

The LOFAR Two-metre Sky Survey (LoTSS)  
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Leiden University



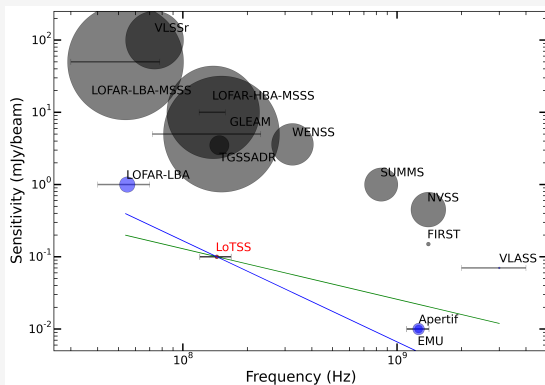
# The LOFAR Two-metre Sky Survey (LoTSS)

PI: Röttgering.

Core team: Best, Brügger, Brunetti, Chyży, Conway, Haverkorn, Heald, Jackson, Jarvis, Lehnert, McKean, Miley, Morganti, Scaife, Tasse, White,

Wise

- Description and preliminary data release in Shimwell et al. *A&A* 2017
- $\approx 5''$  resolution
- $\approx 100 \mu\text{Jy}/\text{beam}$  sensitivity
- 48 MHz bandwidth
- 3170 8hr pointings to cover the northern sky
- Over 13% complete



Green  $\alpha = -0.7$ . Blue  $\alpha = -1.4$  (typical for cluster emission).



# Preparing for the first LoTSS full quality data release

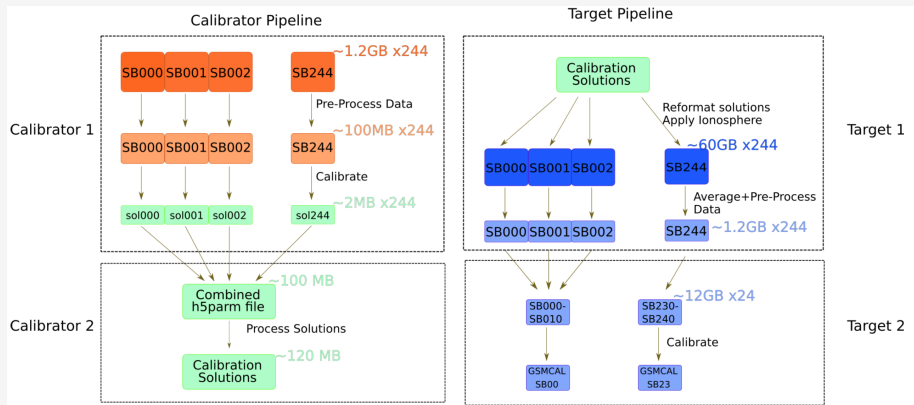
A data release of 6" resolution images with a sensitivity of  $\approx 100 \mu\text{Jy}/\text{beam}$  made from 63 direction dependent calibrated datasets.

This covers  $\approx 400$  square degrees in the region of the HETDEX Spring Field and the catalogue will contain over 300,000 sources.



# Completely automated data processing at SURFsara

Completing LoTSS requires 50 PB of data and processing on the archive facilities mitigates data retrieval issues.

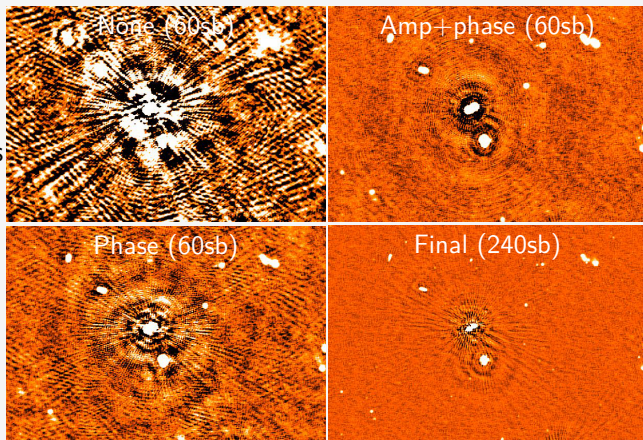


**GRID implementation** – Mechev (poster), Onk, Danezi, Shimwell, Schrijvers

**Prefactor** – Horneffer, van Weeren, Williams, Shimwell, Frohlich, many others

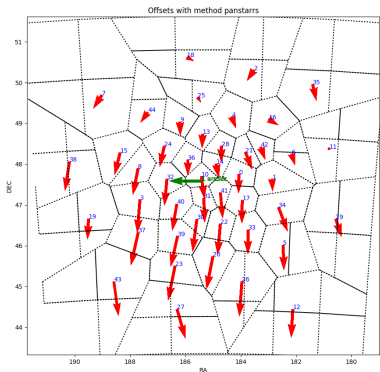
# Fully automated direction dependent calibration and imaging pipeline

DDF-pipeline uses DDFacet and KillMS for imaging and calibration. The pipeline runtime is  $\sim 3$ -4 days per pointing. Nearly 100 HBA pointings have been processed to produce 6arcsec and  $100\mu\text{Jy}/\text{beam}$  noise images. DDF-pipeline requires no user interaction and is operational on SURFsara.

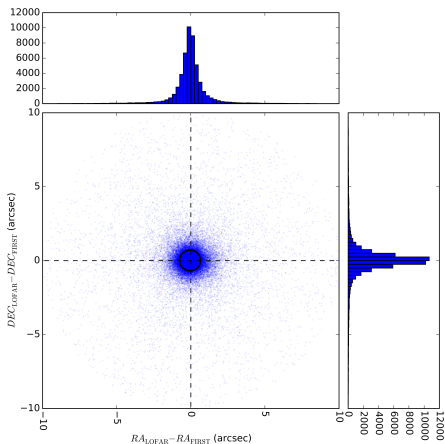


**DDF-pipeline** – Hardcastle, Shimwell, Tasse, Williams

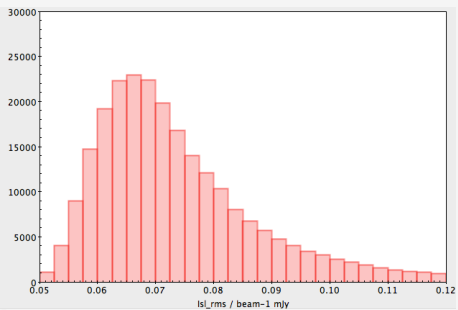
# Image quality



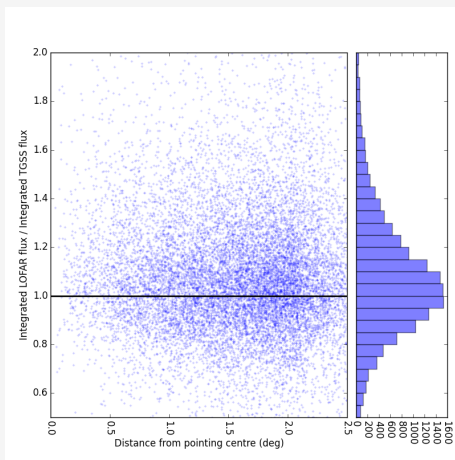
Facet based astrometric corrections based on Pan-STARRS are applied in DDFacet



# Image quality



Noise level typically  $70 \mu\text{Jy}/\text{beam}$ .



Good flux agreement with TGSS.

# Source classification

Select **additional** source components that go with the LOFAR source marked with the cross. If none, don't select anything

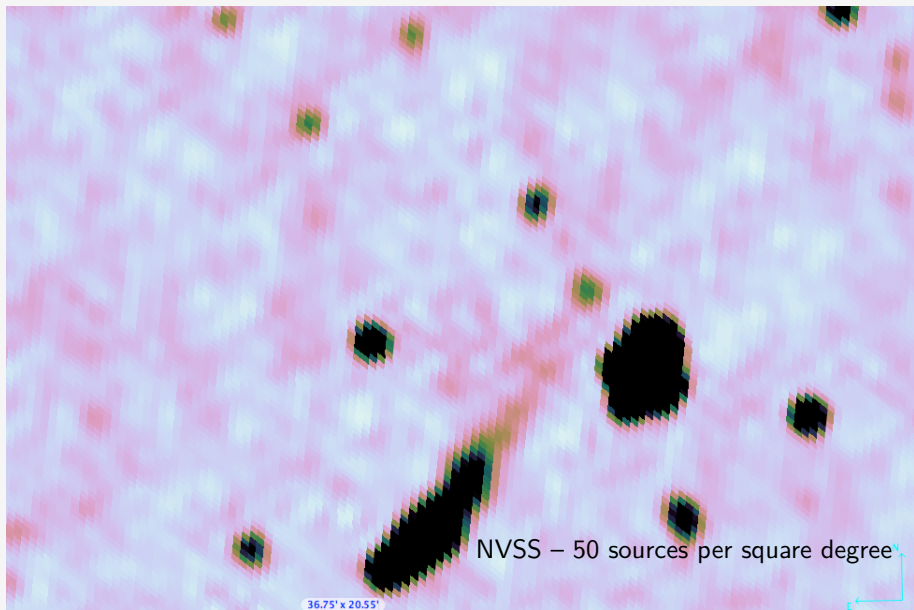
Component selector 0 drawn

Need some help with this task?

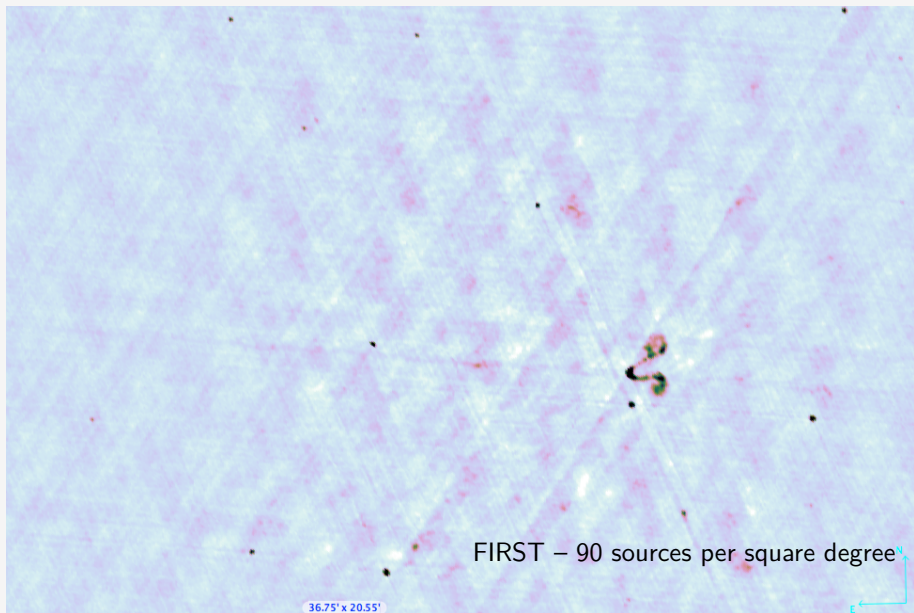
Back Next

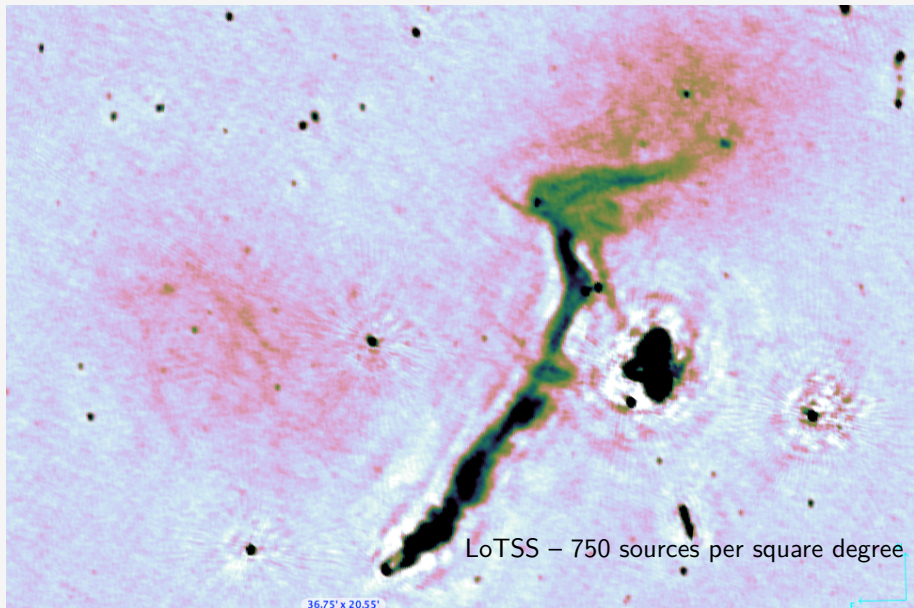
Show the project tutorial

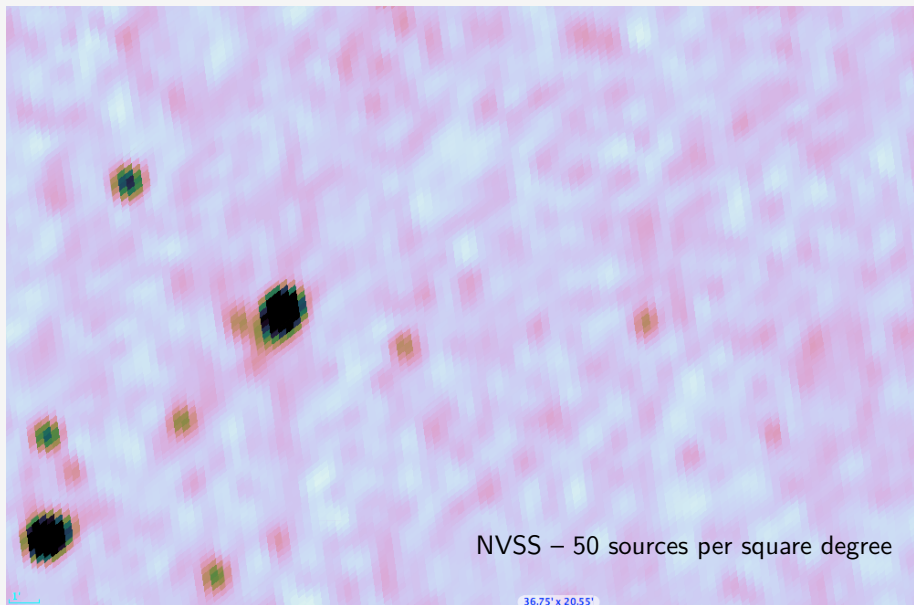
**Multi-wavelength team** – Best, Hardcastle, Williams, Sabater, Duncan and many more

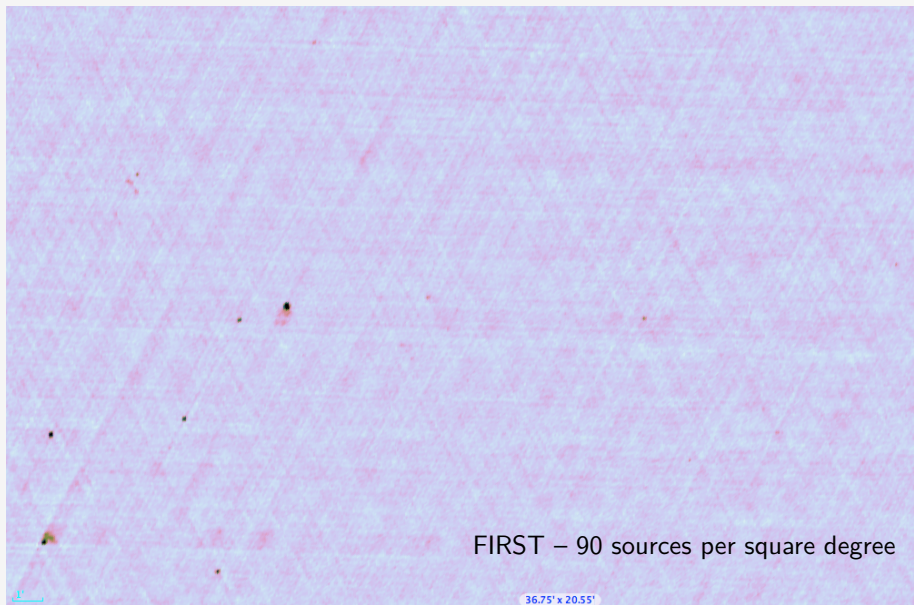


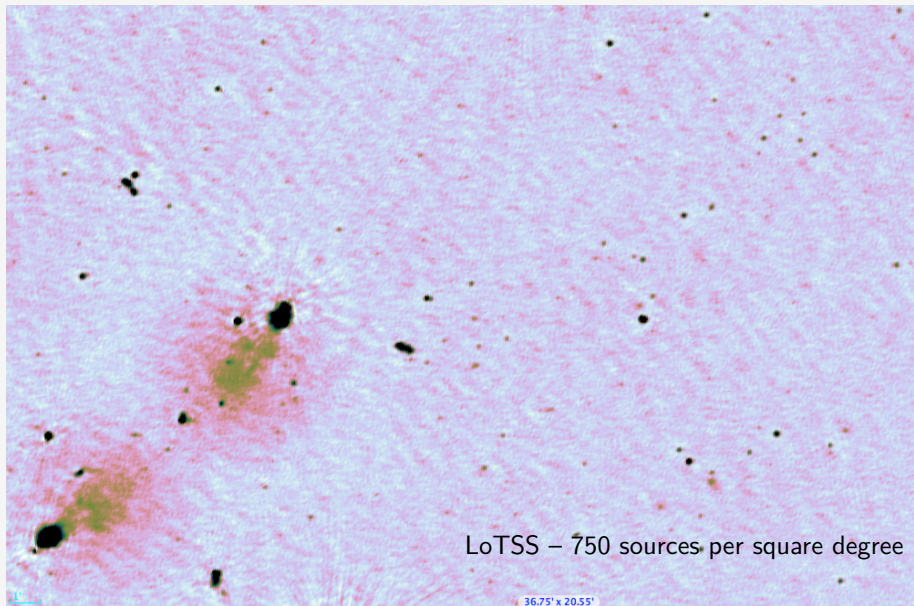


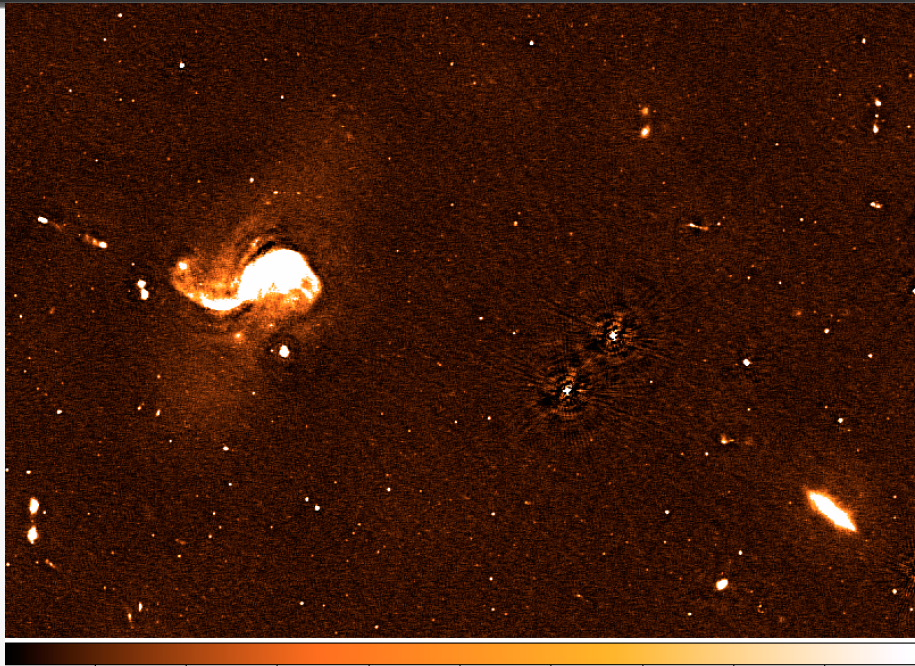




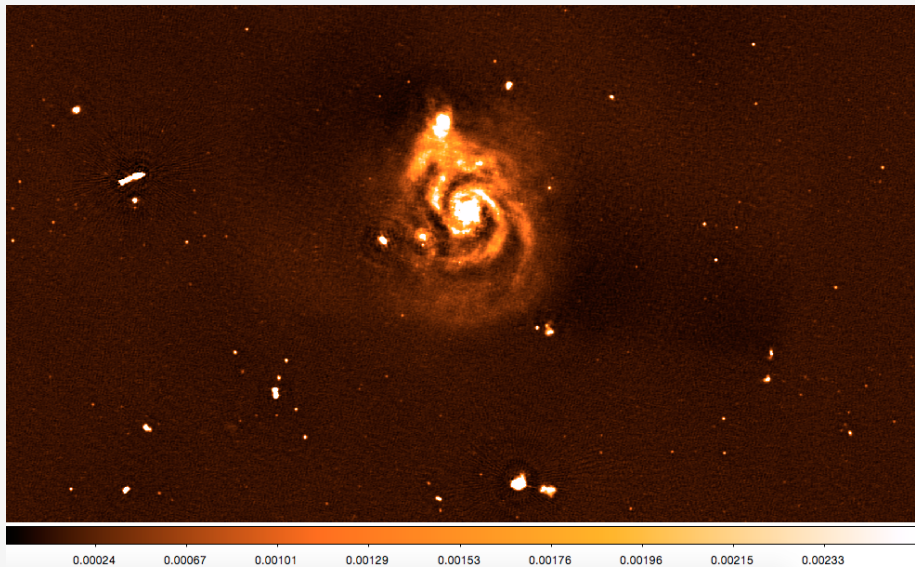








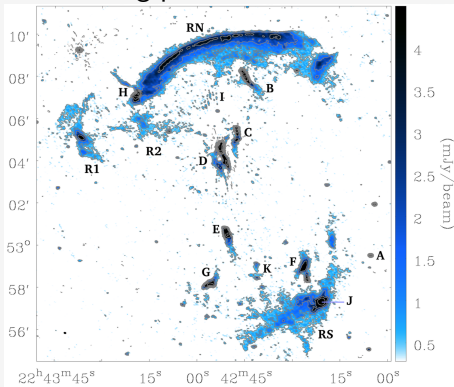






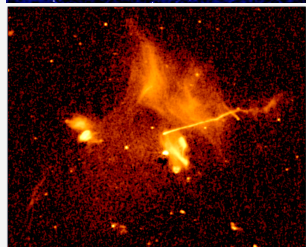
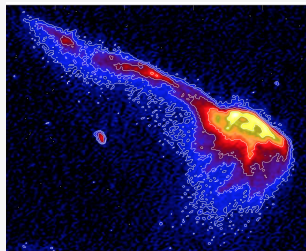
# Cluster science with LoTSS

- Even in very well studied clusters LoTSS depth observations are revealing new emission and allowing precise characterisation.



Hoang+ submitted

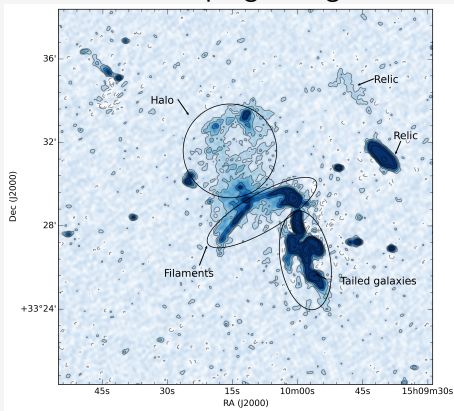
**Facet calibration** – van Weeren, Williams, Rafferty, Hardcastle, Shimwell and many more



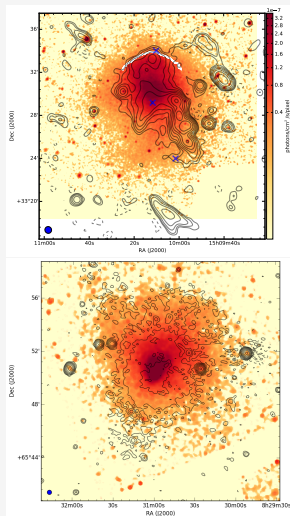
van Weeren+ 2016 and in prep

# Cluster science with LoTSS

- Interesting samples, such as clusters with prominent X-ray shocks, are progressing well.



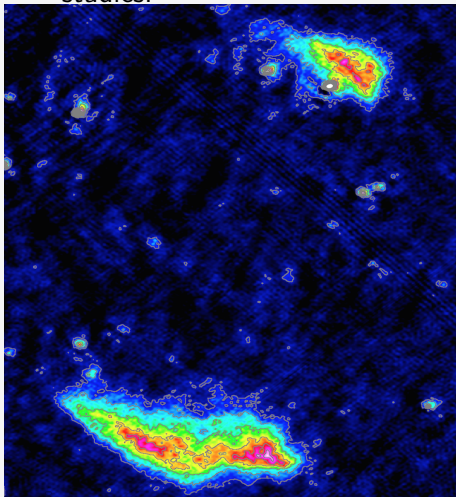
Shimwell+ 2016



Hoang+ in prep. Abell 520 and 2146 are also observed as part of the sample.

# Cluster science with LoTSS

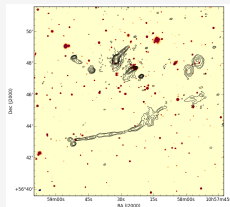
- And many other ongoing studies.



Hoang+ in prep

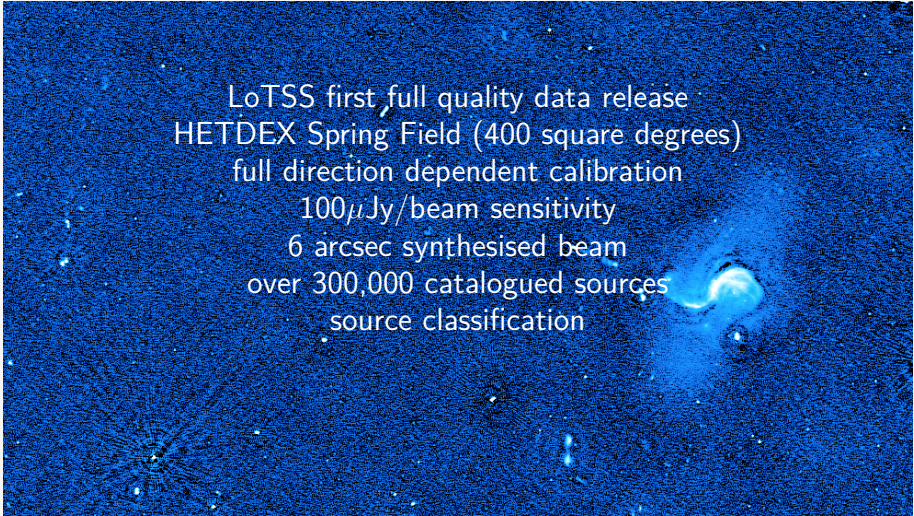
See posters by

- Drabent
- Wilber
- Shulevski
- Botteon
- Mandal
- Dumba



Wilber+ submitted

# Coming soon



LoTSS first full quality data release  
HETDEX Spring Field (400 square degrees)  
full direction dependent calibration  
100 $\mu$ Jy/beam sensitivity  
6 arcsec synthesised beam  
over 300,000 catalogued sources  
source classification