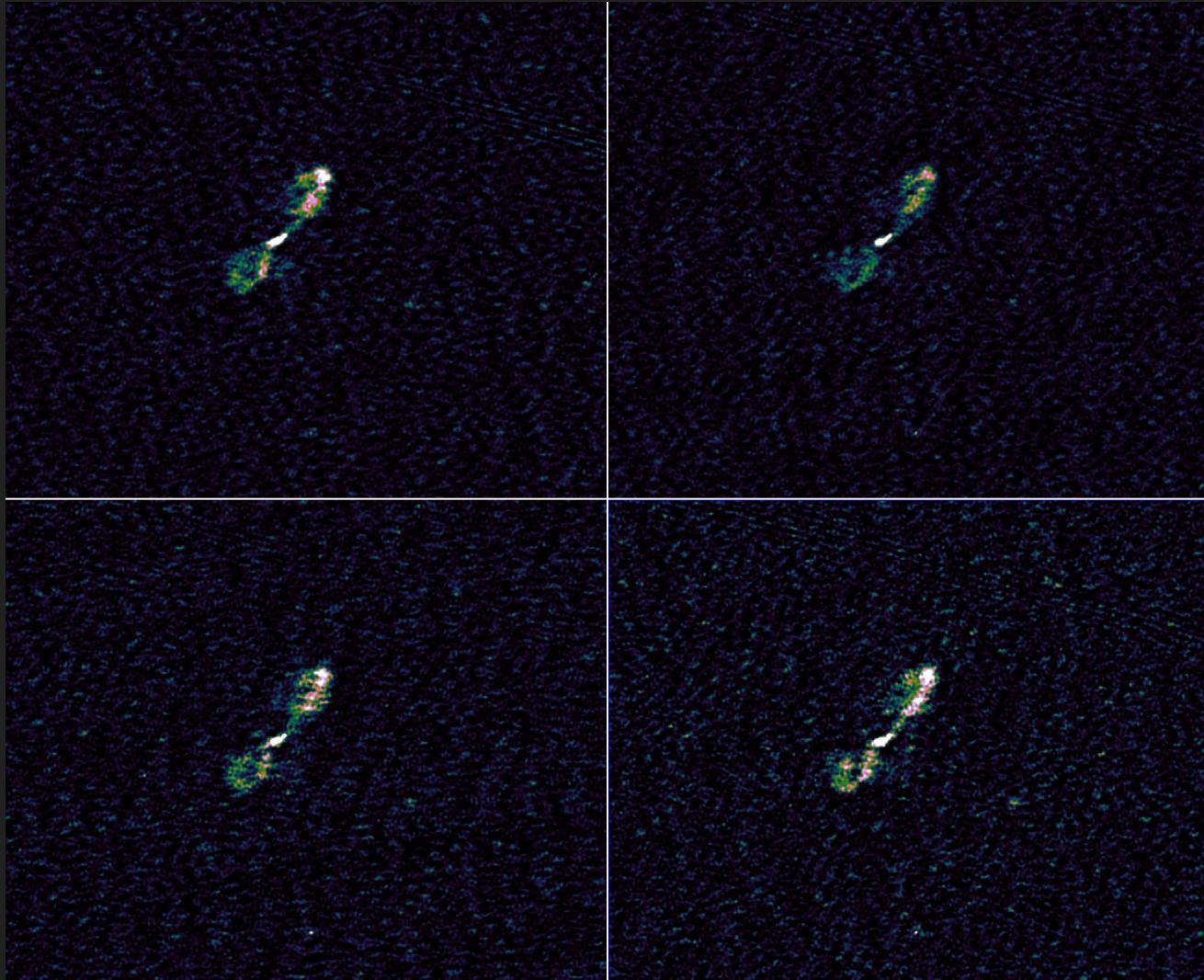
Direction-independent calibration



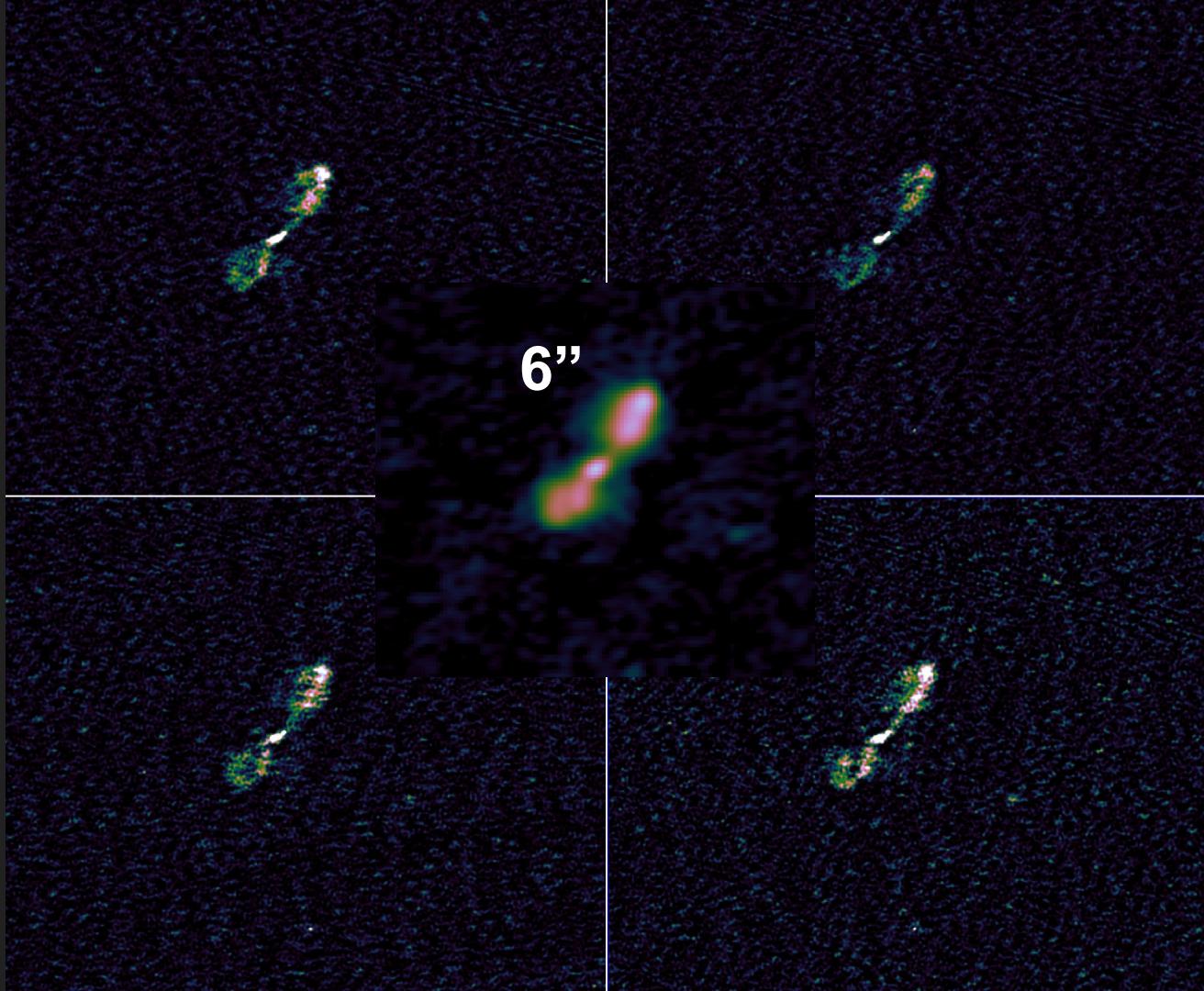
Direction  
independent  
images (1")



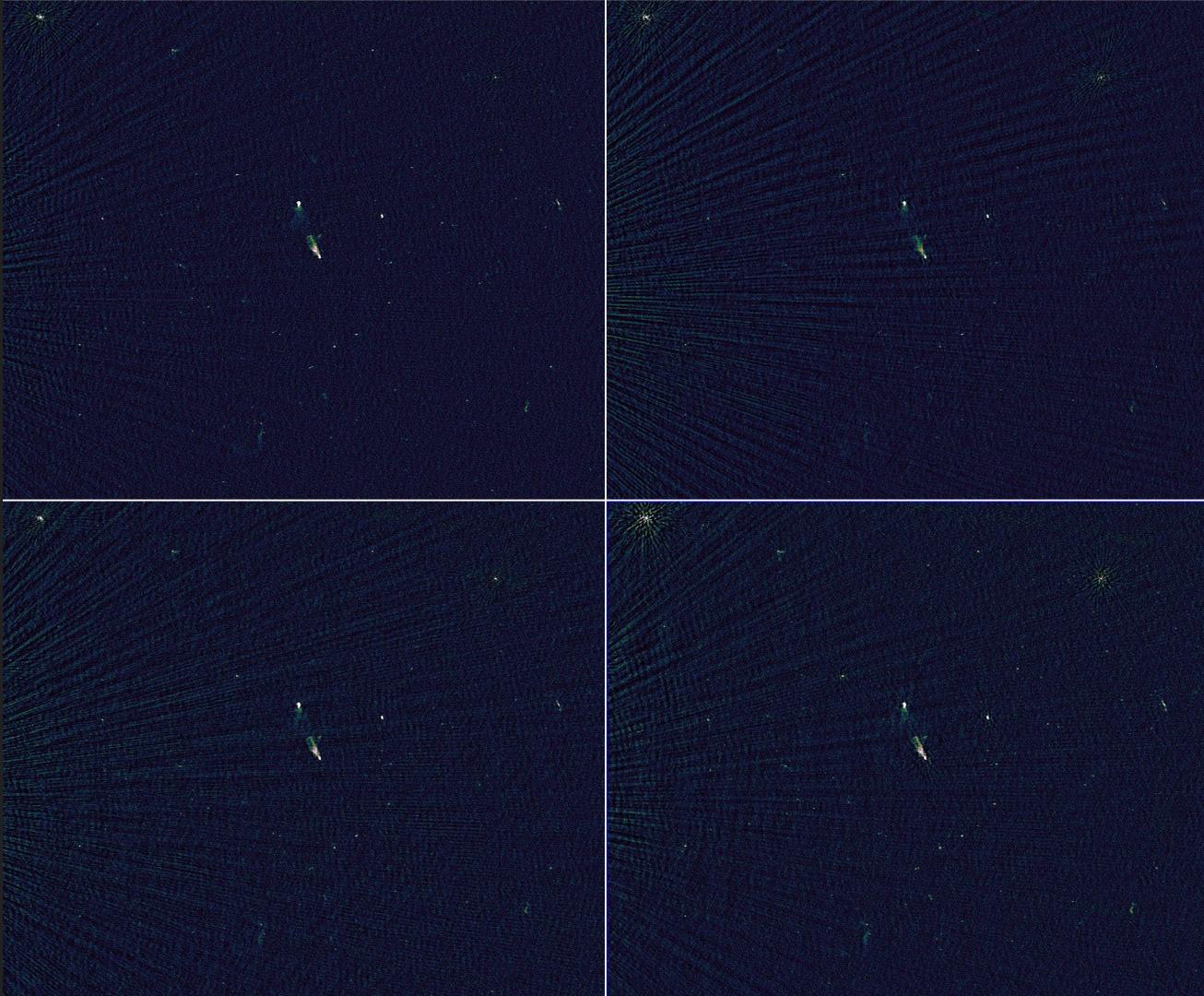
Direction  
independent  
images (1")



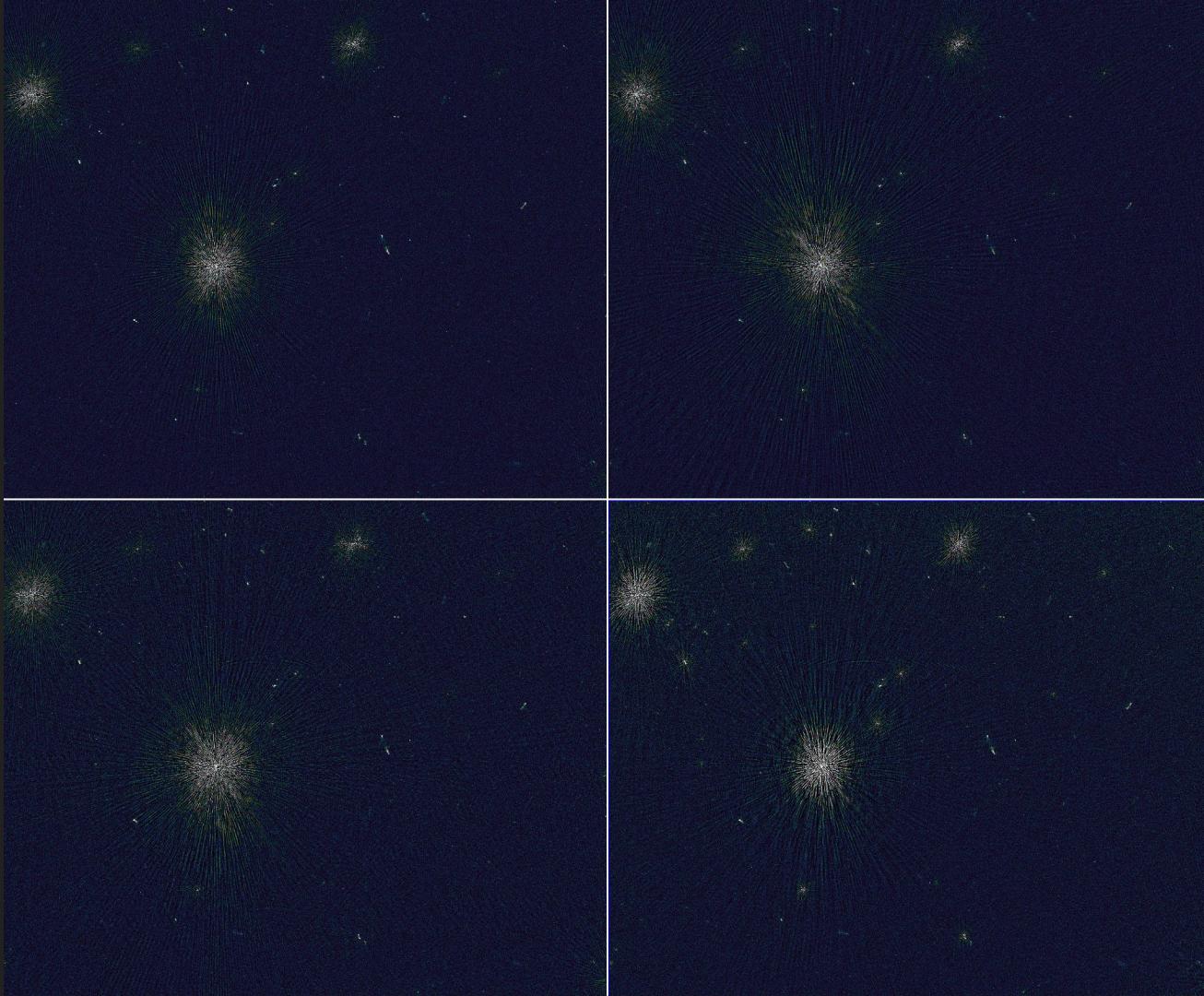
Direction  
independent  
images (1'')



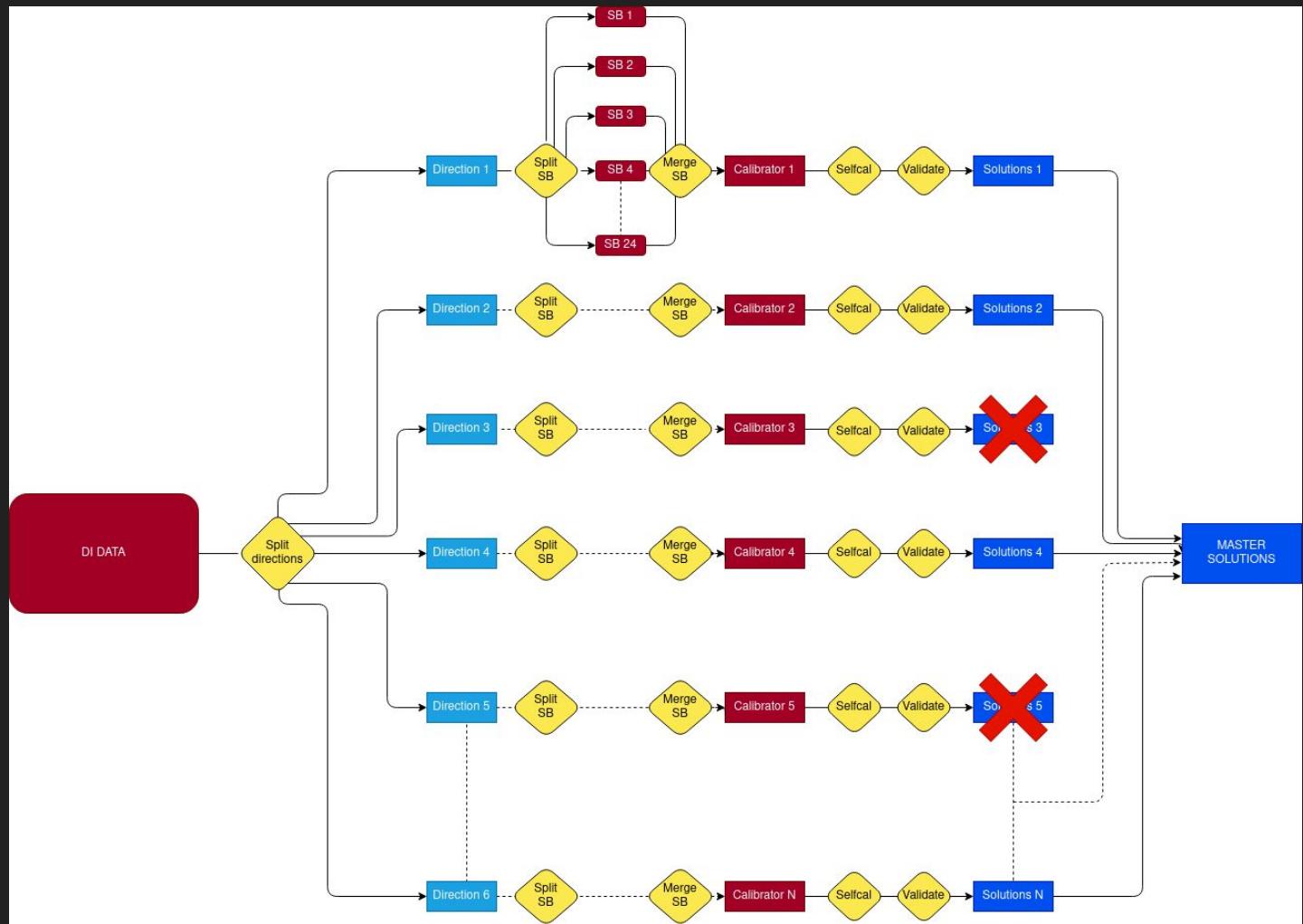
Direction  
independent  
images (1")



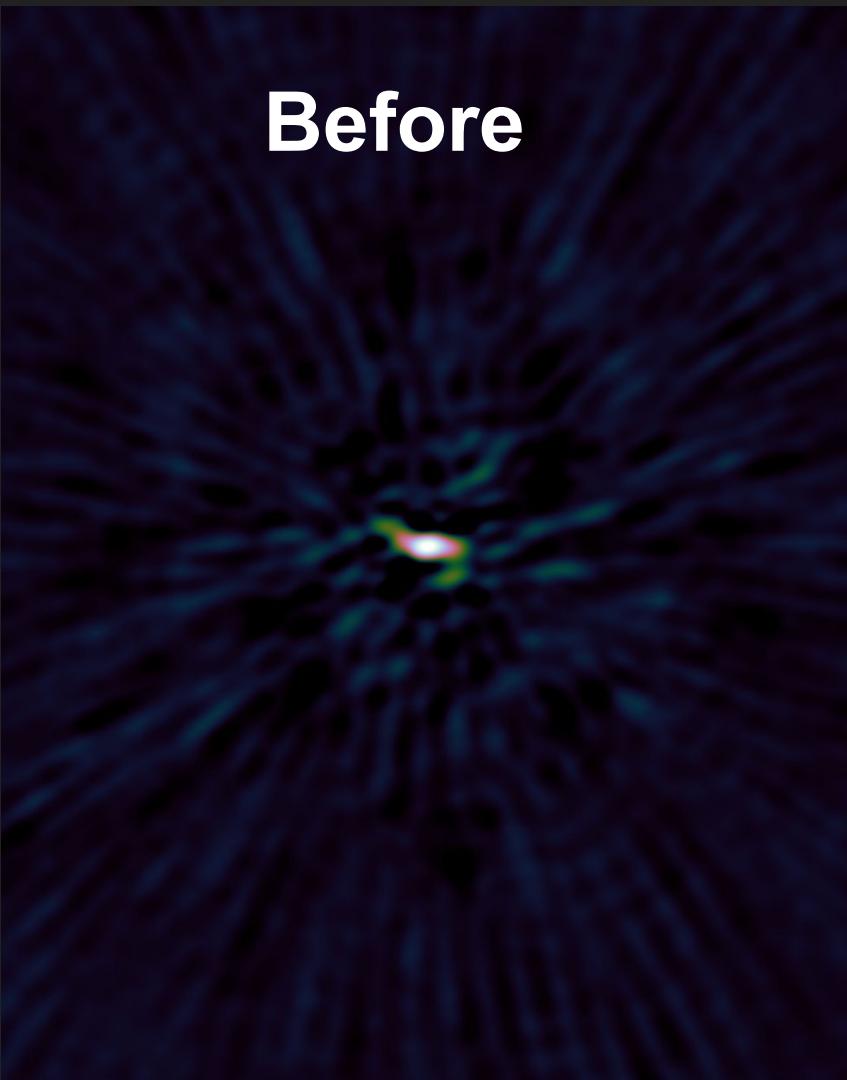
Direction  
independent  
images (1")



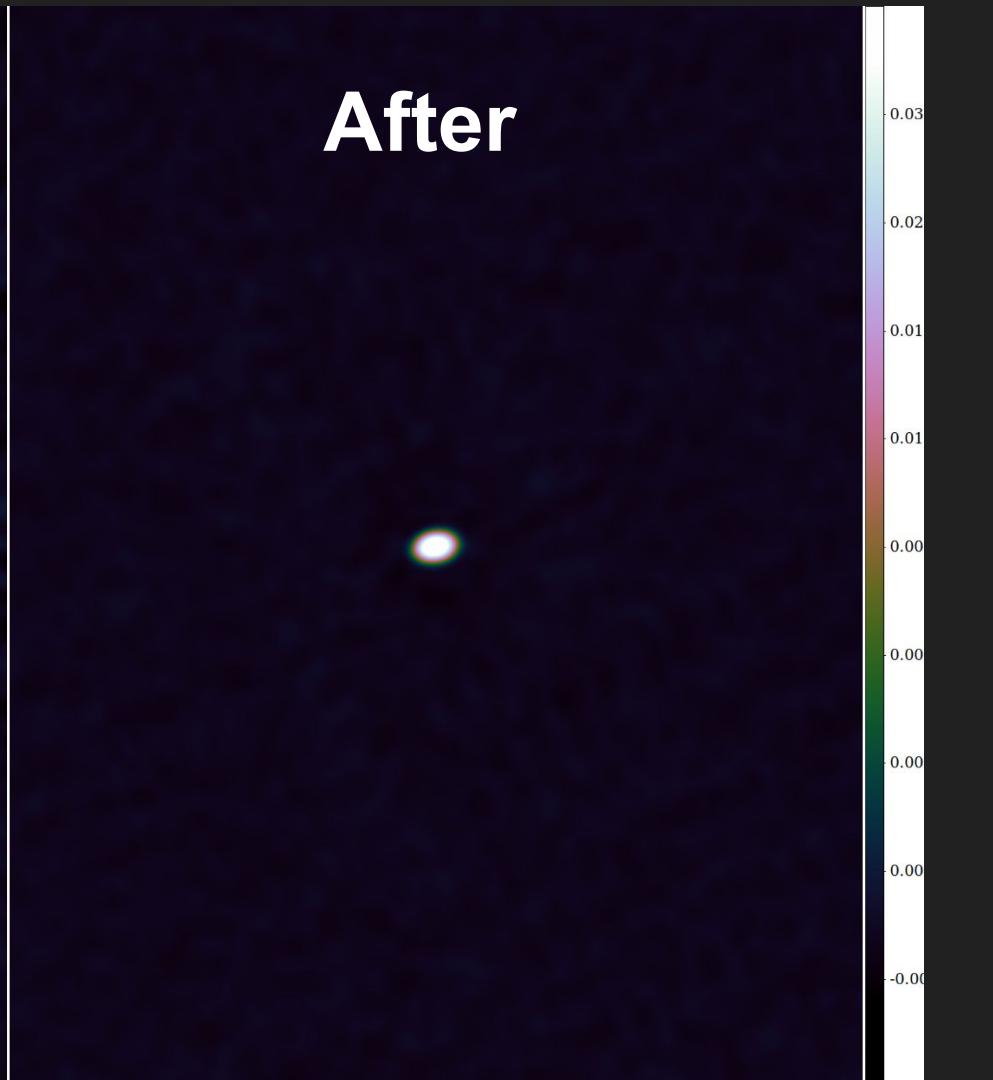
# Choose calibrators



# Before

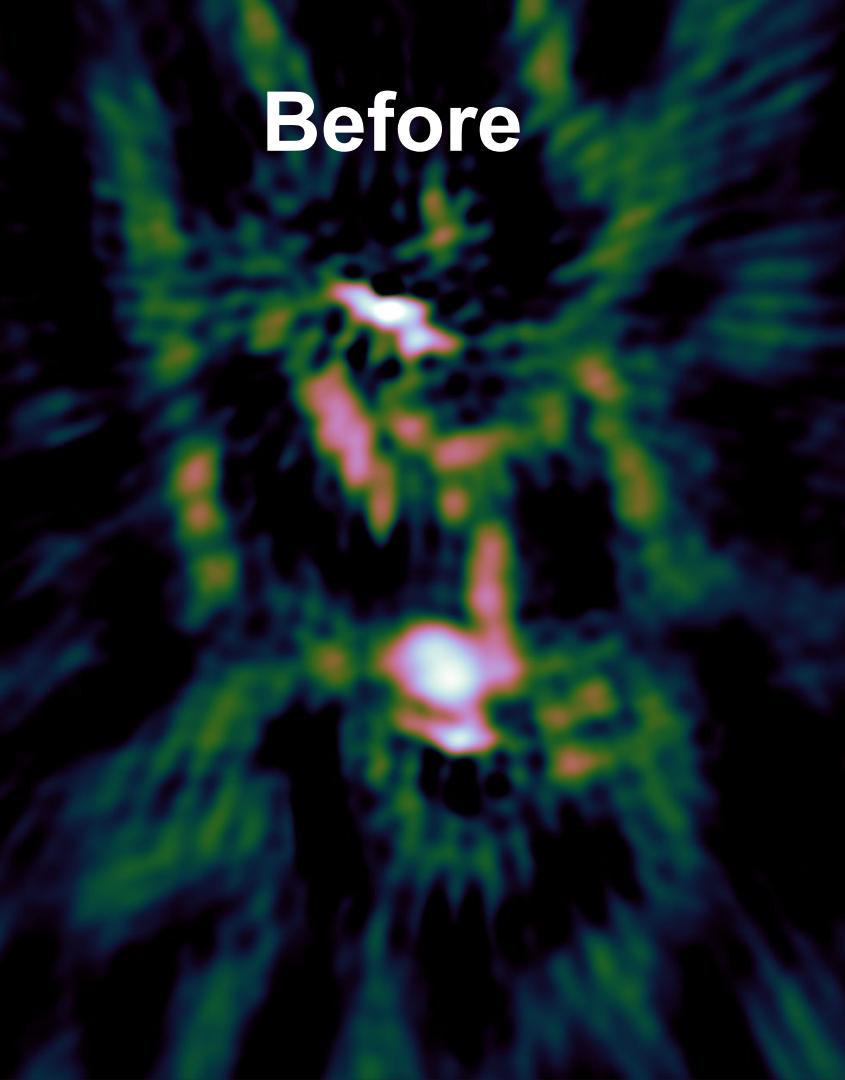


# After

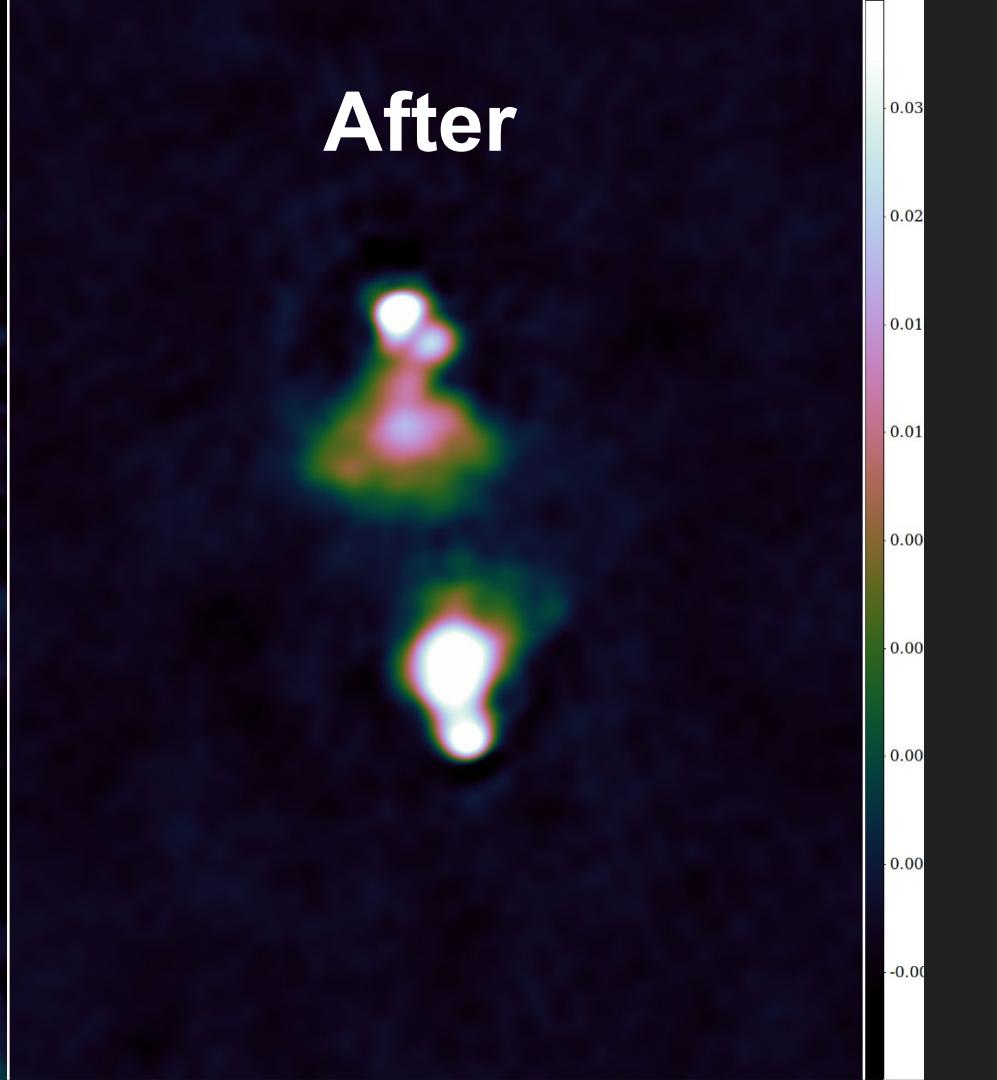


-0.03  
-0.02  
-0.01  
0.00  
0.01  
0.02  
0.03

**Before**

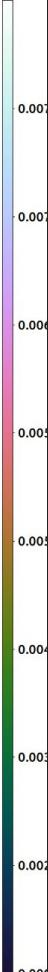


**After**

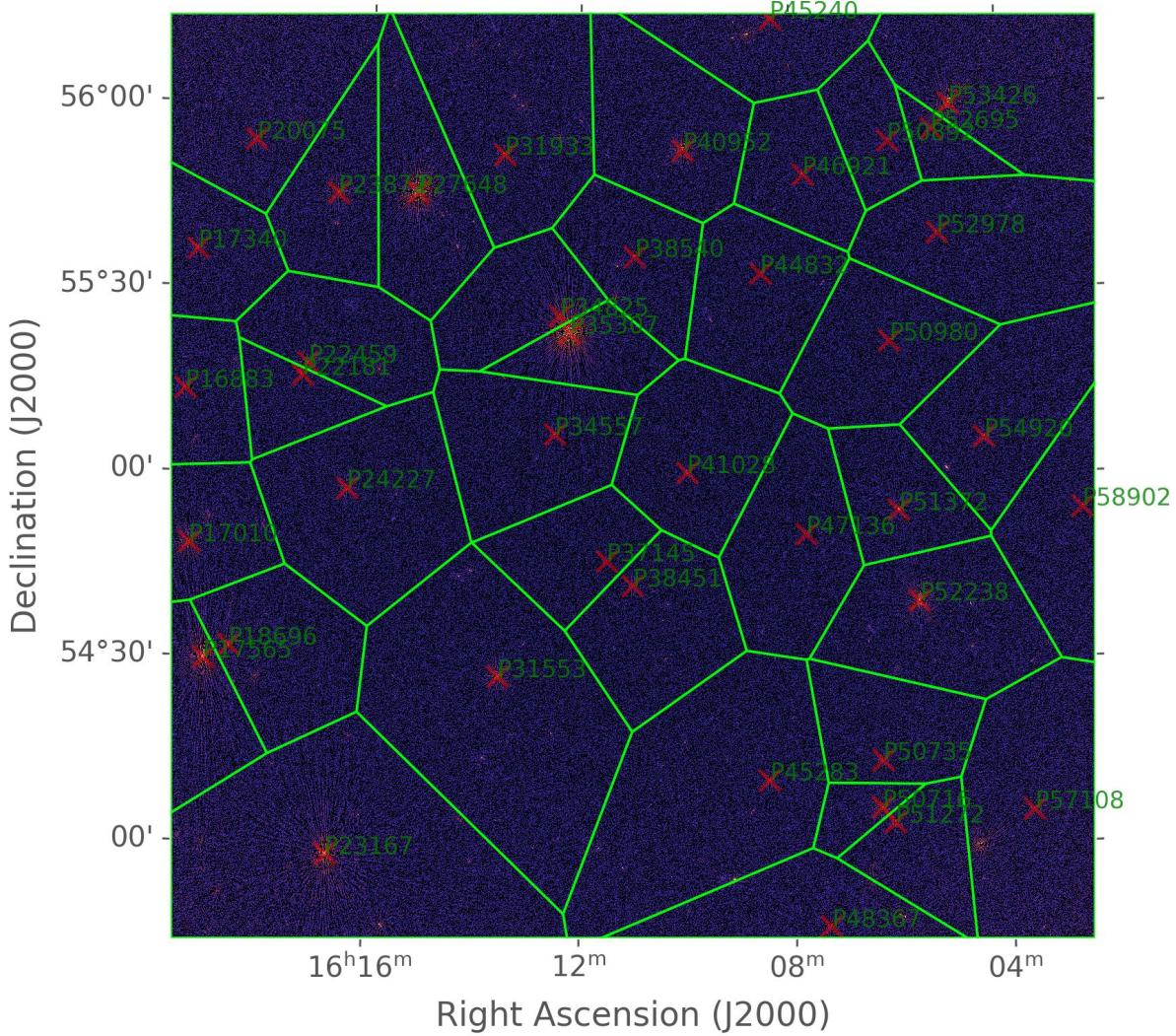


# Before

# After



# Facets



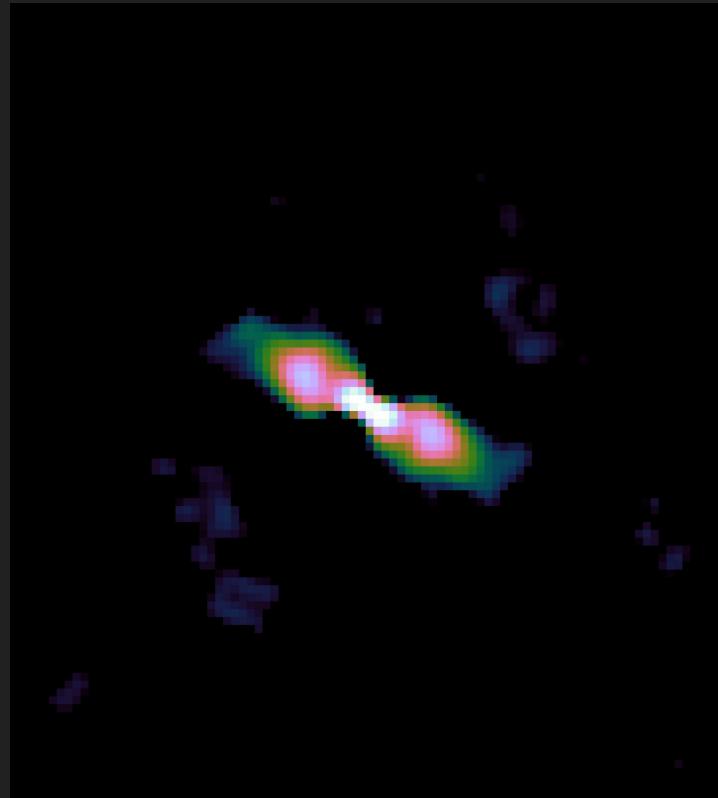
**DD**

**DI**

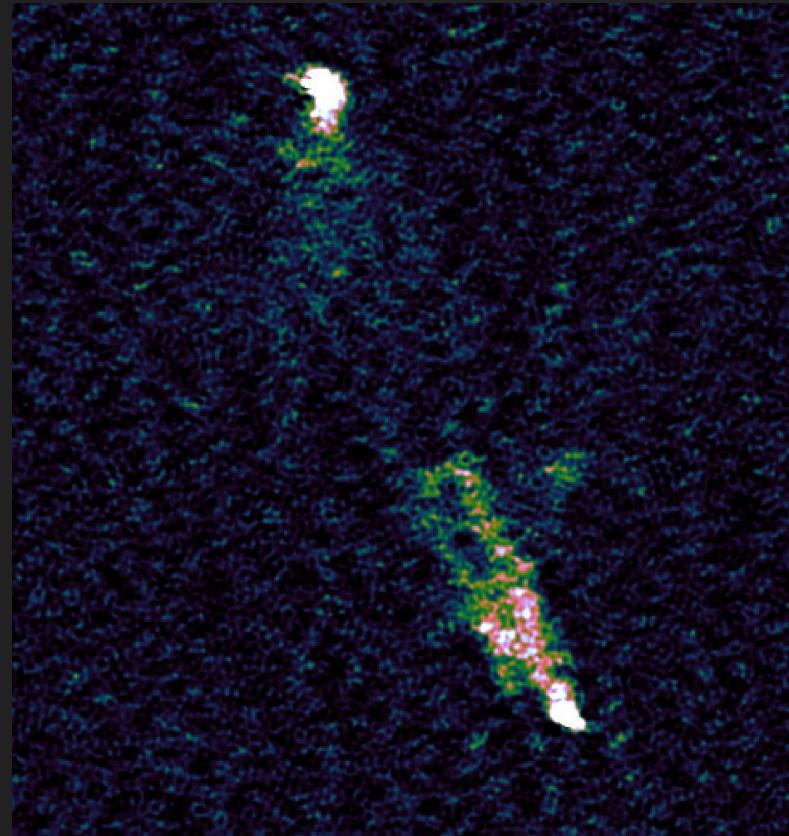
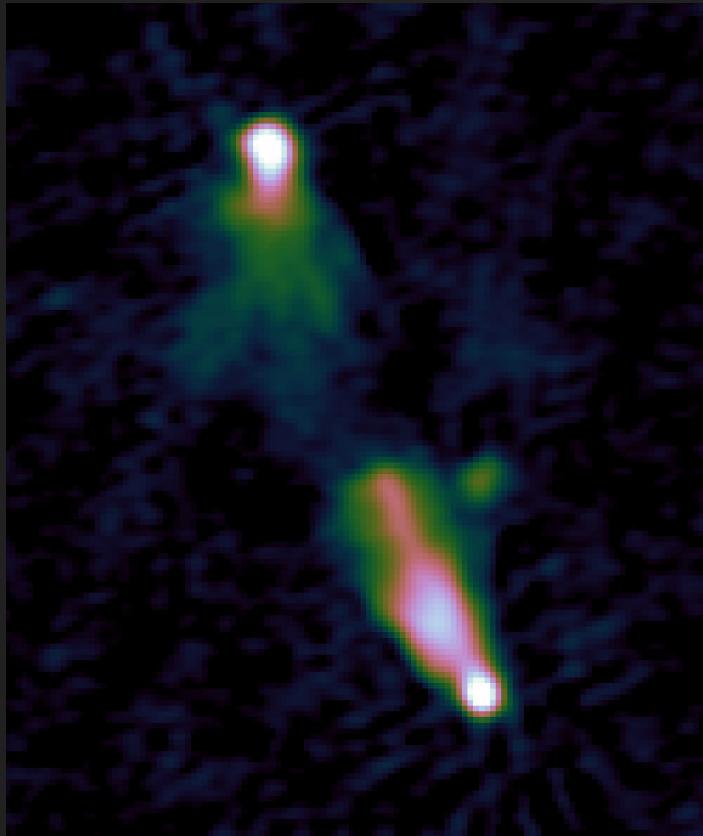
**DD**

**DI**

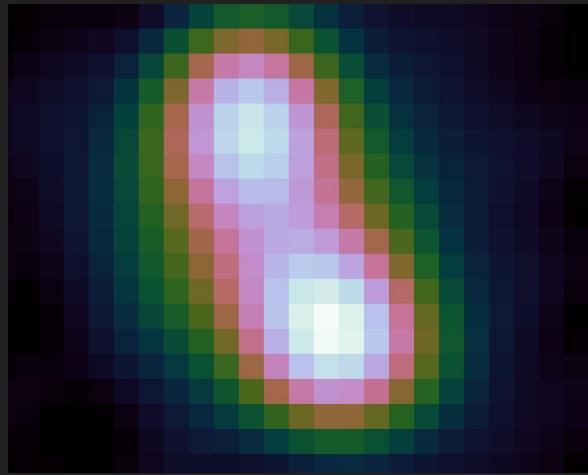
6" versus 1"



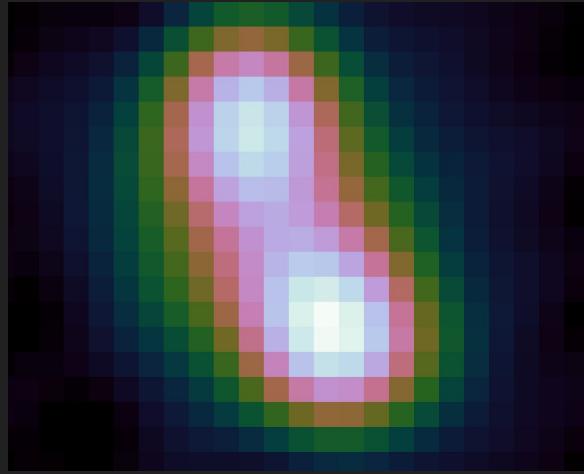
6" versus 1"



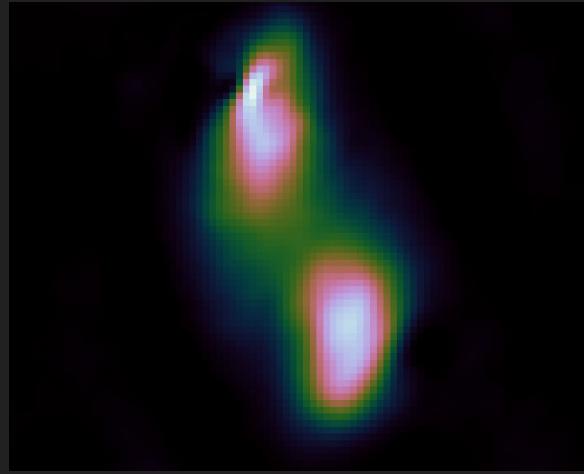
6"



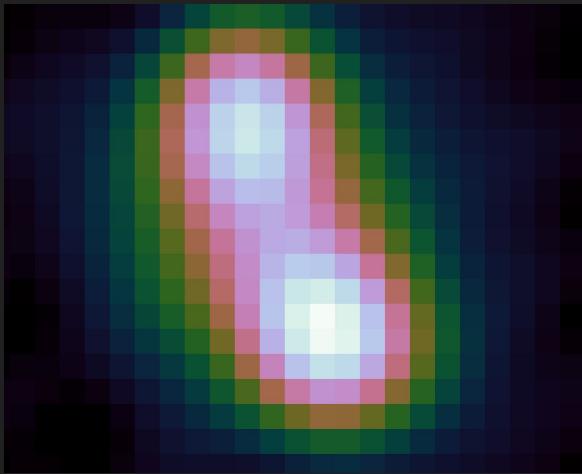
6"



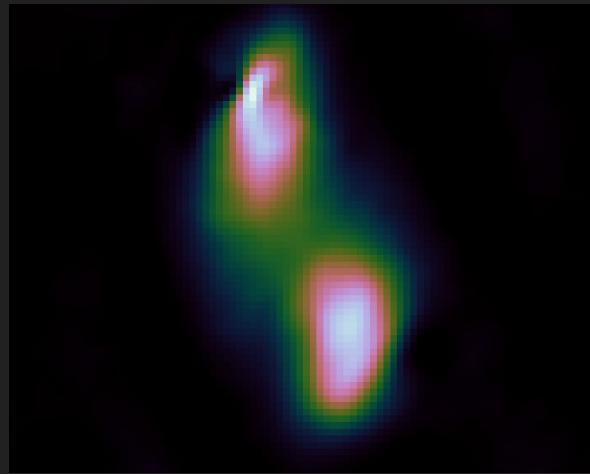
1.2"



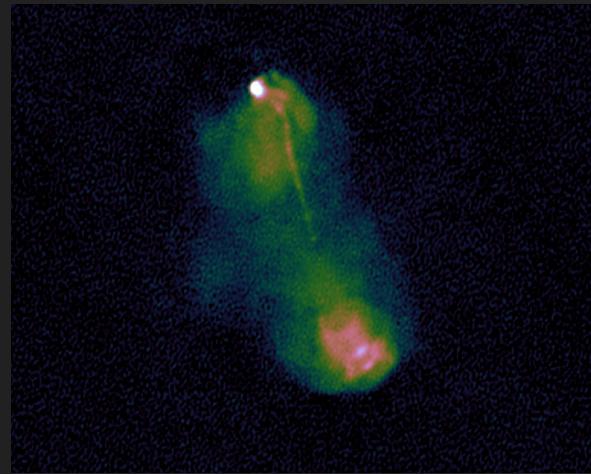
$6''$



$1.2''$



$0.3''$



# Future steps

- Make ~1" with 4 nights
- Make subarseconds with 1 night
- Make subarcseconds with 4 nights?
- Work on automation
  - delay calibrator selection
  - DD calibrator selection

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