

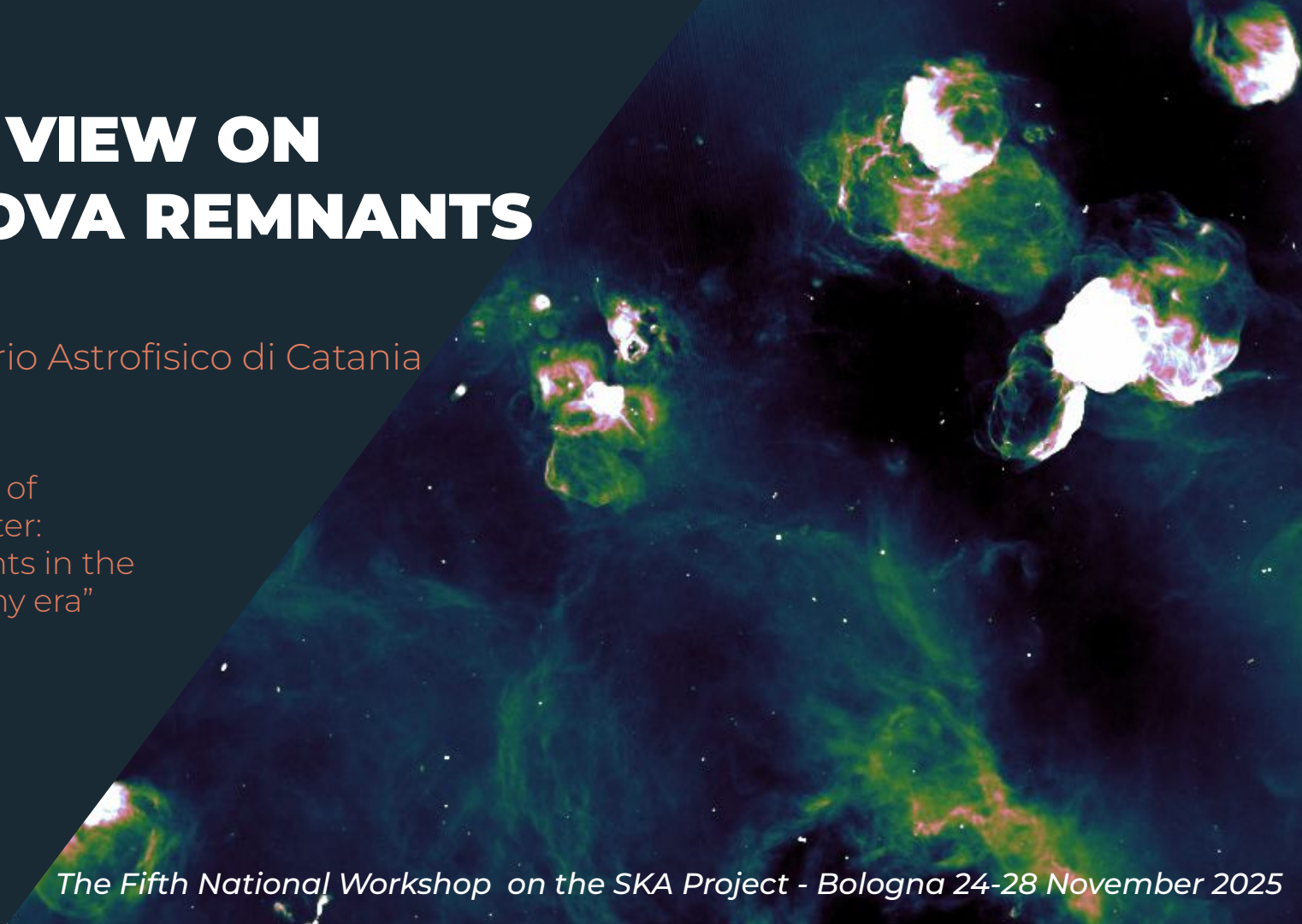
THE SKA VIEW ON SUPERNOVA REMNANTS

Sara Loru

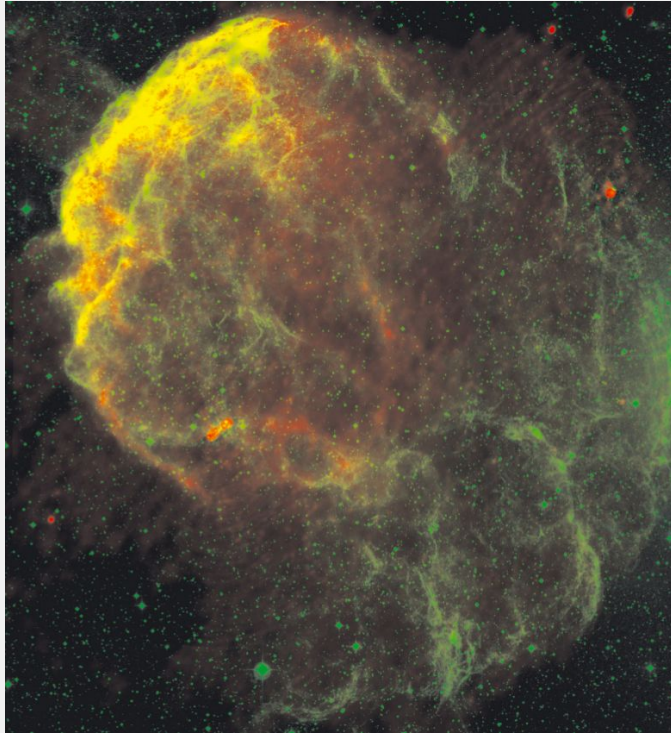
INAF - Osservatorio Astrofisico di Catania

And the co-authors of
the SKA book chapter:
“Supernova remnants in the
new radio astronomy era”

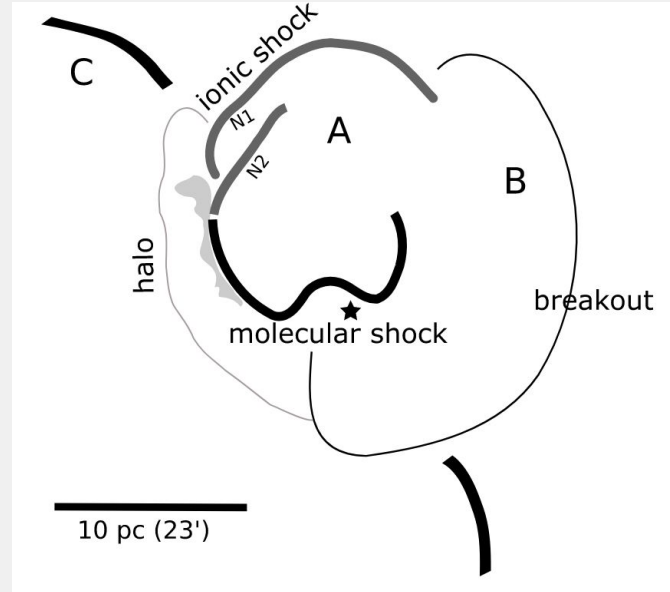
The Fifth National Workshop on the SKA Project - Bologna 24-28 November 2025



SUPERNOVA REMNANTS

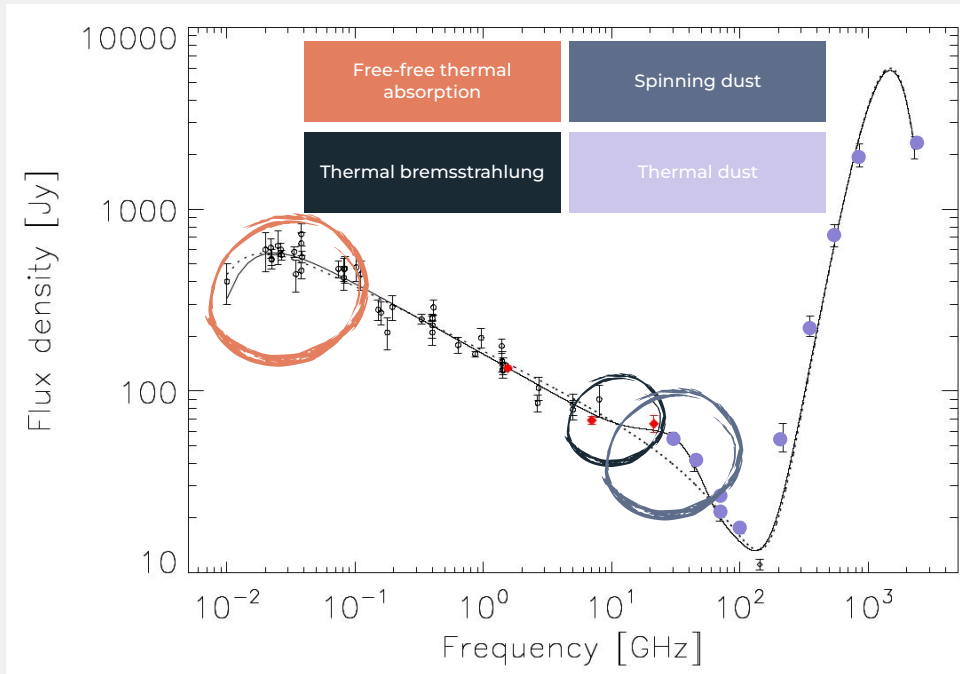


Castelletti et al. 2011

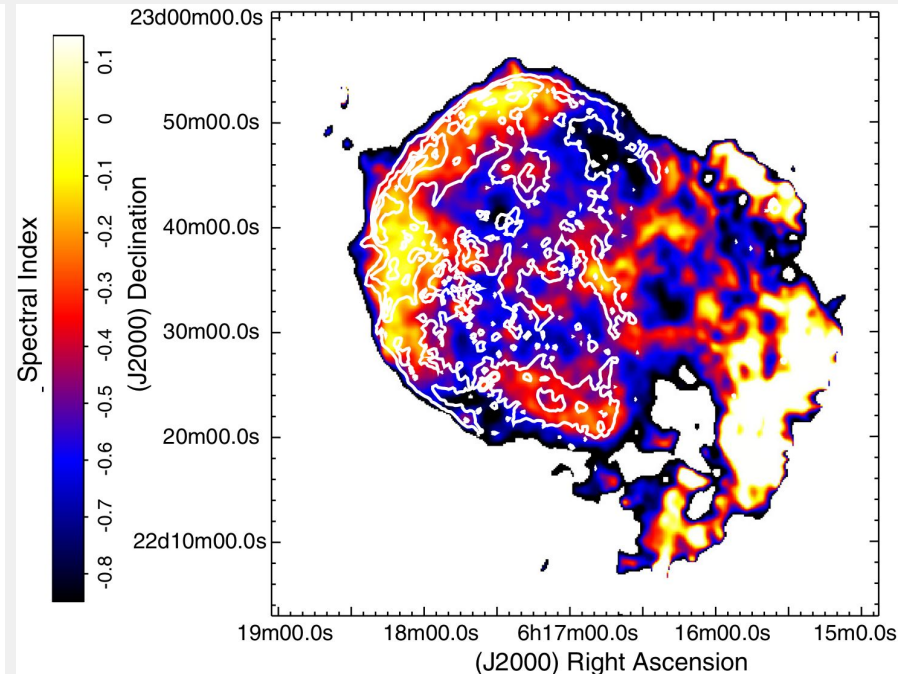


Lee et al 2008

SUPERNOVA REMNANTS : radio spectrum



Loru et al. 2019



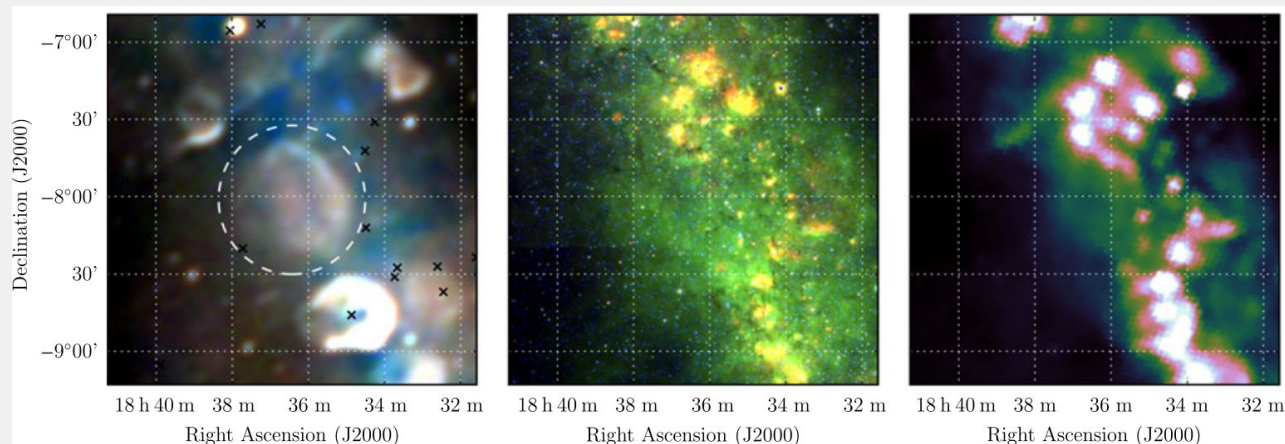
Castelletti et al. 2011

SKA PRECURSOR STRENGTHS

MWA

Hurley-Walker et al. 2019a

Hurley-Walker et al. 2019b



13 confirmed SNRs



7 SNRs reclassified
as HII regions

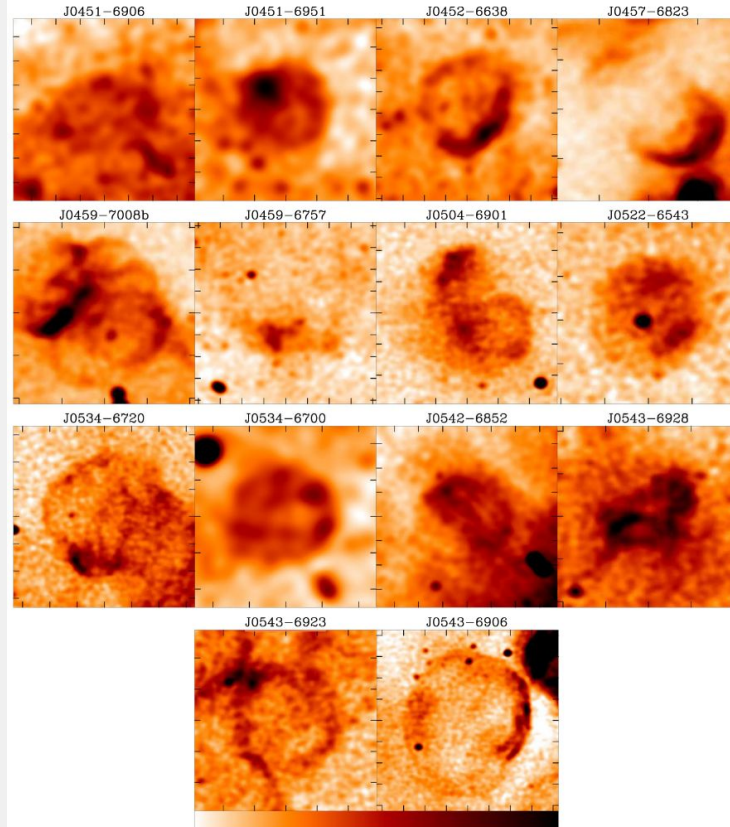


27 new SNRs

SKA PRECURSOR STRENGTHS

ASKAP

Bozzetto et al. 2023



14 new candidates
to the LMC SNR
sample

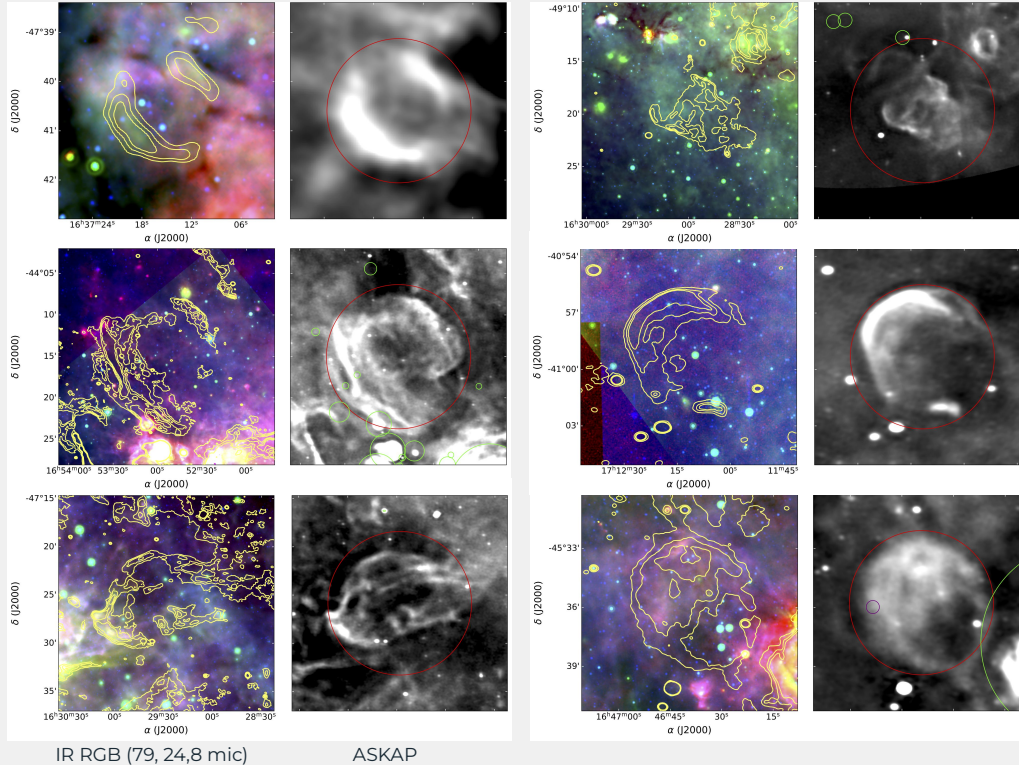


EMU All-sky
continuum survey



POSSUM
polarization survey
(Ball et al.
accepted)

SKA PRECURSORS STRENGTHS



ASKAP

Bufano et al. (in prep.)

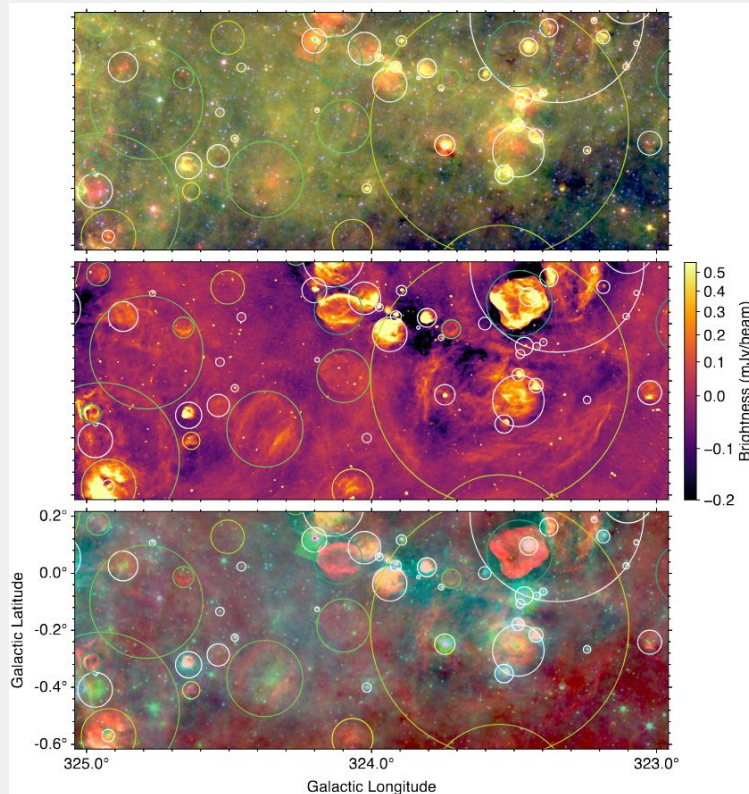


28 new Galactic SNRs candidates (SCORPIO field)
Detailed study (spectral index; comparison with IR, etc.)

SKA PRECURSOR STRENGTHS

MeerKAT

Anderson et al. 2025



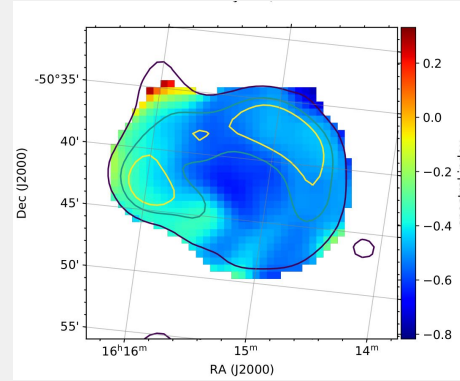
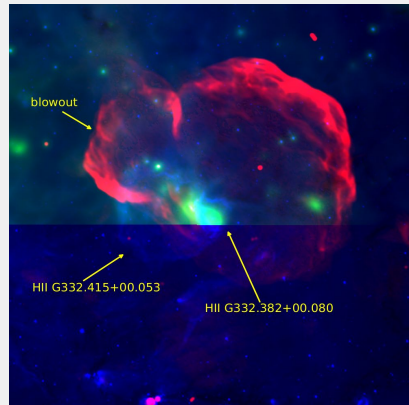
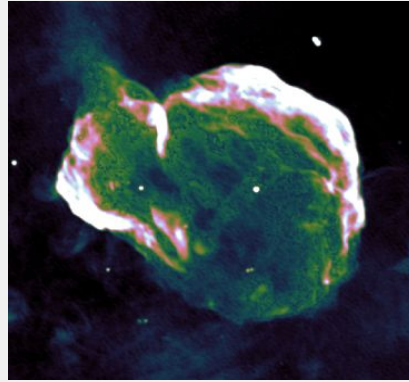
237 new Galactic
SNR candidates



SKA PRECURSOR STRENGTHS

MeerKAT

Loru et al. 2024

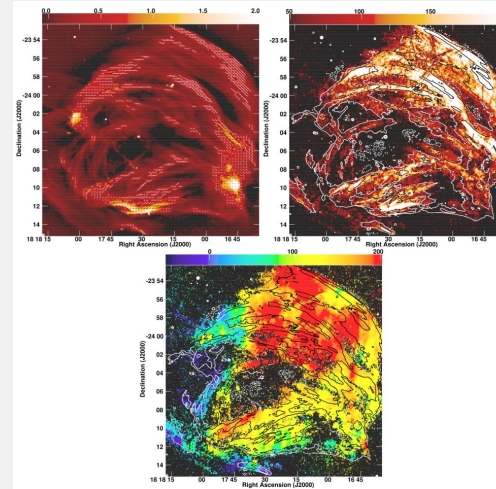
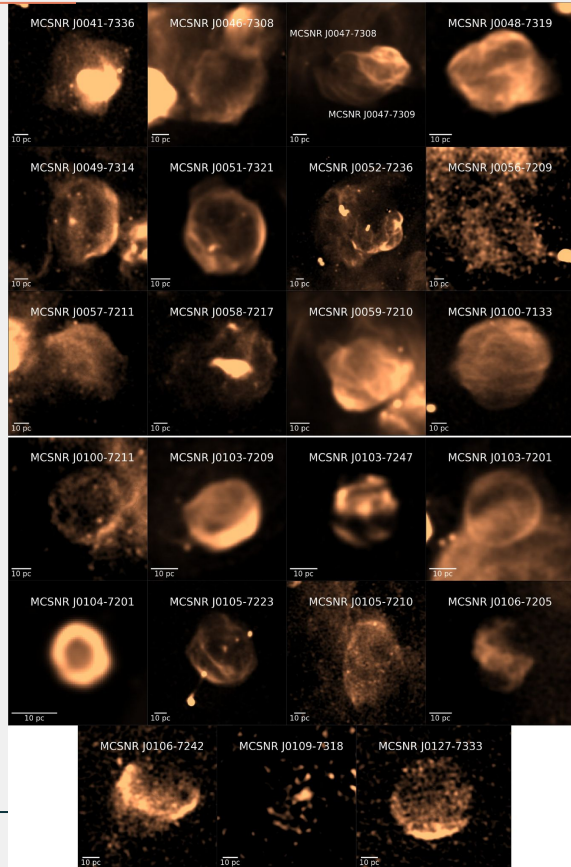


Integrated and
spatially-resolved
spectral
characterization of
29 SNRs

SKA PRECURSOR STRENGTHS

MeerKAT

Cotton et al. 2024



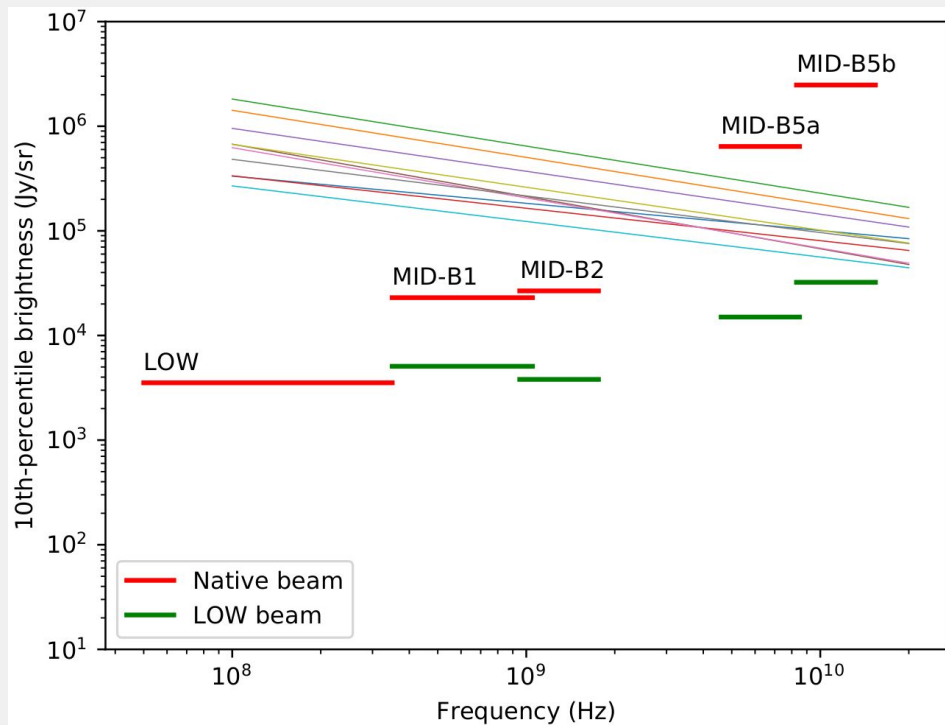
24 bona fide SNRs in the SMC



TI and polarimetric study of 36 high latitude SNRs

Technical requirements

- Radio SED characterisation



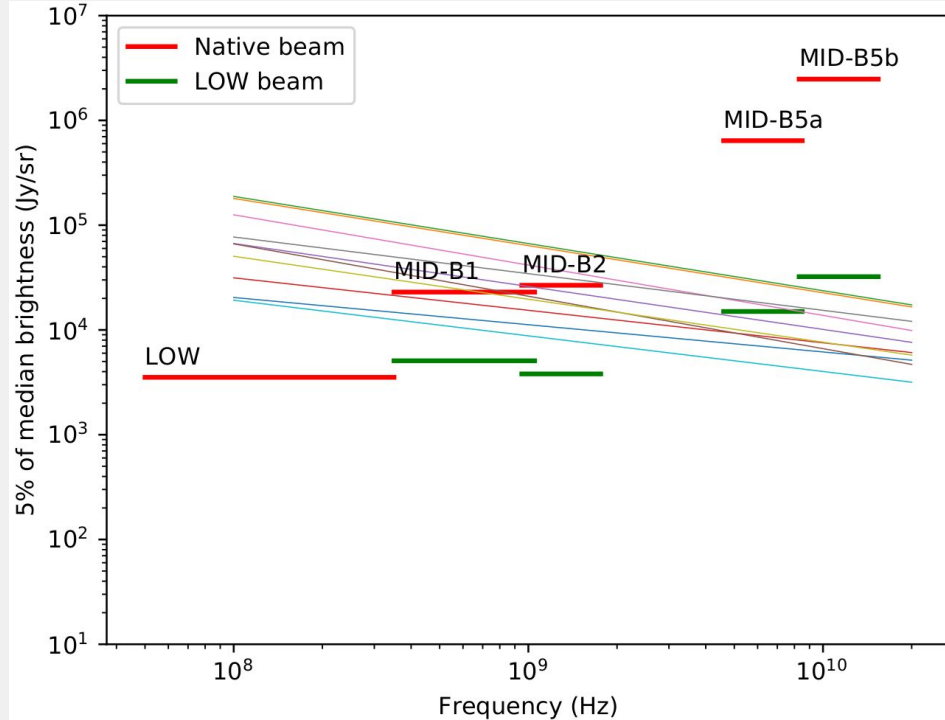
10th-percentile brightness level for each SNR from the SMGPS images (Loru et al. 2024)



Sensitivity limits for a one-hour integration

Technical requirements

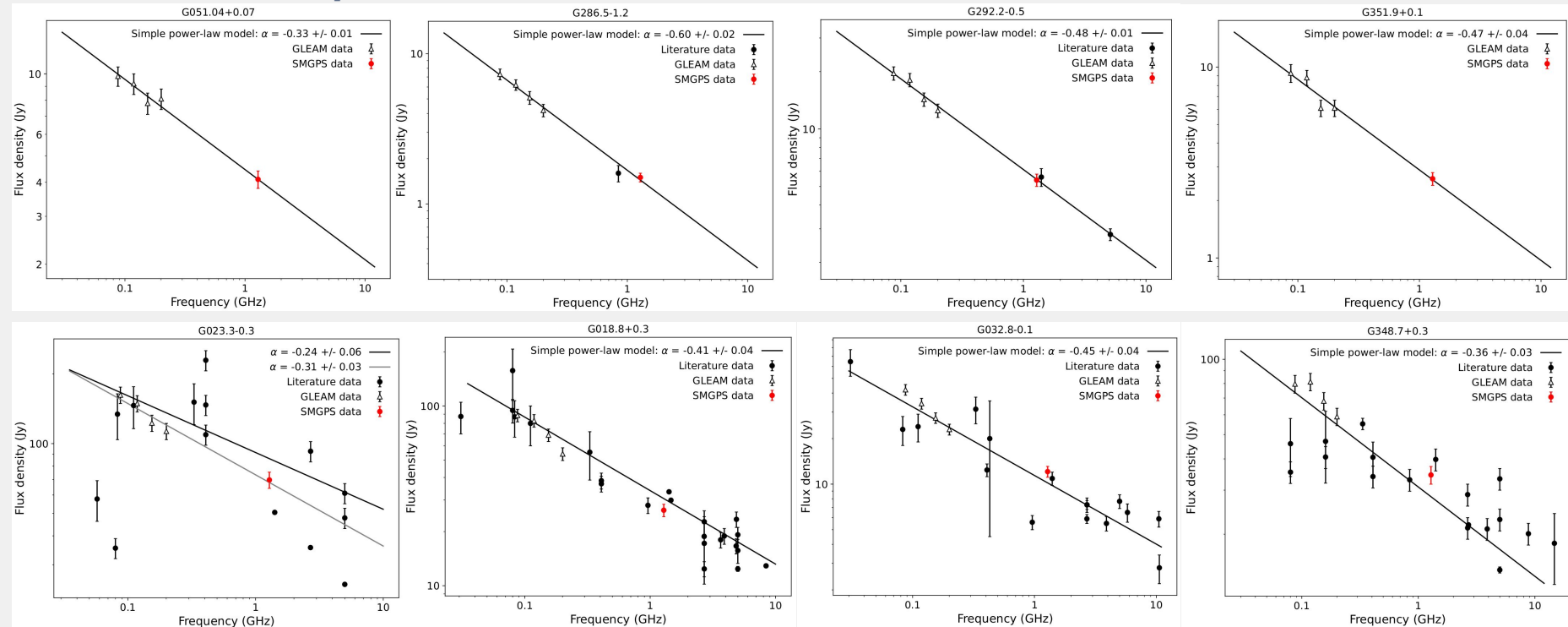
- Polarimetry



The 5% pol. fraction considered as a lower limit

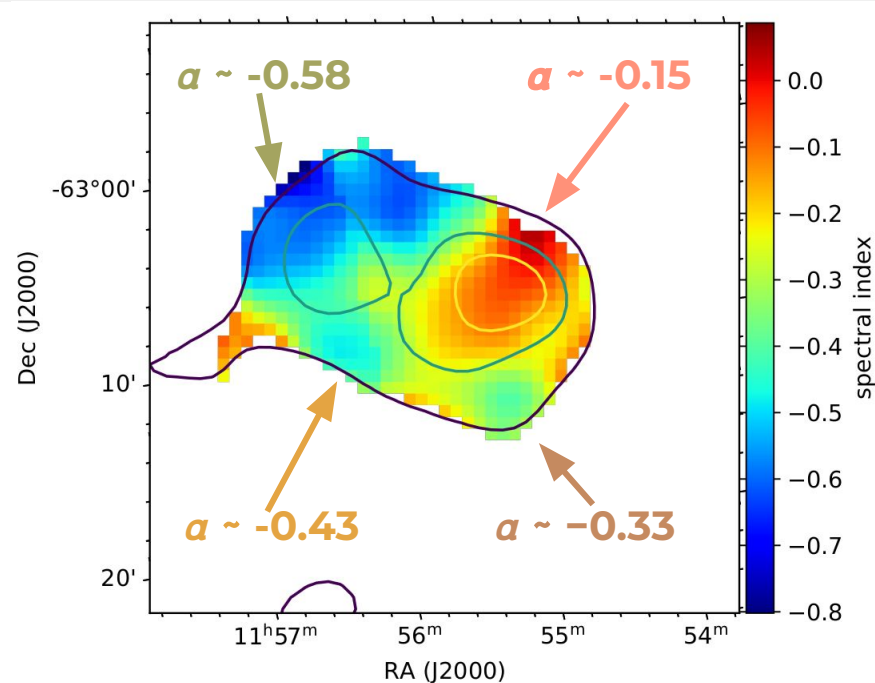
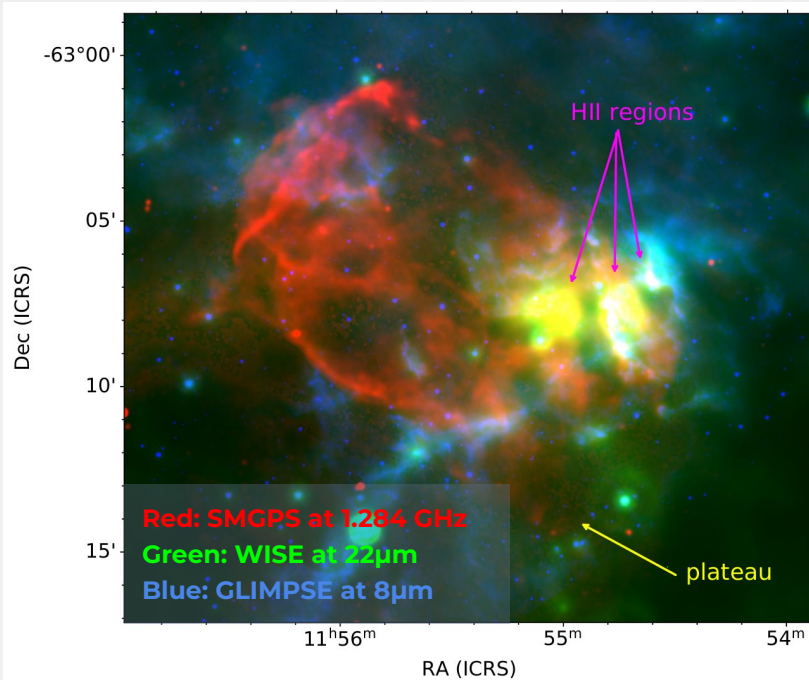
SCIENCE CASES

Radio spectral characterisation



SCIENCE CASES

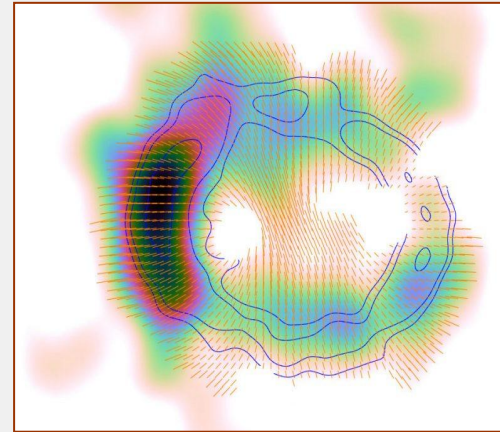
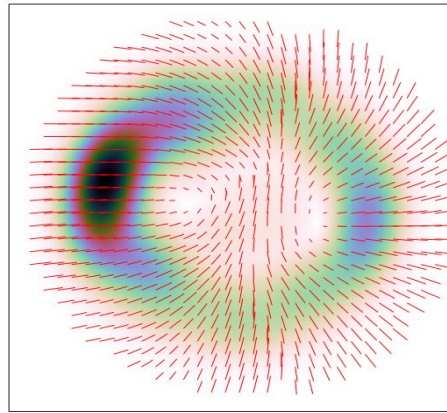
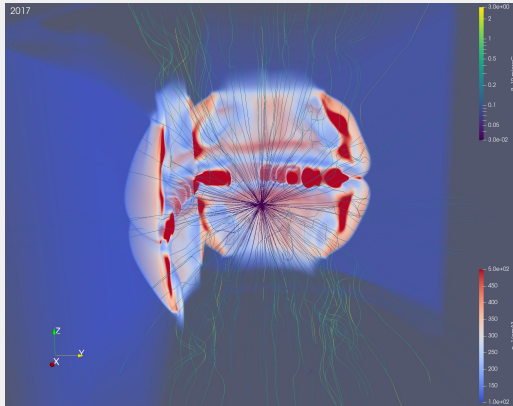
- Radio spectral characterisation



SCIENCE CASES

- Polarimetry and MHD modelling

Polarization maps show us what is not visible in the total intensity maps.
SN1987A for the year 2017



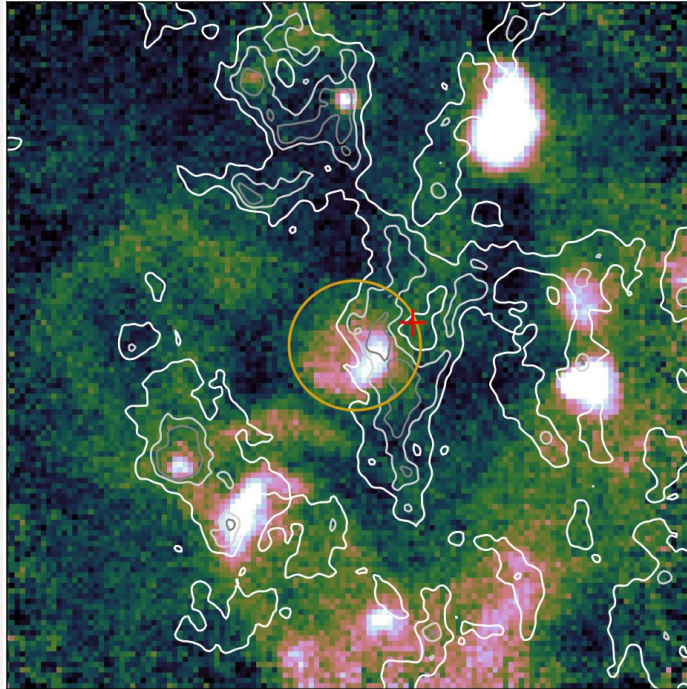
MHD structures and polarization map from
3D MHD numerical model of this SNR.

MF (lines) and density structures (cross-sections, in color); reddish colors
due to the SNR shock propagation (Petruk et al., in prep.)

Observations
(Zanardo et al. 2018)

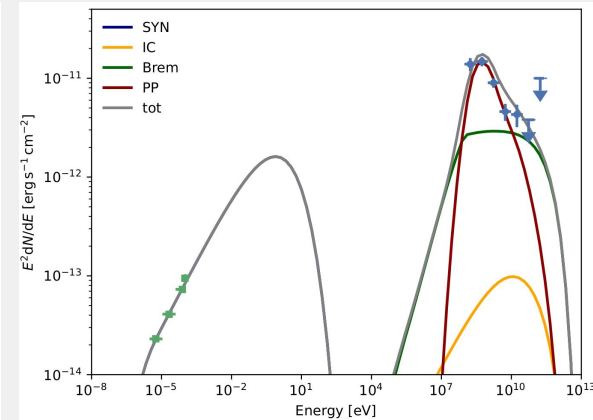
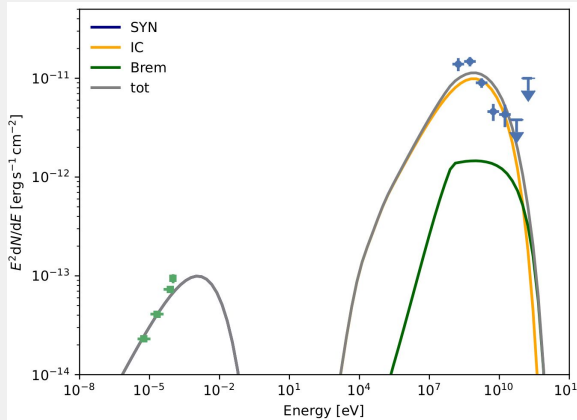
SCIENCE CASES

- Radio to γ -ray characterization



Sardinia Radio Telescope image @ 24.8 GHz

High-resolution and high-frequency radio data of KES 73:
flux density measurements restricted to the region of enhanced CR acceleration



(Loru et al. 2025)

SCIENCE CASES

- Work in progress

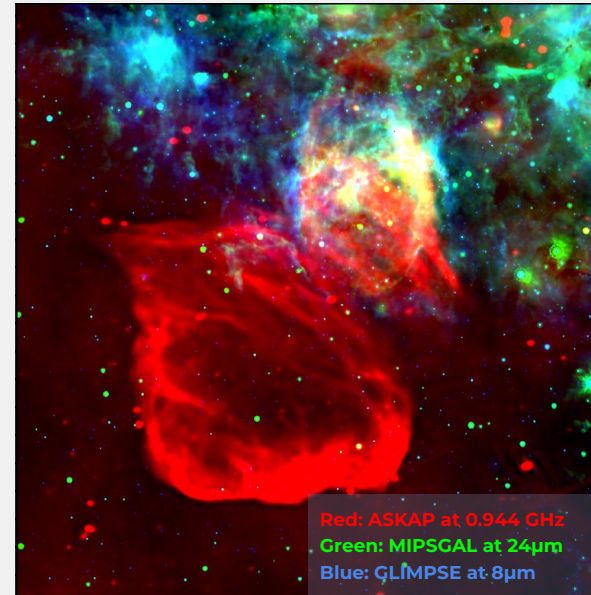
MeerKAT

- 9 gamma-ray SNRs to be observed @ ~ 0.8 and ~ 3 GHz.

(MeerKAT project
MKT-25099
approved - PI S.
Loru)

ASKAP

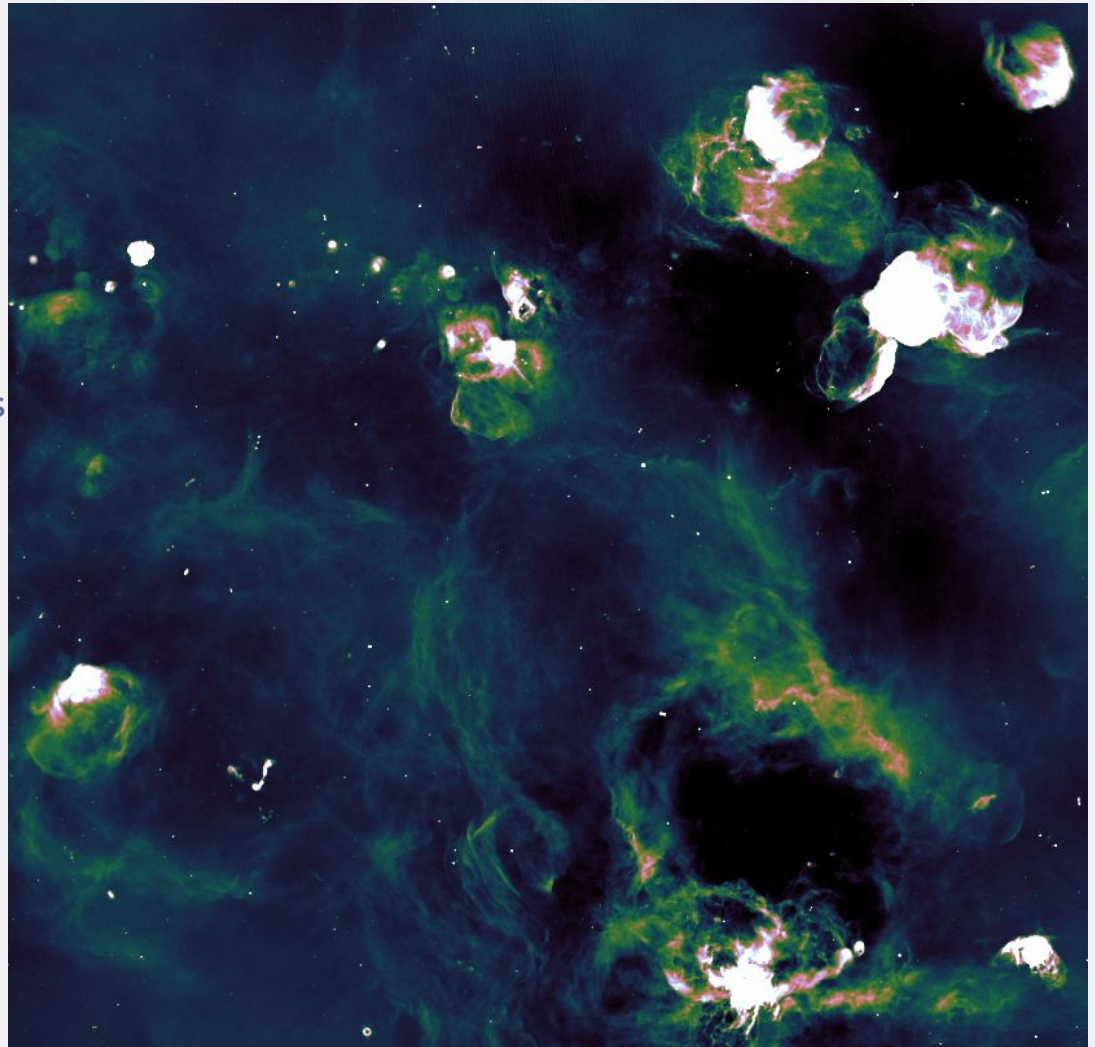
G343.1-00.7



(Loru et al. in prep)

SCIENCE CASES

- Radio SED characterisation
- Polarimetry
- Radio to γ -ray characterization
- Interaction with molecular clouds
- MHD modeling
- Single-dish
- OH masers
- Commensalities and synergies



SCIENCE CASES

- Radio SED characterisation
- Polarimetry
- Radio to γ -ray characterisation
- Interaction with molecular clouds
- MHD modeling
- Single-dish
- OH masers
- Commensalities and synergies

THANKS !

