



# Radio Interest Group

Chair: Mark Lacy (NRAO)

Vice-Chair: Francois Bonnarel (CDS)

# Charter:



The group shall define requirements for the representation of radio astronomy data in the VO through:

- development of use cases for data discovery, access and visualization.
- identification of metadata concepts needed by radio astronomy data that are not currently supported by the VO
- The group will provide a well identified point of contact for radio projects with IVOA, and actively encourage their use of VO standards and protocols.
- The group will organize sessions focused on radio astronomy data at IVOA meetings

# Why is radio “special”?

- Diversity of data types.
- Diversity of facilities and resources.
- (Slowly) increasing diversity of radio astronomers (both demographic and in terms of experience/specialty).

(Of course many of these are common to other fields too...)

- Large amounts of data (several PB in current archives), but data processing pipelines/source cataloging at a relatively early stage compared to other fields in astronomy (so not “Big Data” - yet).

# Types of radio astronomy data

- Classic Interferometry (single “pixel” visibility data, e.g. VLA, ALMA)
- Interferometry with multiple beams and beamforming capabilities (e.g. ASKAP, LoFAR, APERTIF)
- Very long baseline interferometry.
- Single dish (including many telescopes with focal plane arrays).
- Time domain (Pulsars, Fast Radio Bursts, transients and variables – timescales milliseconds to decades). Also SETI.
- Continuum (wide-band, 2D images)
- Spectroscopy (nearly always cube data)
- Polarization properties important (Stokes I, Q, U, (V))

# Types of radio astronomy facility

- Large observatories/facilities (ALMA, NRAO/(VLA,VLBA) CSIRO/(ASKAP, ATCA), SARO/(MeerKAT), LoFAR).
- Smaller facilities (Sardinia Radio Telescope, Green Bank Observatory, MWA, MERLIN, Effelsberg, NOEMA....)
- Experimental/very small (Long Wavelength Array, Allen Telescope Array, HERA, CHIME, AMI...)
- Consortia/organizations for coordinating VLBI (JIVE, EHT).
- Planned facilities (SKA, ngVLA) that will provide future challenges in terms of data rate and observing modes.

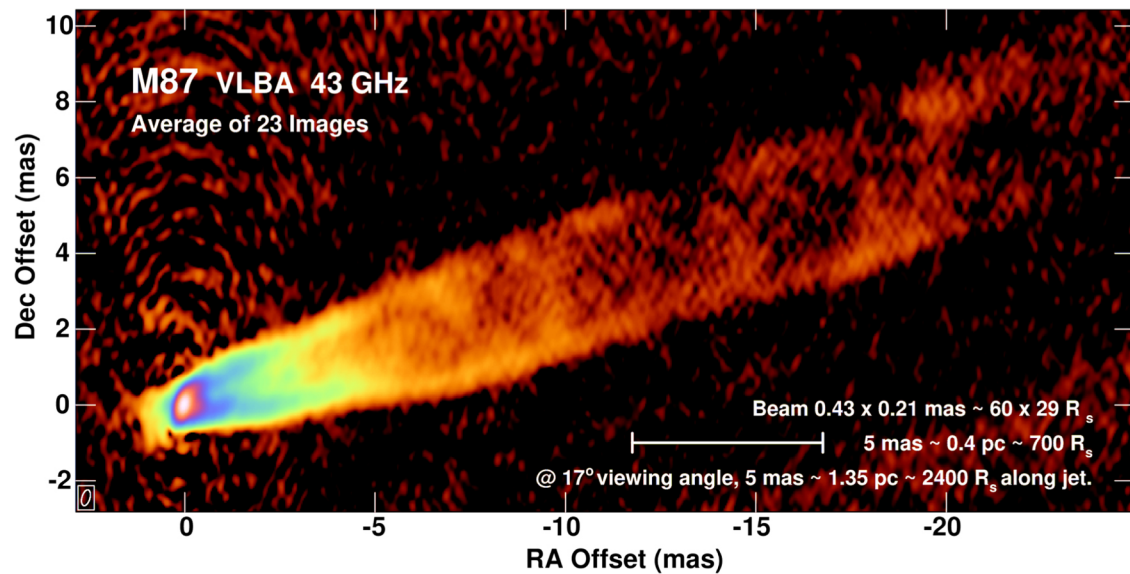
# Types of radio astronomer

- No longer only the “black belts” who have been in the subject all their careers.
- Increasingly multi-wavelength astronomers, used to accessing pipelined data products, often through API interfaces.



# How will (radio) astronomers use the VO?

- Search for archival observation of new transients.
- Search for multiwavelength data on an object (e.g. ALMA CO, VLA HI, Spitzer mid-IR, PanSTARRS optical)
- Many others... RIG will compile use cases as part of its charter.



# A few particular challenges already identified

- Interferometers and the concept of largest angular scale.
- Radio observations:
  - Calibrators interleaved with science targets in a single observation dataset.
  - How to define footprints for single pointings and mosaics.
  - How to characterize VLBI data where multiple correlation centers can be within a single field.
- New axes:
  - Rotation measure (integral of line-of-sight B-field x electron density).
  - Dispersion measure (integral of line-of-sight electron density).





# Summary/Next steps

- RIG membership not fully defined yet (email [mlacy@nrao.edu](mailto:mlacy@nrao.edu) if you wish to be involved and are not already on the mailing list from October).
- Over the next few months, the RIG will begin to address the issues in the charter.
- Expect a report at the next Interop...