

Sub-arcsecond resolution imaging of M 51 with the International LOFAR Telescope

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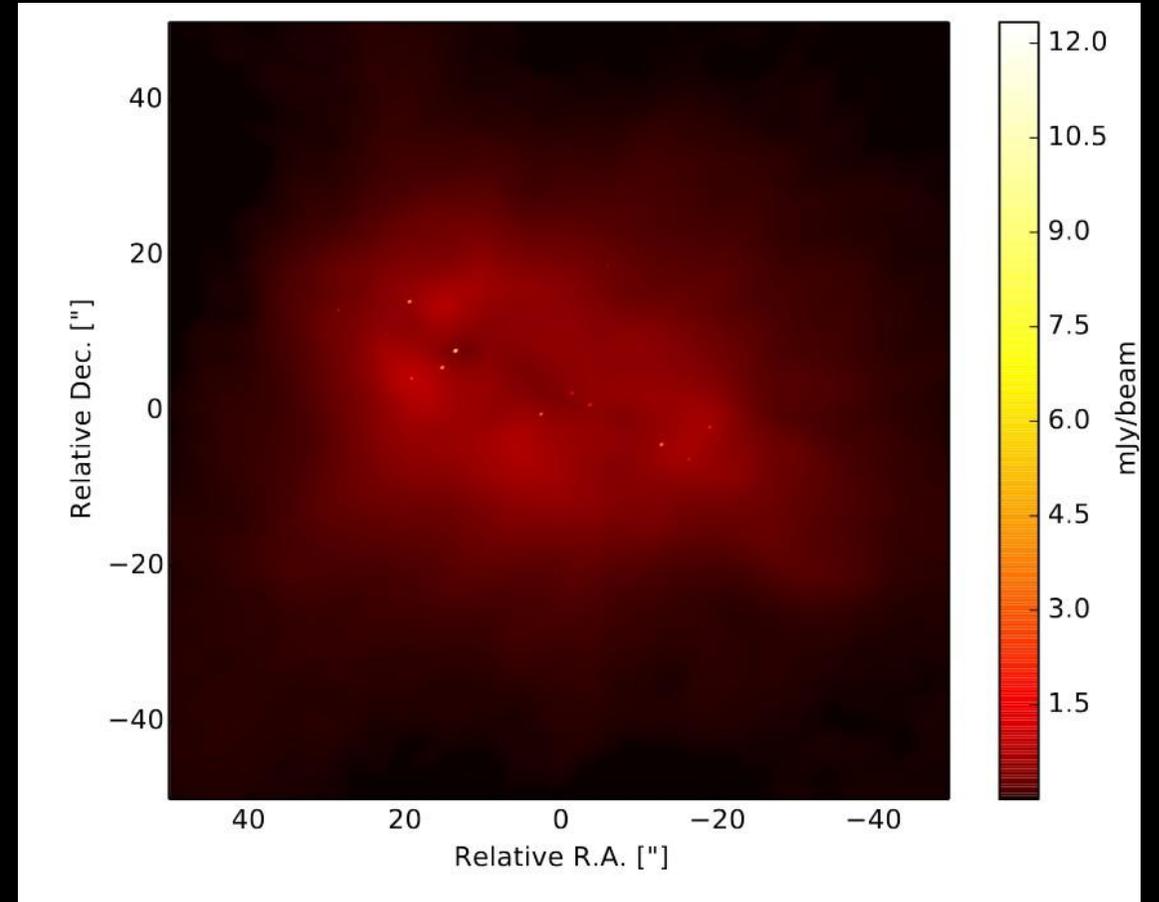


LOFAR Family Meeting June 16, 2023

The "Why"

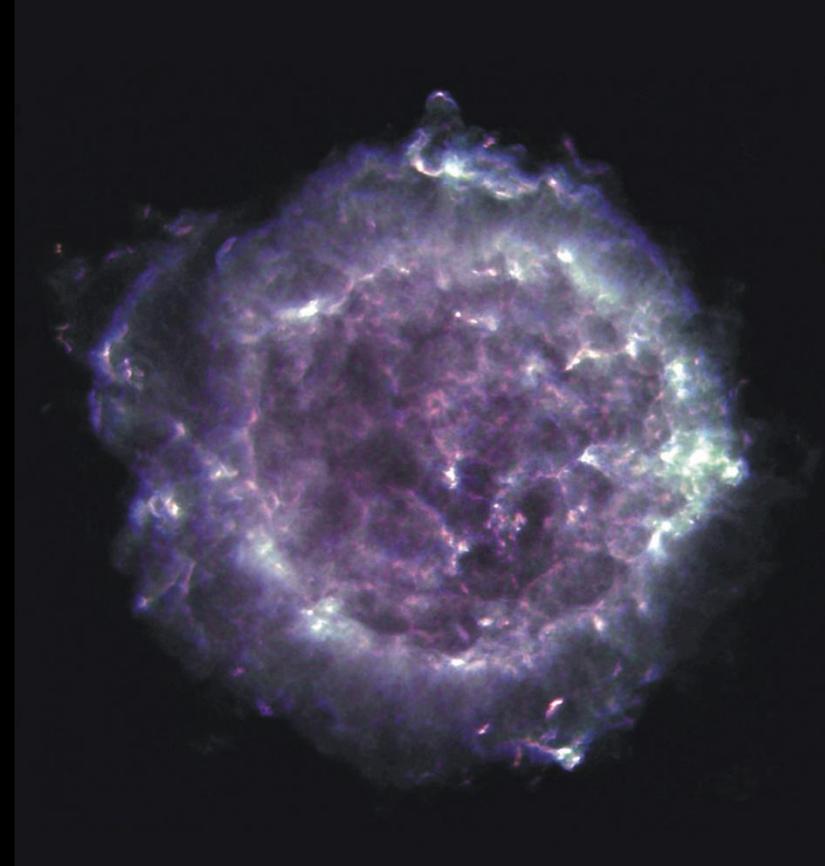
- For compact objects:
Low ν - discovery space
Highest resolution possible

Varenius et al. 2015



SNe

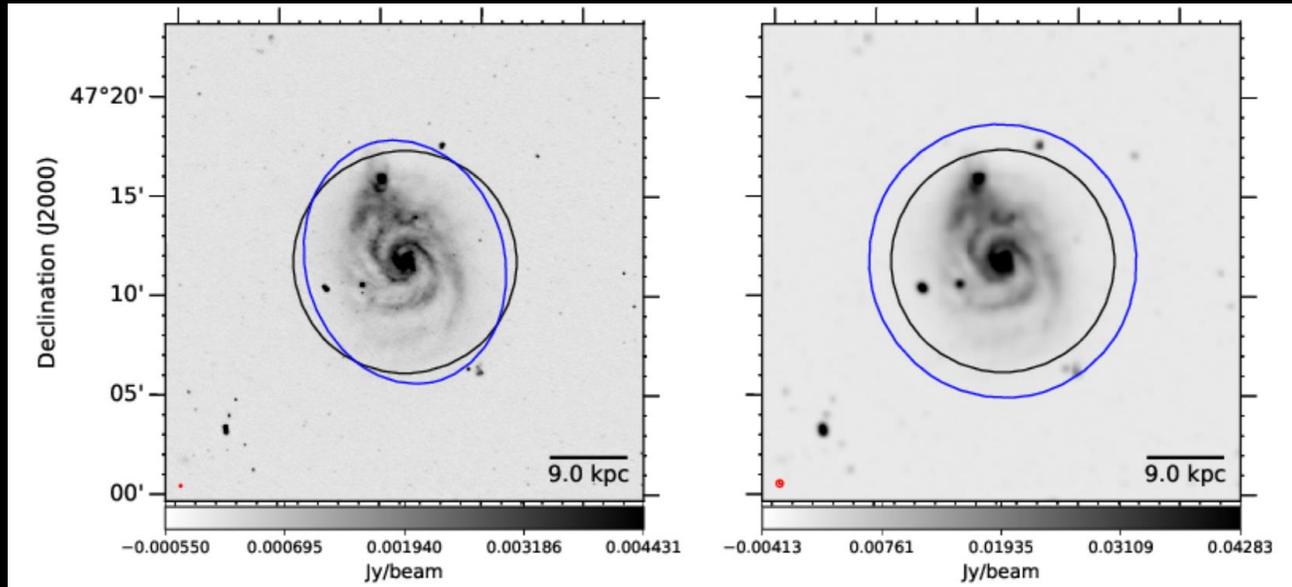
- Radio Supernovae
- Synchrotron



Cas A

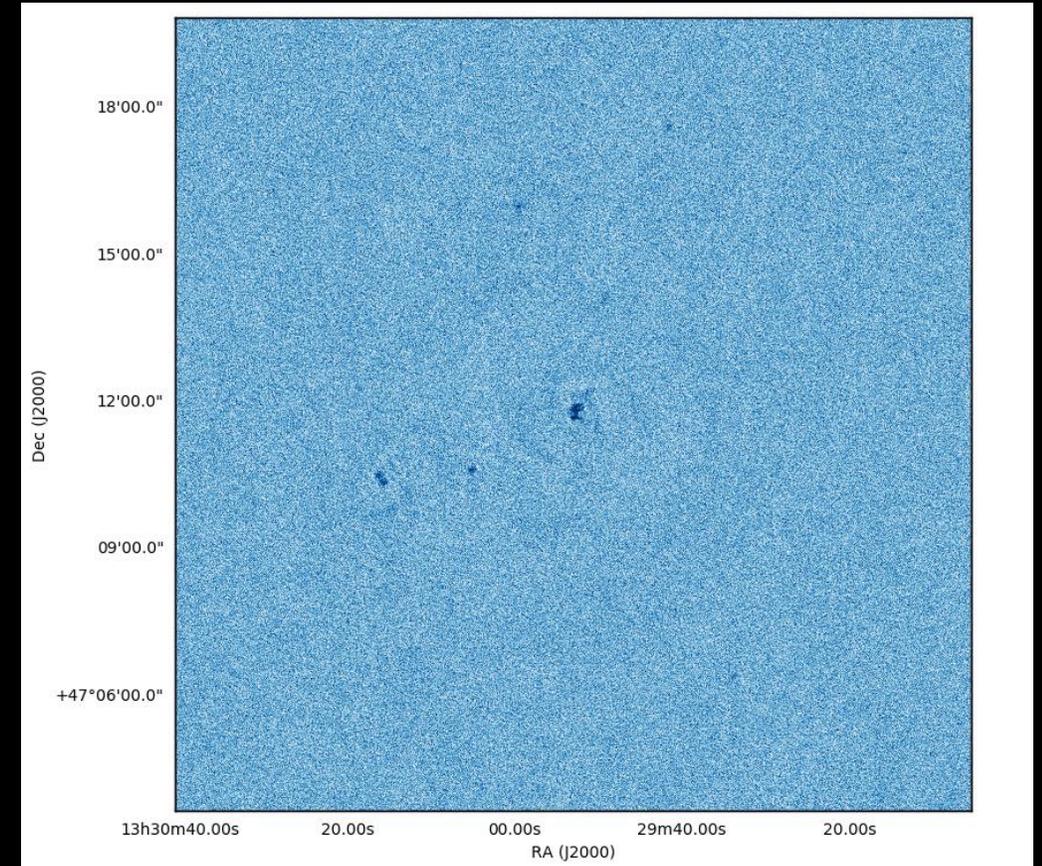
<https://public.nrao.edu/gallery/cassiopeia-a>

M 51 with LOFAR



Heesen et al. 2022

rms 46 μ Jy/beam
beam 0.436 " \times 0.366 "

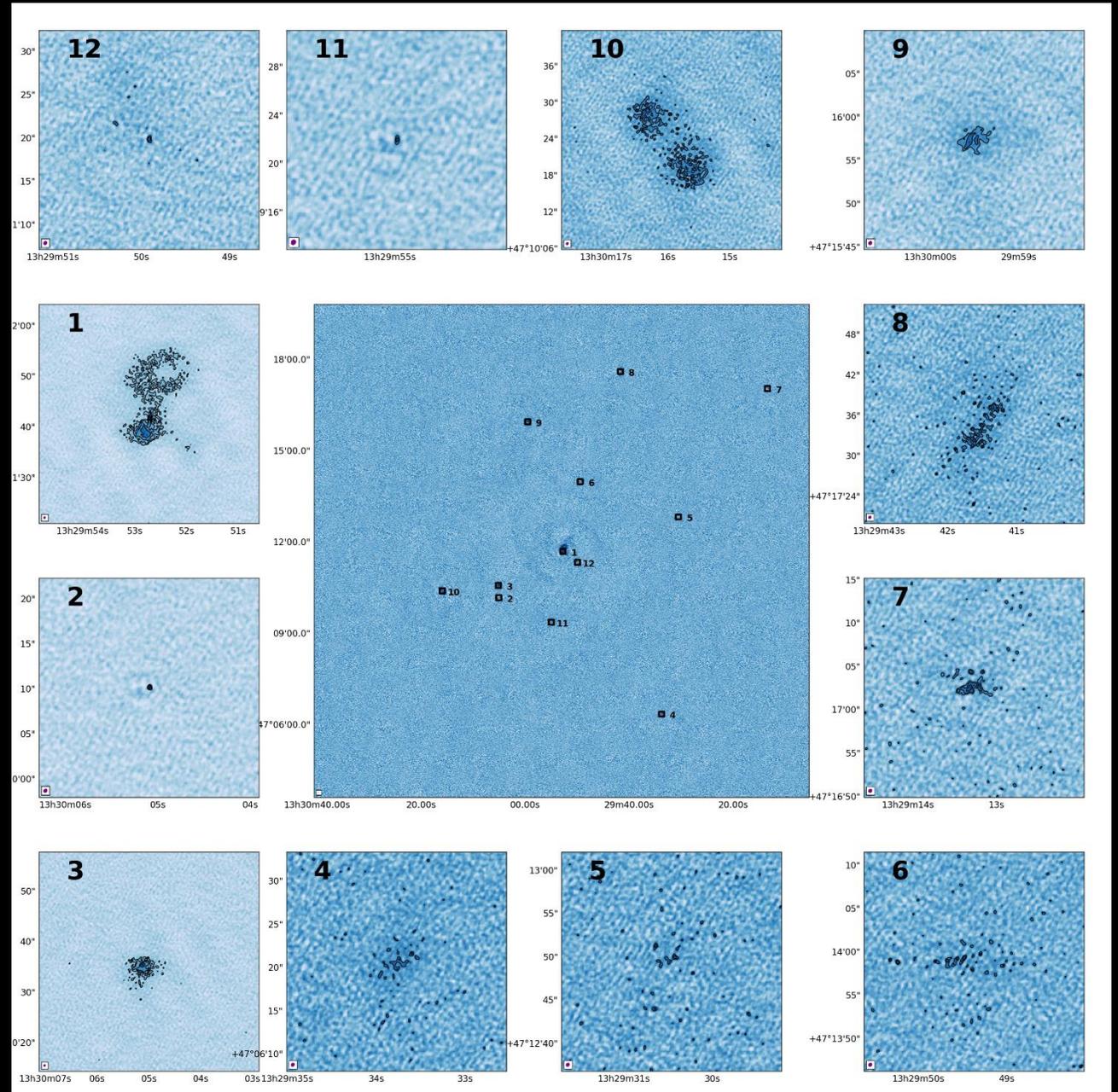


Venkattu+ submitted

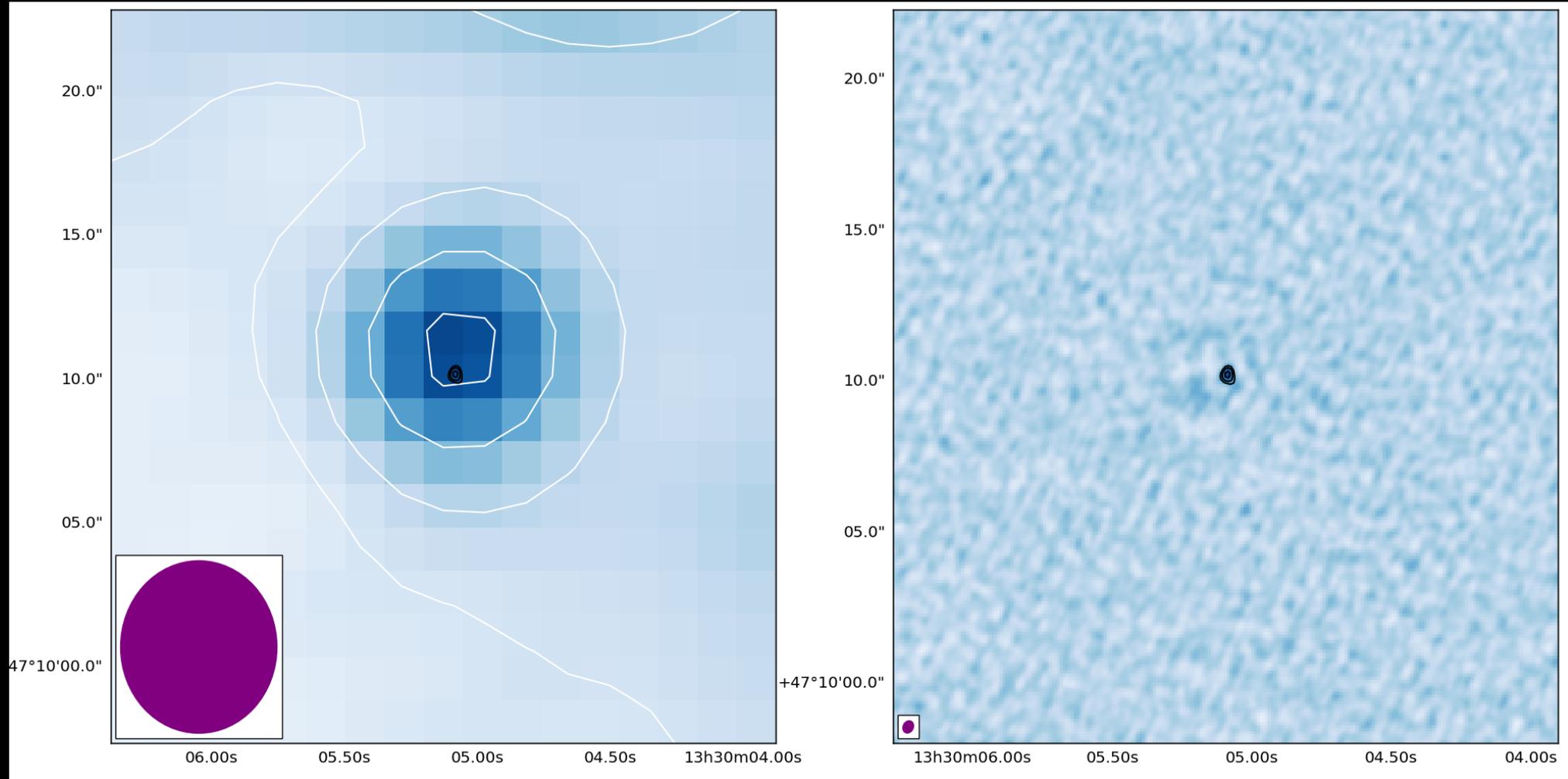
Imaging + Source detection

- PyBDSF
 - LoTSS cross-match -10
 - SNR catalogue
- Winkler 2021
- Rampadarath 2015
 - Maddox 2007

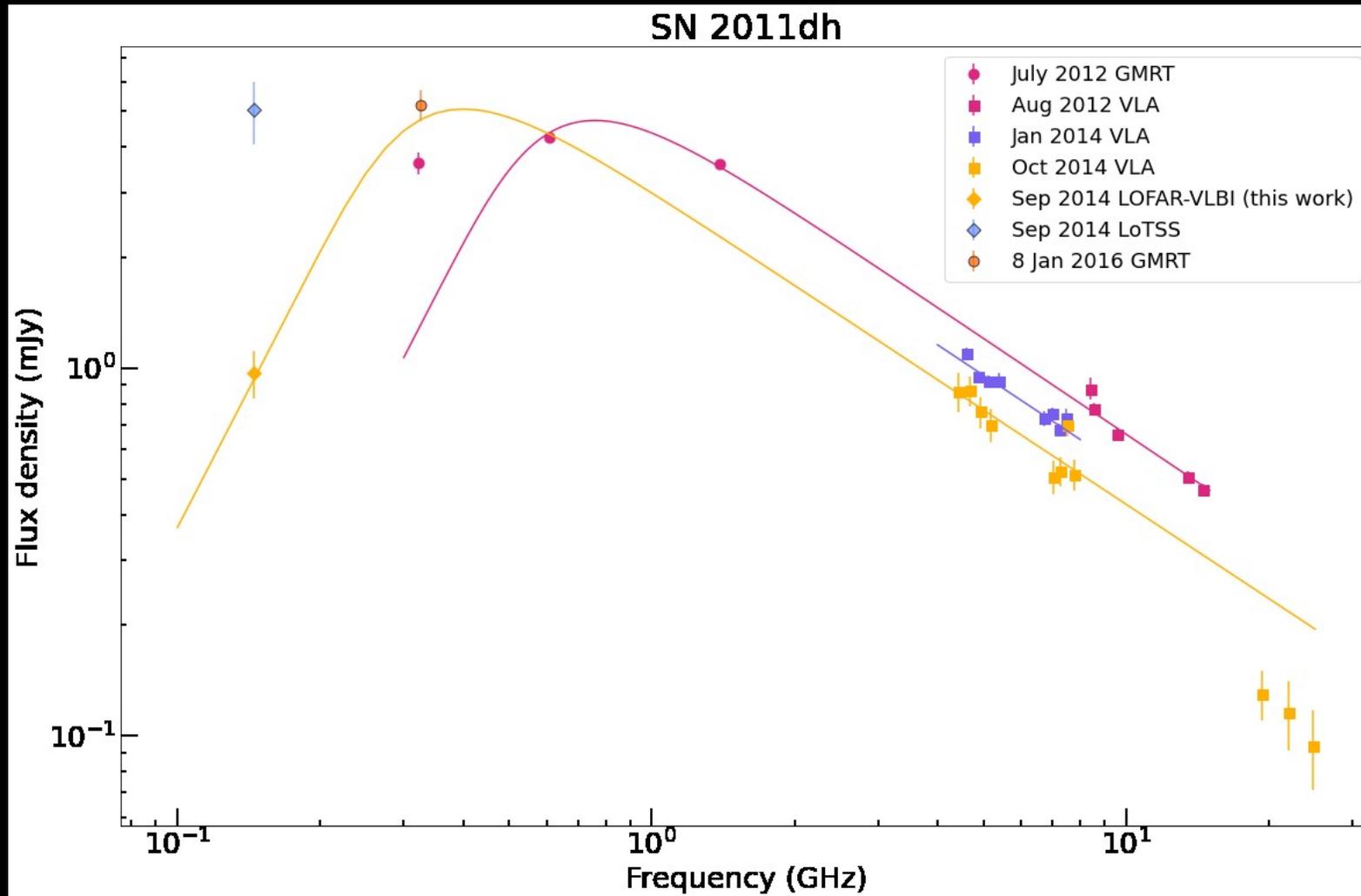
Venkattu+ submitted



Sne in M51 – SN 2011dh



Sne in M51 – SN 2011dh



Venkattu+ submitted

Sne in M51

- SN 1994I

non-detection

compared with scaled fluxes from VLA

Weiler et al. 2011

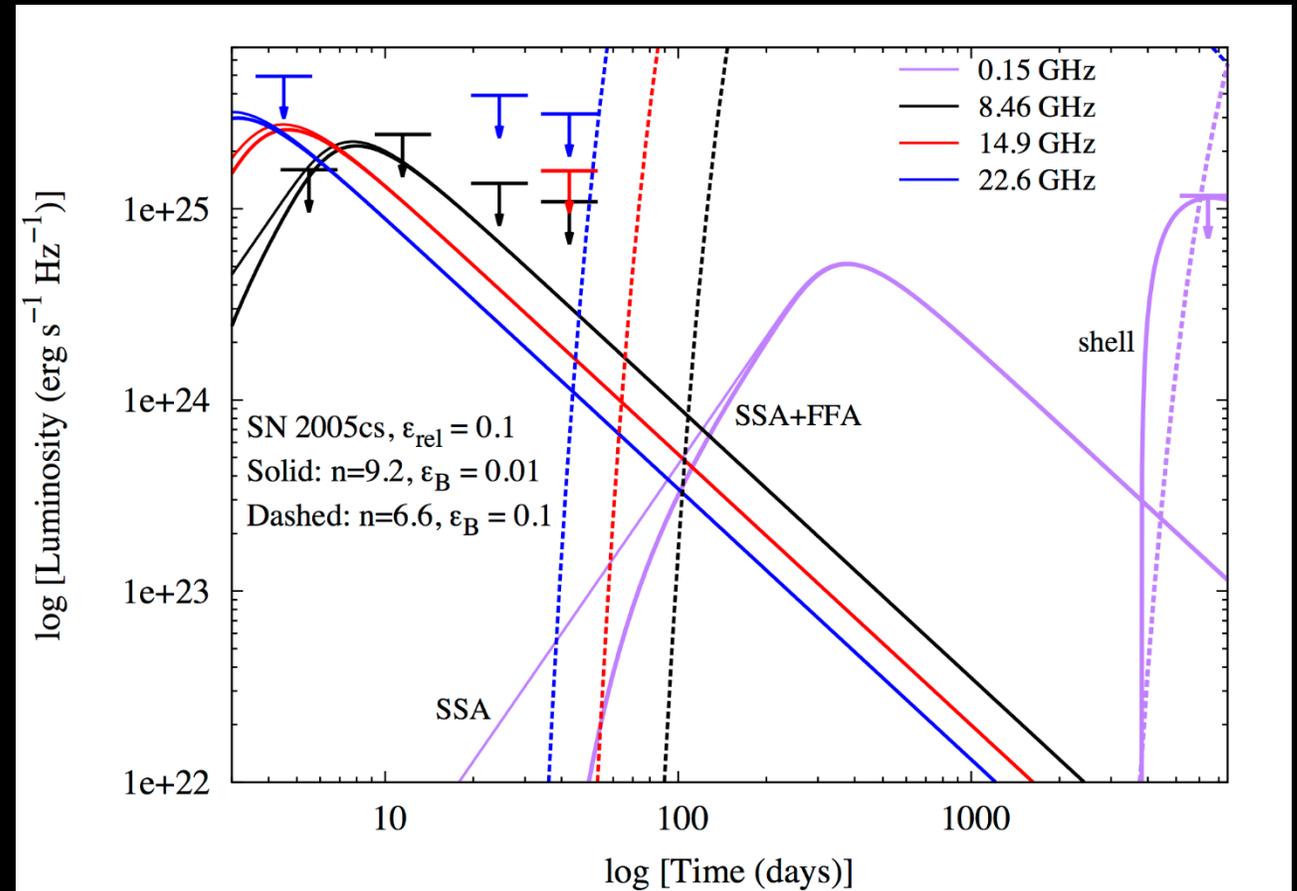
Maddox et al. 2007

Sne in M51

- SN 2005cs

non-detection
modelling

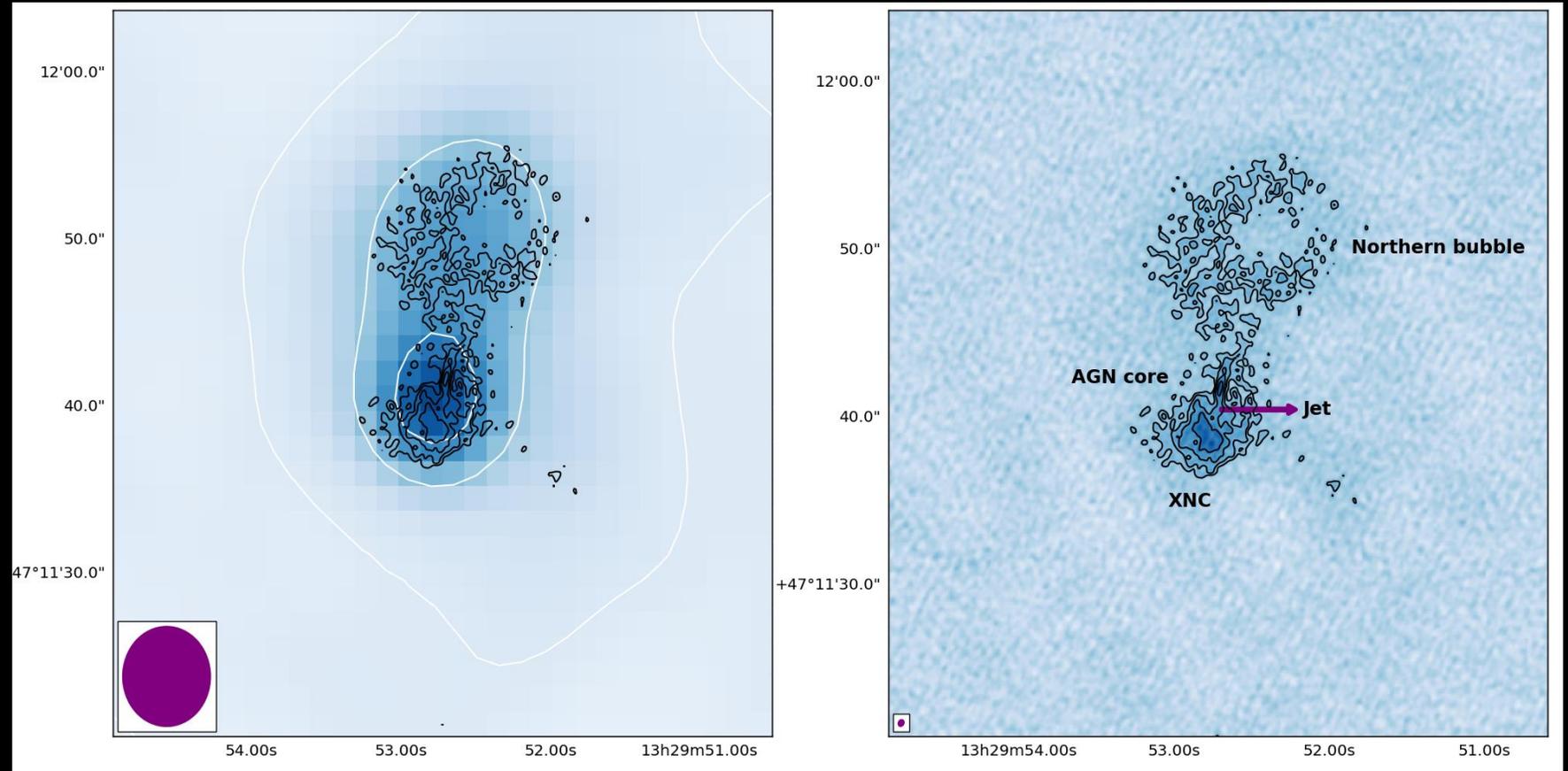
Kozyreva et al. 2022



Venkattu+ submitted

Nuclear emission

- AGN
- Northern bubble
- XNC



- Maddox 2007, Rampadarath 2015

Venkattu+ submitted

Other sources

- H II regions?

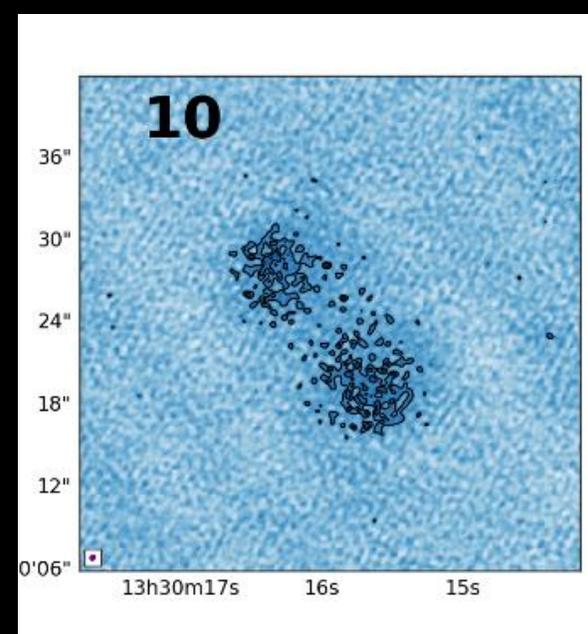
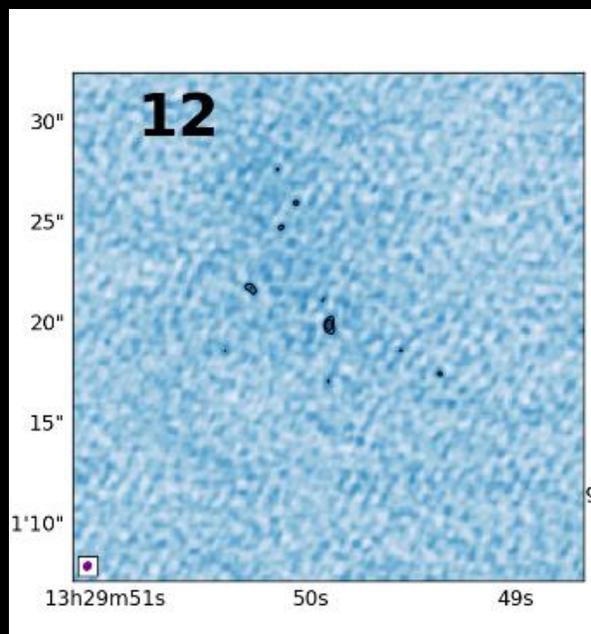
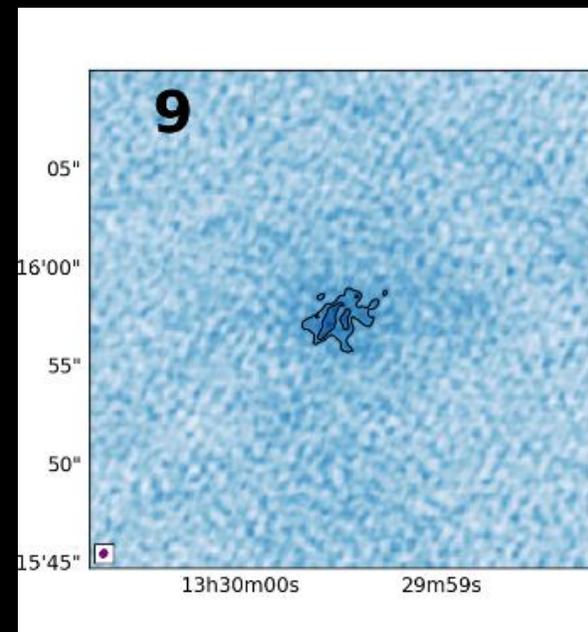
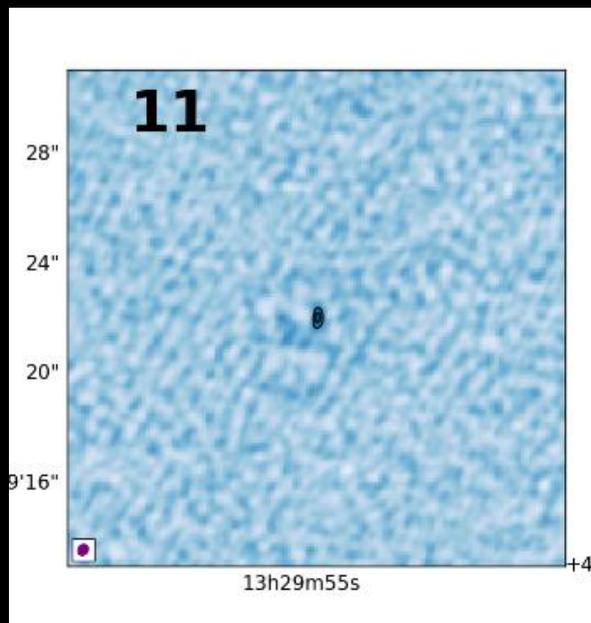
- HMXB

- SNR candidate

- M51b

- FR II

Venkattu+ submitted



Summary

- M 51 ILT image – 12 sources, 2 not detected in LoTSS
- SN 2011dh
- 94I, 05cs – non detections and constraints

- ILT imaging – nearby galaxies
- LoTSS-HR!!