GLASS and other deep fields with uGMRT

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with inputs from Minh Huynh

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GAMA Legacy ATCA Southern Survey - GLASS

- Deep, wide field survey of GAMA G23 field with ATCA at 5.5GHz and 9.5GHz
- Sensitivity**: ~30μJy** rms at 5.5GHz and **∼ 50μJy** rms 9.5GHz
- **50sq degree** region (centre: 23h, -32.5°)
- **~2500 hours** total (700 hours this semester, to finish last region and ‘patch’ up pointings)

G23 has outstanding multi-wavelength coverage
Deep UV, optical, nIR, far-IR
(GALEX, KiDS, VIKING, WISE, HERSHEL)

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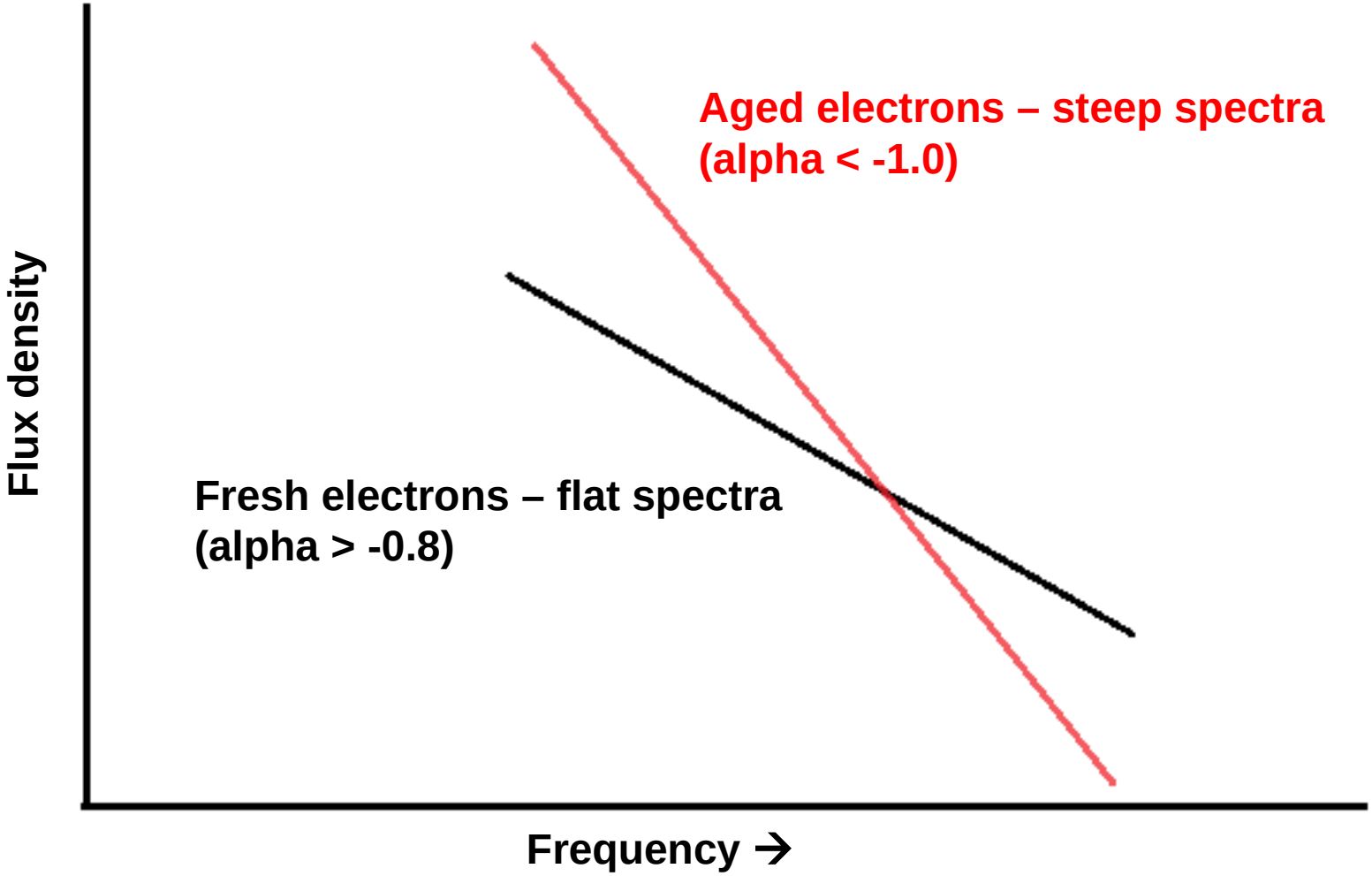
GLASS Science Goals

- Life cycle of radio-loud AGN
  - Double-double or 3C388 type
  - “Dead” AGNs (in Radio)

MHz vs GHz -advantage uGMRT

Steepening of synchrotron spectra with time….

stronger at low frequencies;faint at high frequencies



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GLASS Science Goals

- Life cycle of radio-loud AGN
  - Double-double or 3C388 type
  - “Dead” AGNs (in Radio)
  - Atypical radio sources (**X, S, Z** shaped)
- Evolution of radio-loud AGN
  - CSS/GPS sources
  - Giant Radio Galaxies
- Population of high redshift radio-loud AGN
  - USS sources, IFRS as candidate HzRGs..
- RLF and source count at low frequencies

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GLASS TEAM

Minh Huynh (PI and GLASS Exec)	CASS and ICRAR/UWA
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Stas Shabala (GLASS Exec)	U Tas
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Chris Riseley	CASS
Andrew Butler	ICRAR/UWA
Tim Galvin	CASS
Jordan Collier	UCT
Andrew O'Brien	WSU, CASS
Ross Turner	UTas
Jesse Swan	UTas
Josh Marvil	NRAO
Jonathan Rogers	UTas
Ishwara Chandra	NCRA-TIFR
Dharam Lal	NCRA-TIFR
Biny Sebastian	NCRA-TIFR

Veeresh Singh, Mousumi Das...

uGMRT band 3 observations (250–500 MHz) (Cycle 32, August 2017)

- 30 microJy/beam at 5.5 GHz = 190 microJy/beam at uGMRT band 3 (250 – 500 MHz), for a spectral index 0.7

- Requested 66 hrs to cover 53 pointing, awarded 33 hrs.

- Observations carried out using bandwidth 200 MHz (300 – 500 MHz), 4K channels and 8sec integration.
- about 30 mins/pointing (10mX3 scans – semi-snapshot)

- Analysed using CASA-based pipeline

(*http://www.ncra.tifr.res.in/~ishwar/pipeline.html*)

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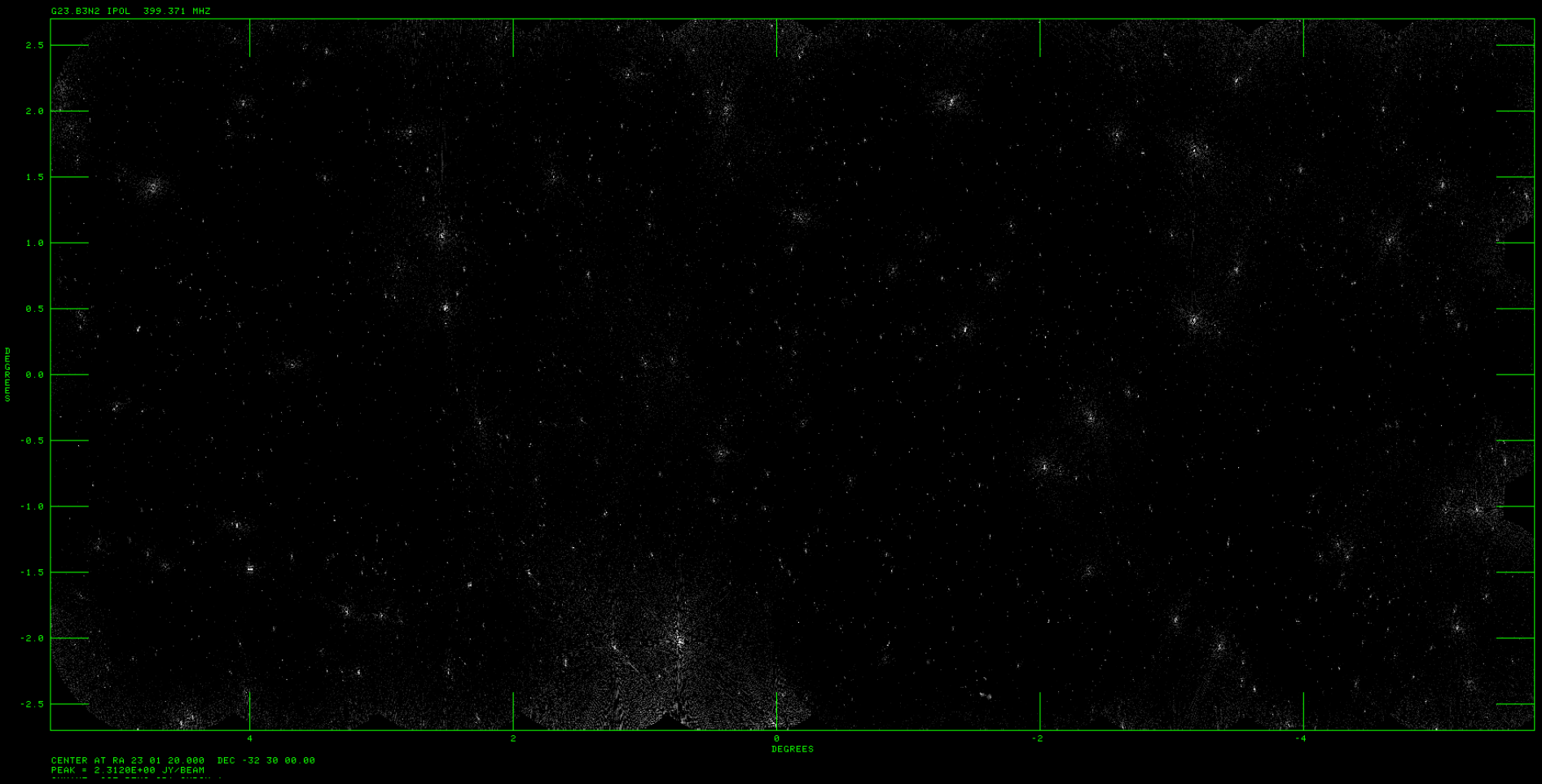
The ATCA-GAMA G23 Legacy Field

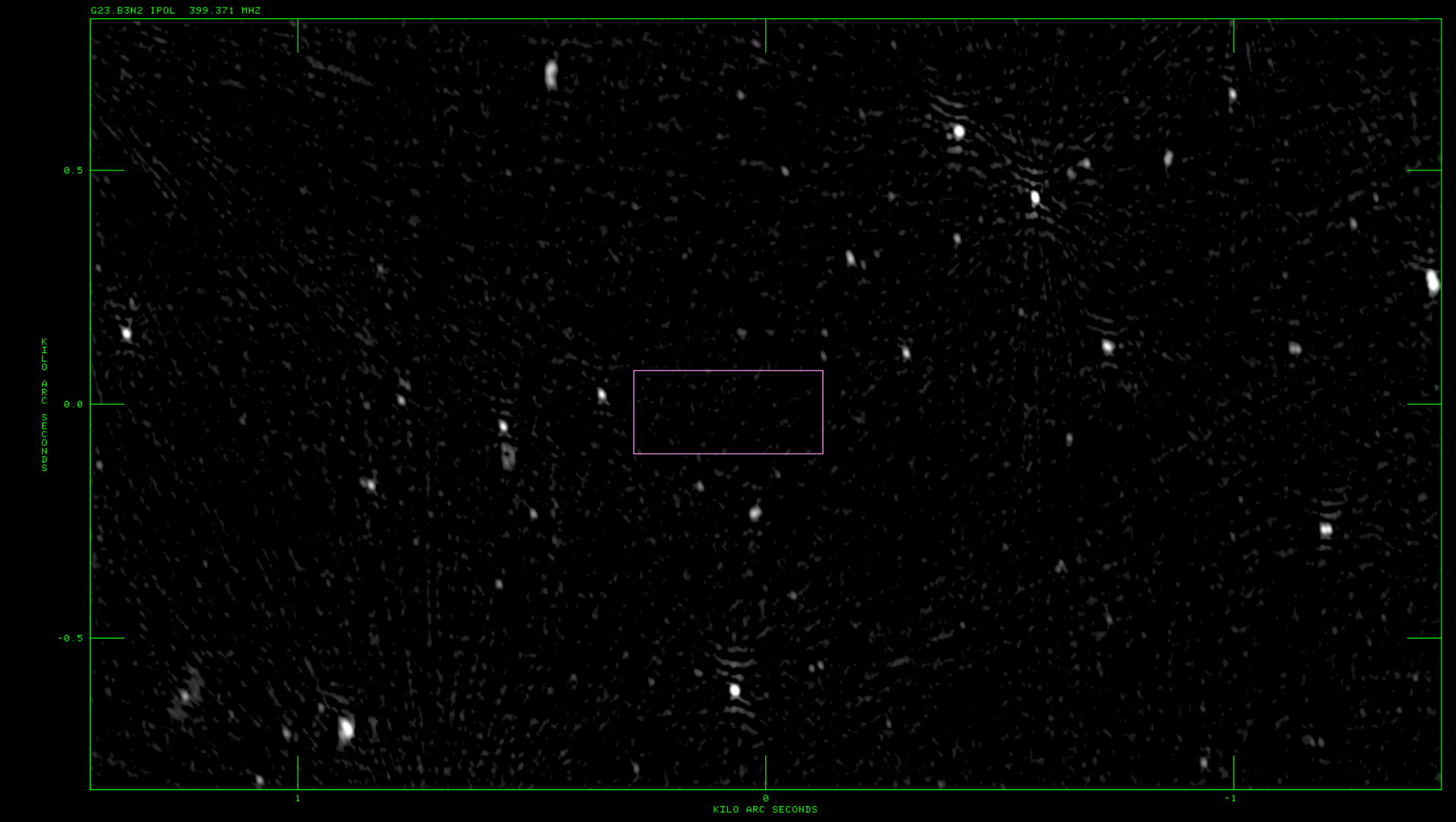
Preliminary image from uGMRT available!
12Degree X 5 degree MOSAIC from 50 pointings



The ATCA-GAMA G23 Legacy Field

A small region…..

rms ~ 130 microJy/beam; resolution ~ 10”

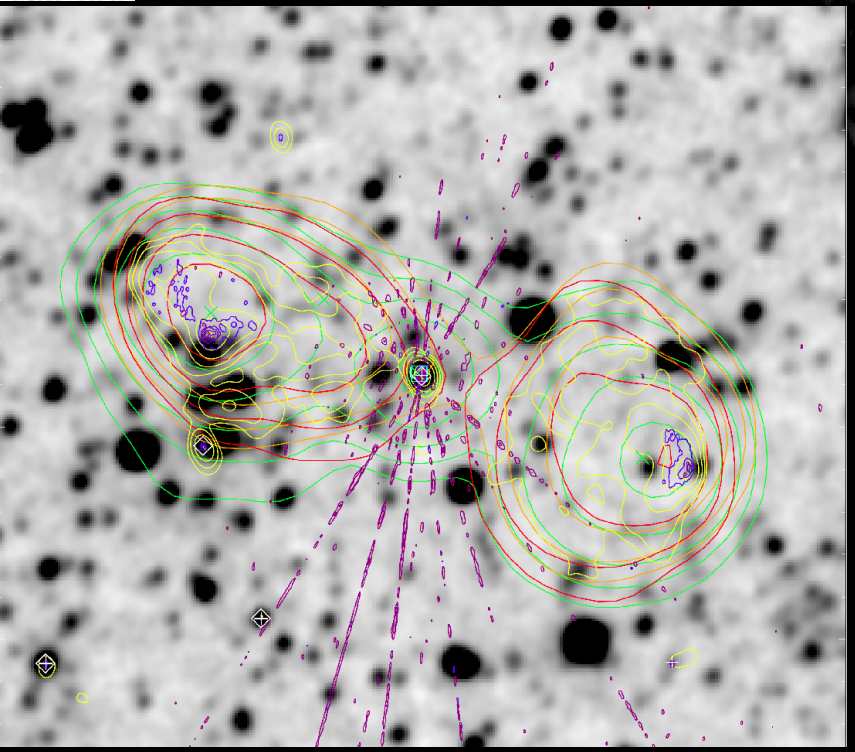


uGMRT followup

Subsequent proposals with uGMRT in 2018 and 2019 for individual sources in band-3, band-4 and band-5.

Giant Radio Source

Seymour et al, PASA, 2019.



TGSS, MWA Overay

uGMRT 680 MHz

uGMRT 400 MHz

ATCA 5.5 GHz

Possible Indo-Aus collaborations

GAMA and G23:

uGMRT band-3 (250 – 500 MHz) preliminary images of G23 field (50 sq degrees) available and improvement coming *soon*!

uGMRT band-4 (550 – 850 MHz) and band-5 (1000 – 1450 MHz) followup observations of selected sources from G23 completed with science ready images

New: Equitorial GAMA fields with uGMRT?

Possible Indo-Aus collaborations

uGMRT neatly fills the gap between MWA and ASKAP!

(*high freq for MWA and low freq for ASKAP!*)

Low freq counterpart to EMU suvery at uGMRT band-3

- ***Matched resolution and sensitivity***
- ***Pilot proposal in the next GTAC Cycle planned***

Deeper TGSS in uGMRT band-2 over GLEAM-X ?

Looking forward to more discussion