



# MeerChoirs: Unveiling the resolved HI in nearby Groups with MeerKAT (Part 1)

Moses Mogotsi

SAAO, SALT

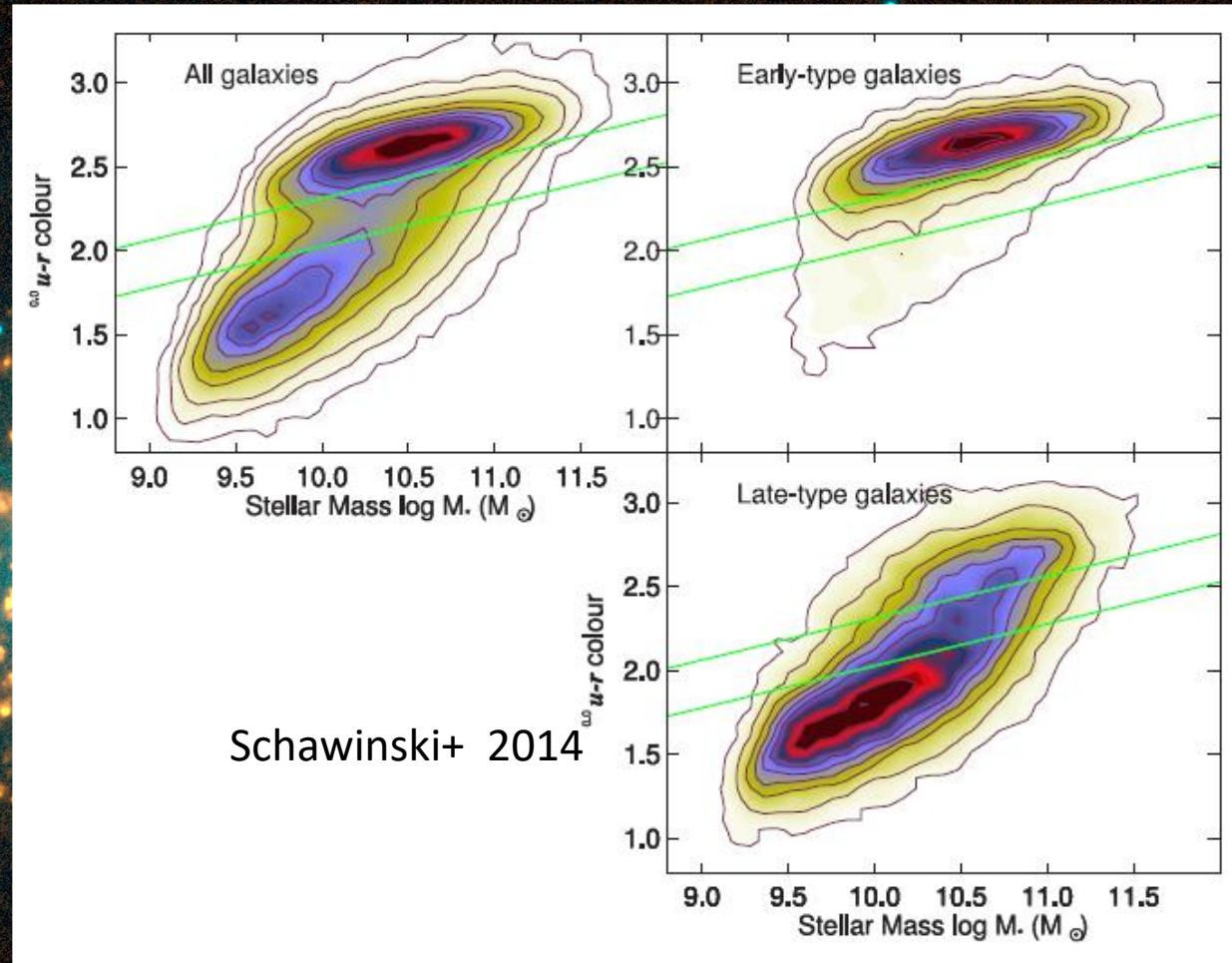
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# Galaxy Evolution

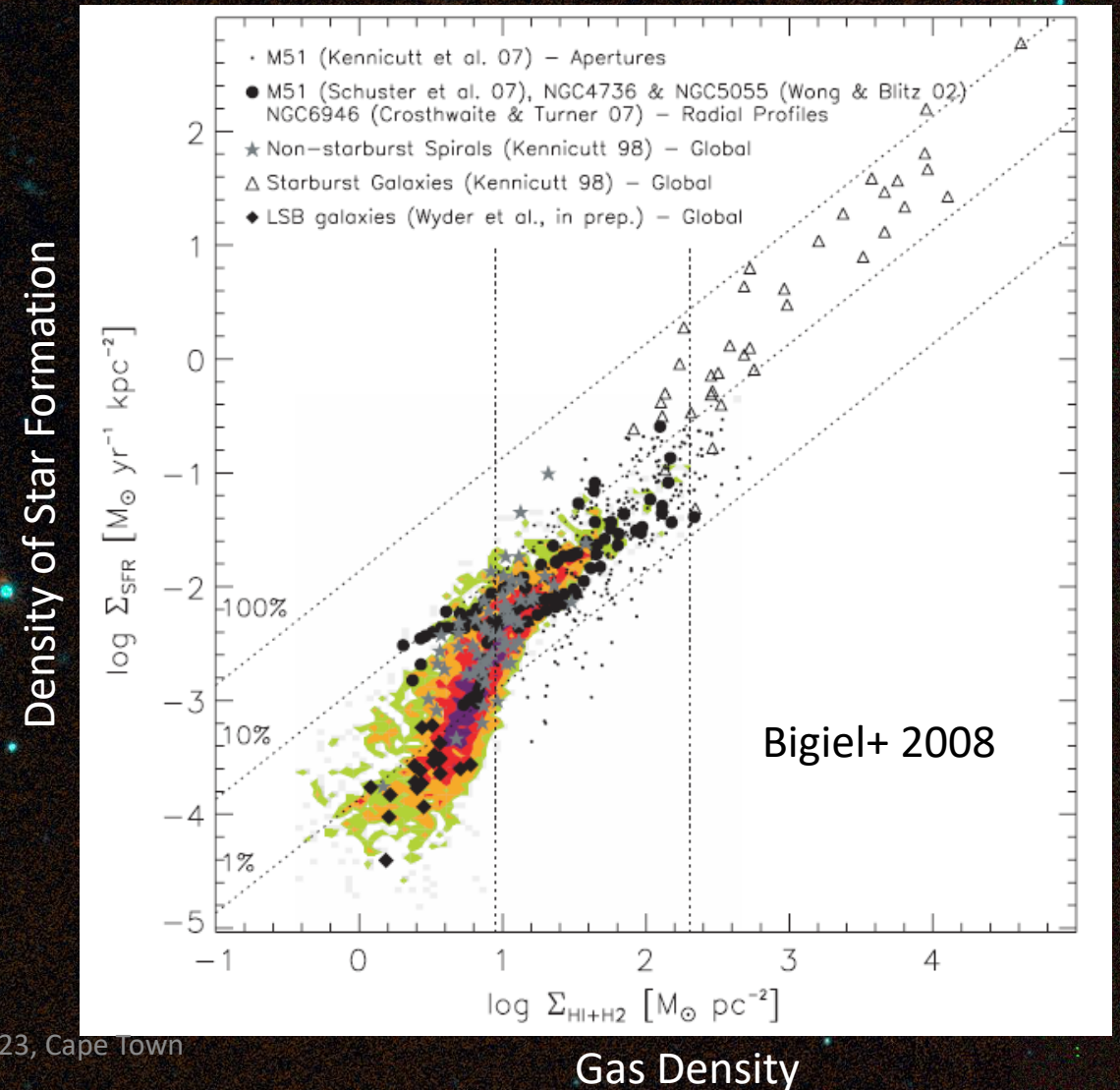
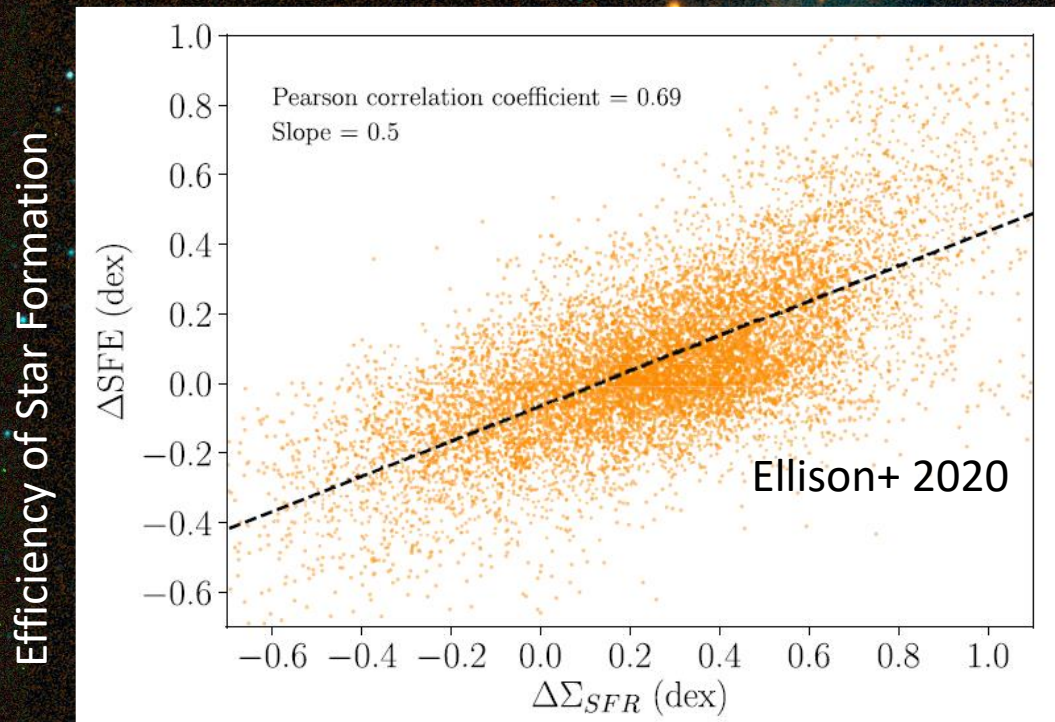
- Early Type Galaxies
  - Gas Poor
  - Low Star Formation Rate
- Late Type Galaxies
  - Gas Rich
  - Star Forming
- Evolve from Blue to Red





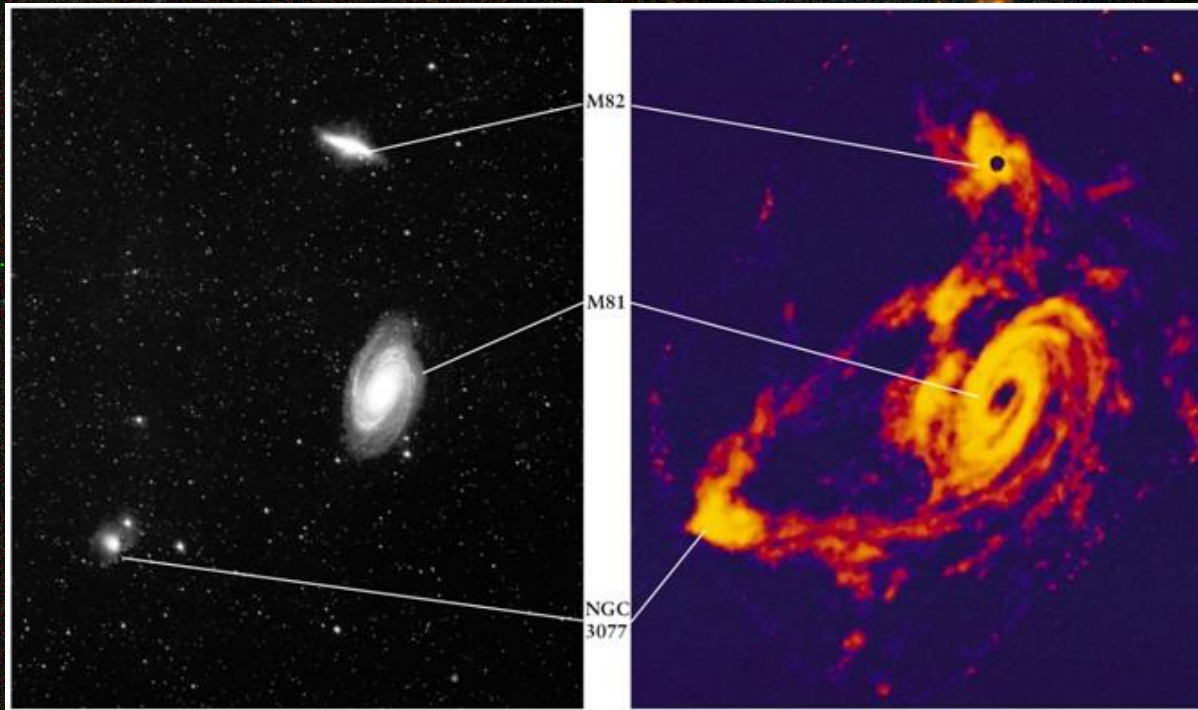
# Galaxy Evolution – Star Formation

- Gas is needed to form stars
  - Need cold gas
  - How much gas is turned into stars?
  - How do galaxies maintain fuel?

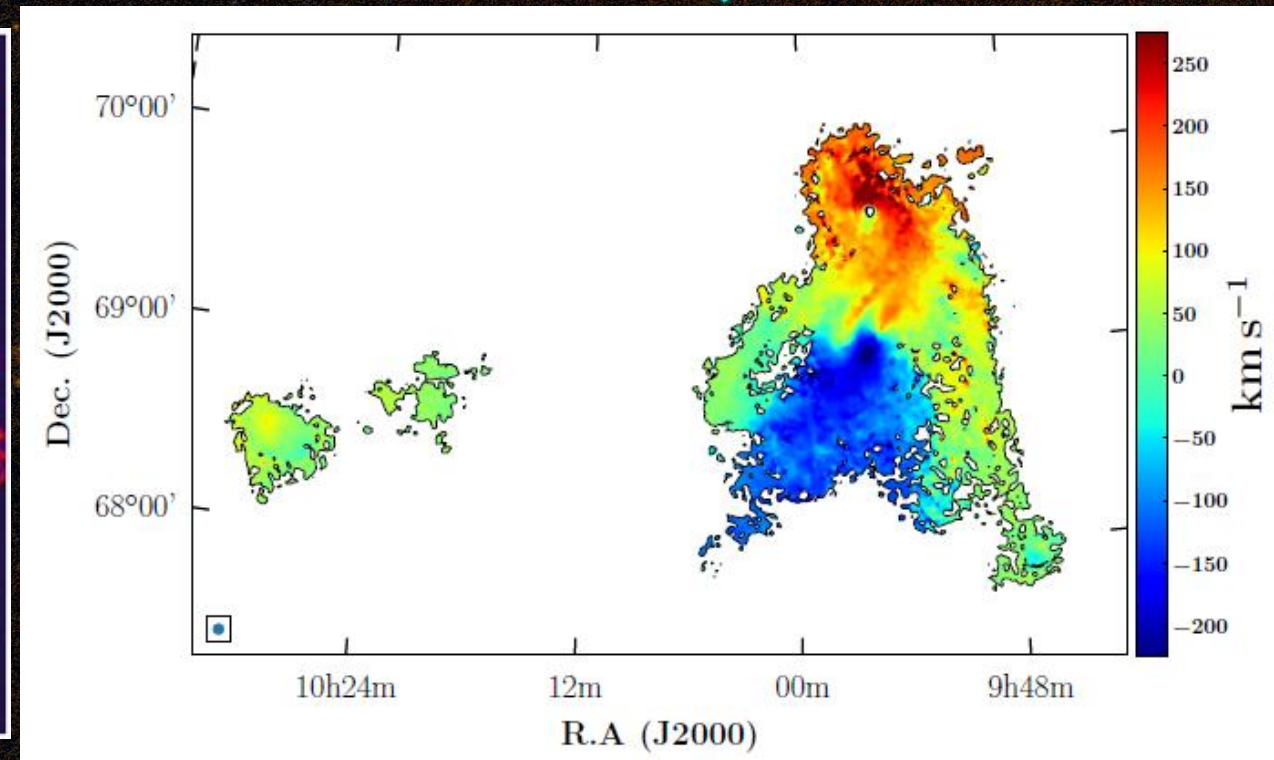




# Galaxy Environments



E. McCormick lecture



Sorgho+ 2018



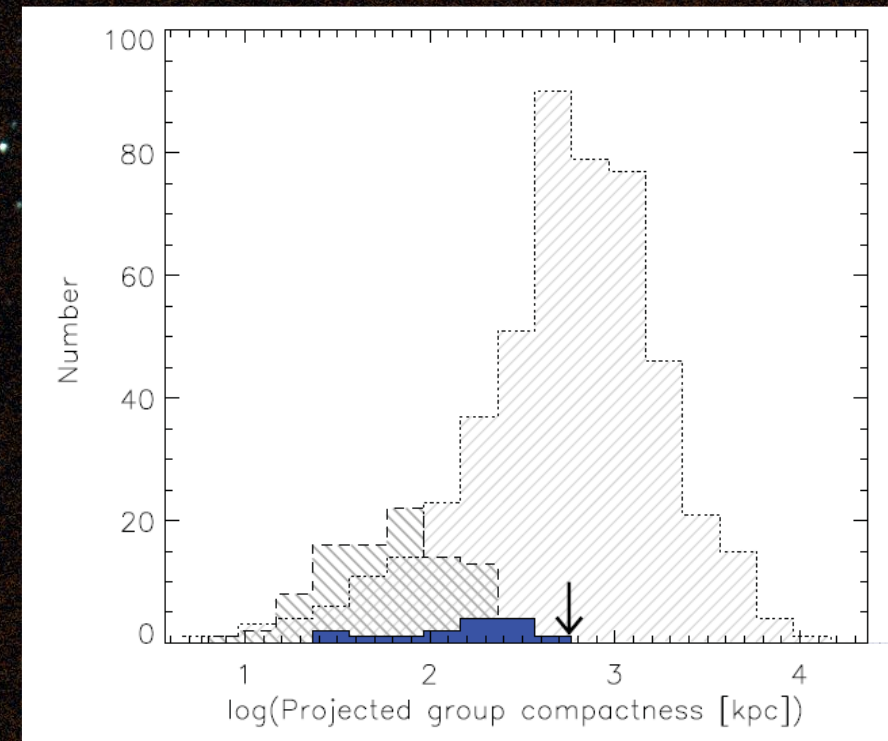
# SINGG & Choirs

- HI (HIPASS) – based sample
- SINGG: H $\alpha$ , R, UV, observations (Meurer+ 2006, Hanish+ 2006, Wong 2006)
- Choir Groups
  - Multiple (4+) H $\alpha$  sources within a HIPASS detections (Sweet+ 2006)



# Choir Groups Properties

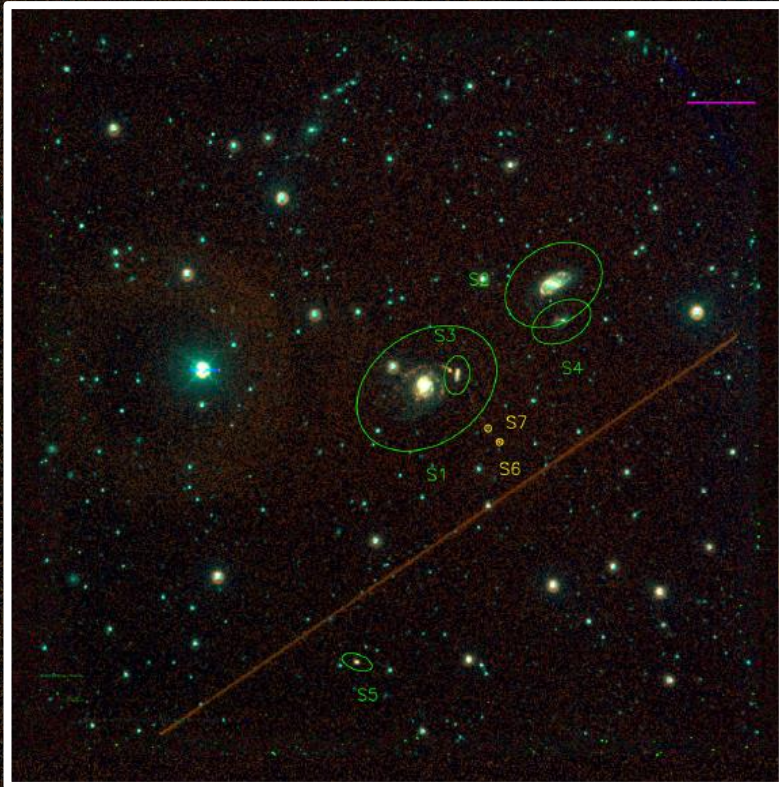
- Distance: 23 - 151 Mpc
- Group  $M_{\text{HI}}$  : 9.92 - 10.61  $\log M_{\text{sol}}$
- Emission Line Group Members: 4-10
  
- Lots of star forming galaxies
- No bright ellipticals associated with groups



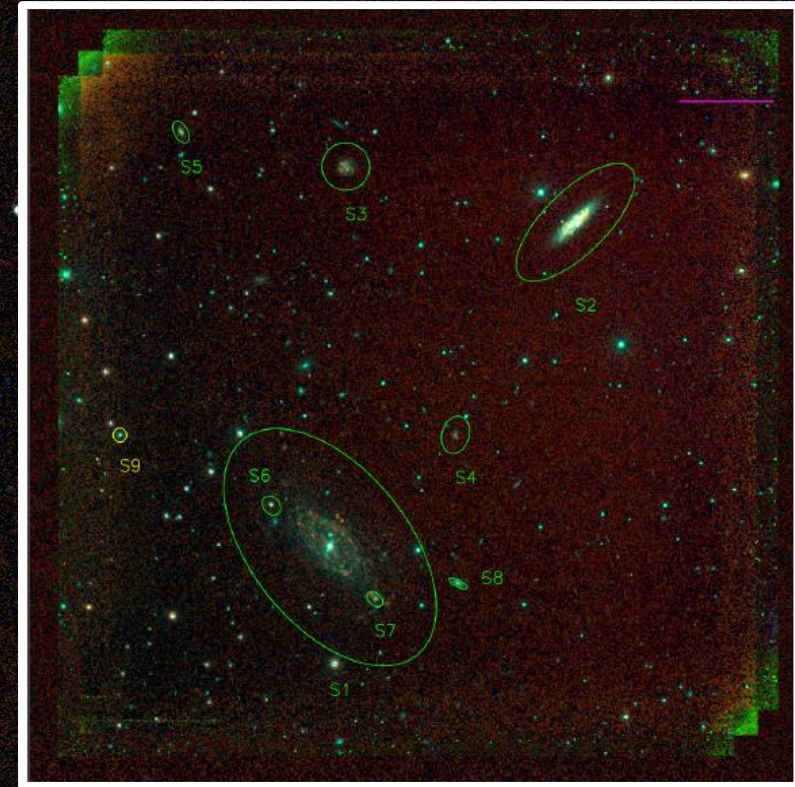
Sweet+ 2013



# Choirs Groups



J1250-50, Sweet+ 2013

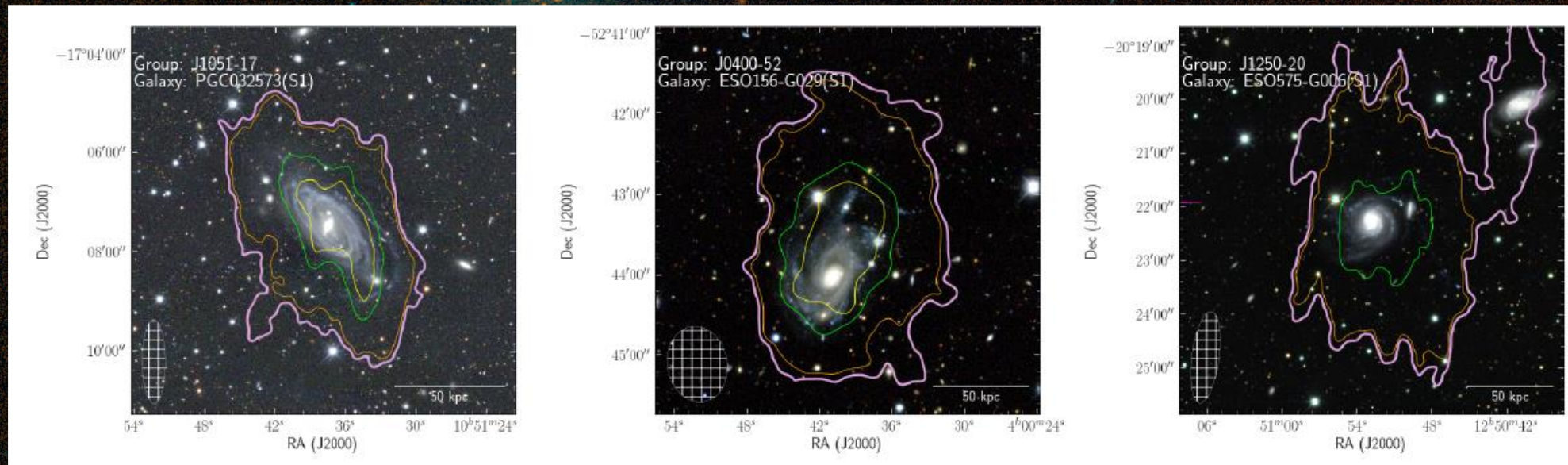


J1051-17, Sweet+ 2013



# HI in Choir Groups

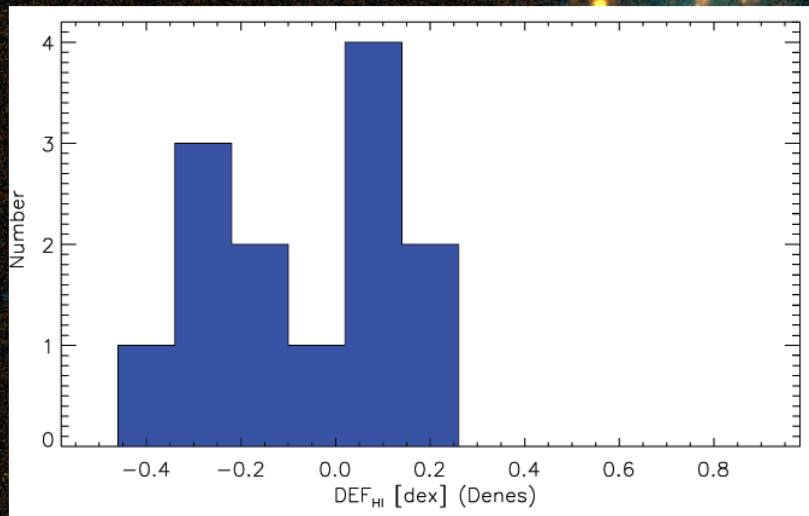
- Previous ATCA and VLA observations of \*some\* of the groups
- Dzdzar+ 2019, 2021



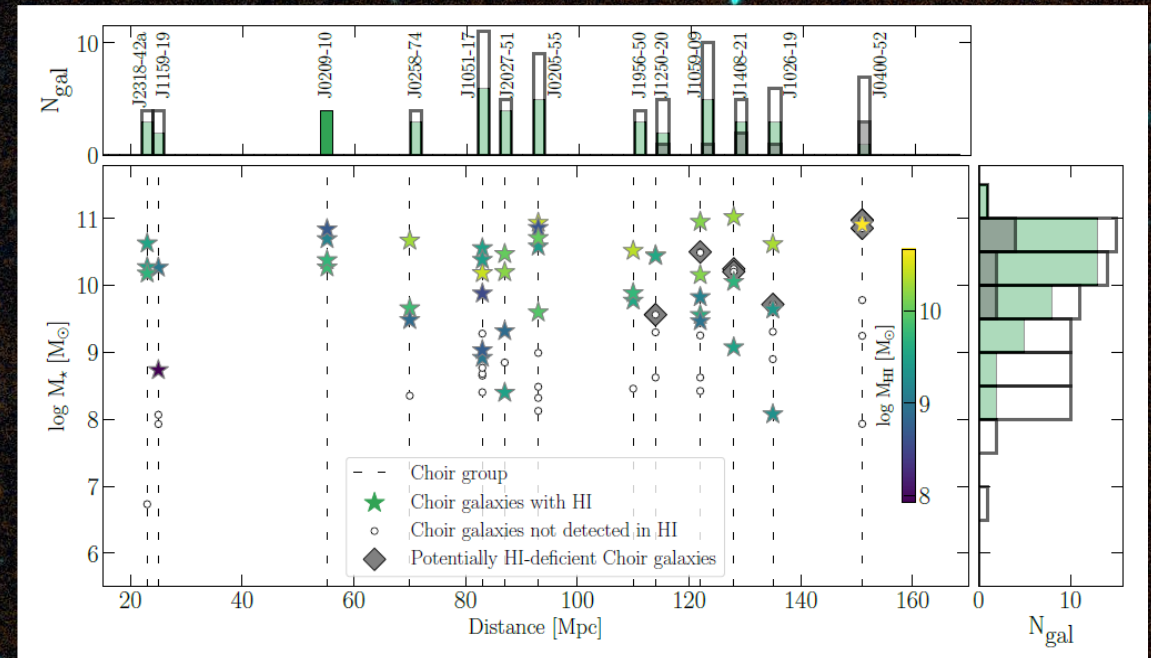


# HI in Choir Groups

- Groups are mostly not HI deficient
- Seem to be in early stages of evolution



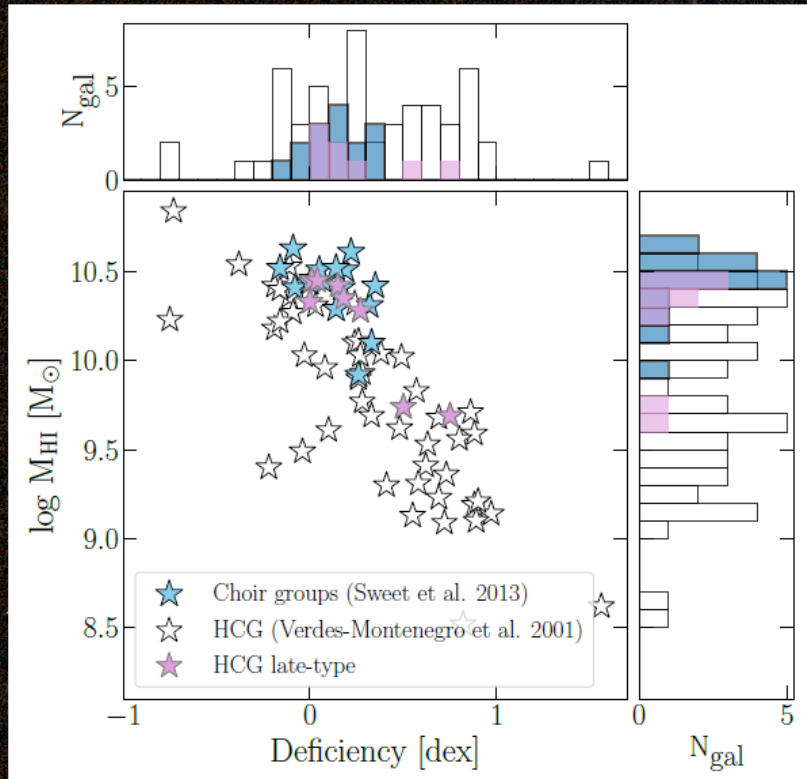
Sweet+ 2013



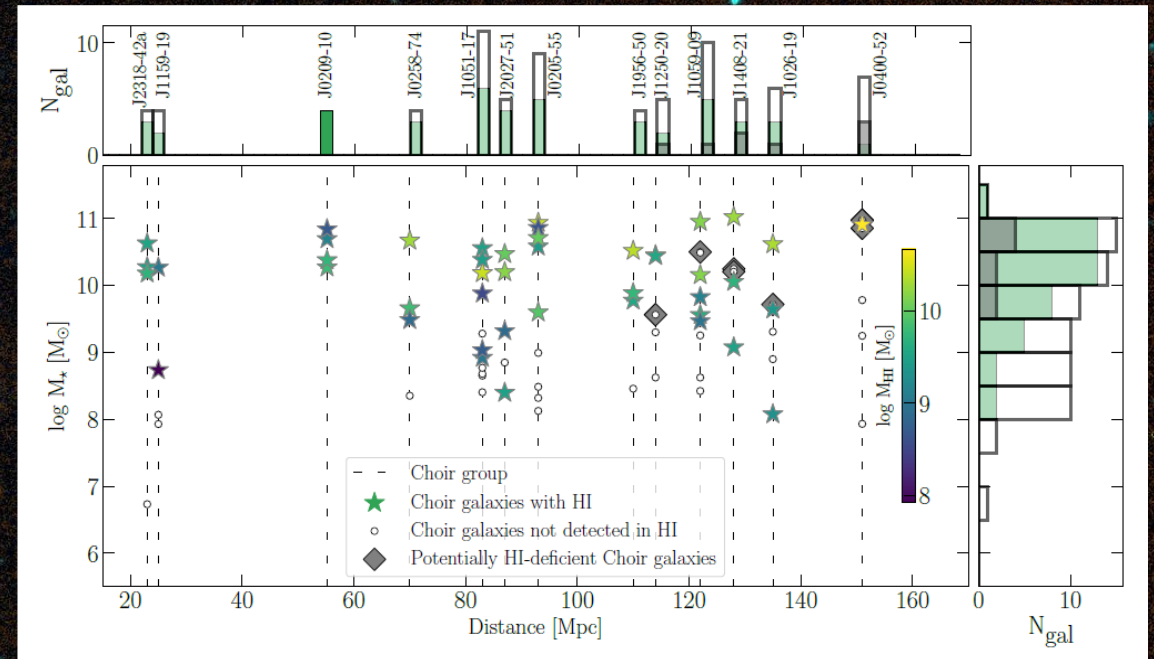
Dzudzar+ 2021



# HI in Choir Groups



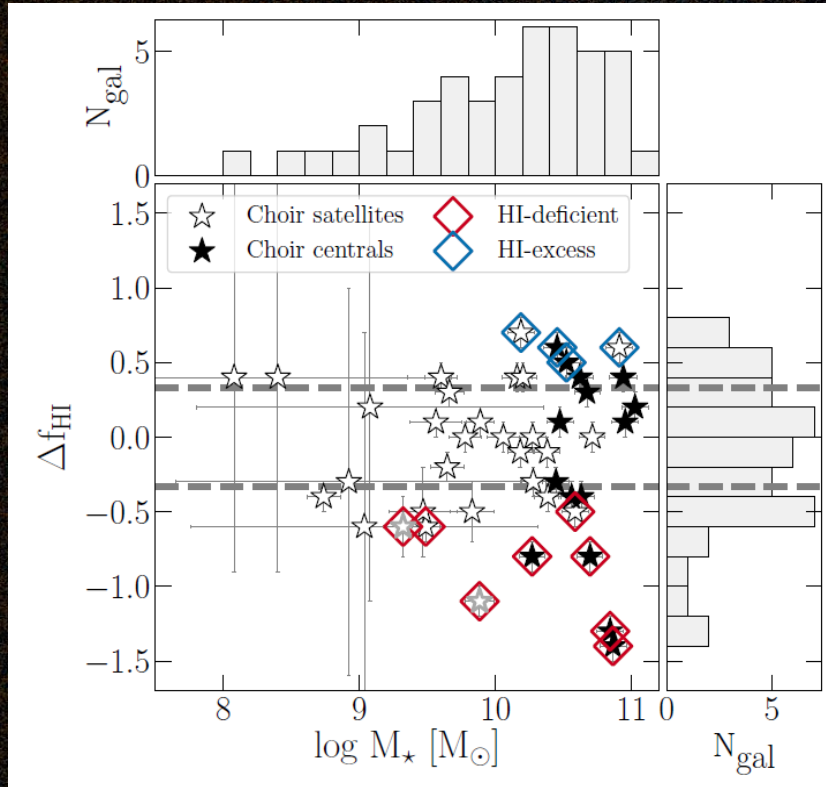
Dzudzar+ 2021



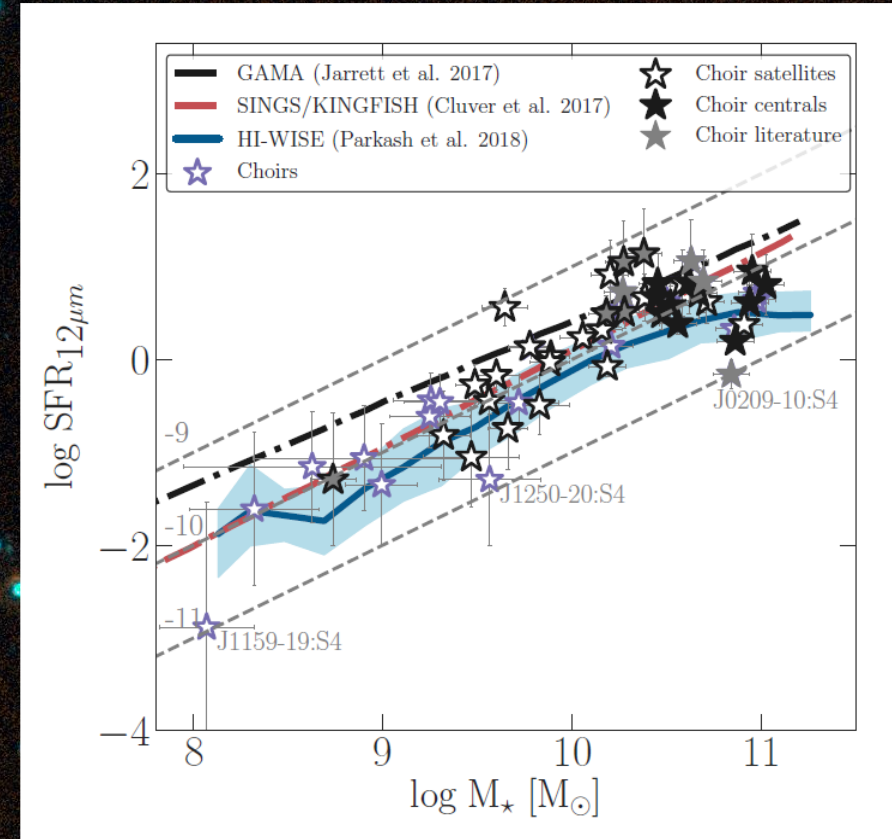
Dzudzar+ 2021



# HI in Choir Groups



Dzudzar+ 2021



Dzudzar+ 2021



# MeerChoirs

- Resolved HI studies of the galaxies and gas within Choir Groups with MeerKAT
- Study the evolution of galaxies and atomic gas within groups
- 32k, ~6 hours per group
- ~10-20" arcsec spatial resolution ( 2-5x better)
- Utilizing the combination of high spatial, spectral resolution, sensitivity and large field of view



# MeerChoirs

- MeerKAT Observations
  - Pilot of 6 Groups – awarded Priority B Time
  - Allocated Priority B Time to observe 8/9 of the remaining groups
    - One group was observed by a different program



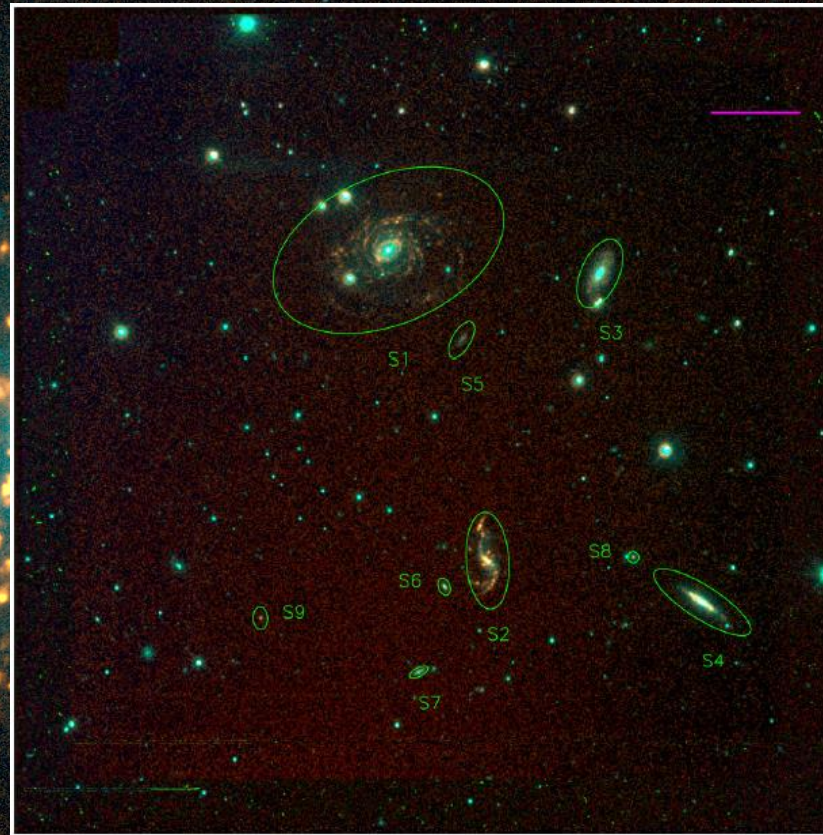
# MeerChoirs Preliminary

- Using the Calibrated data from MeerKAT pipeline
- CASA Imaging
- Via IDIA-Ilifu

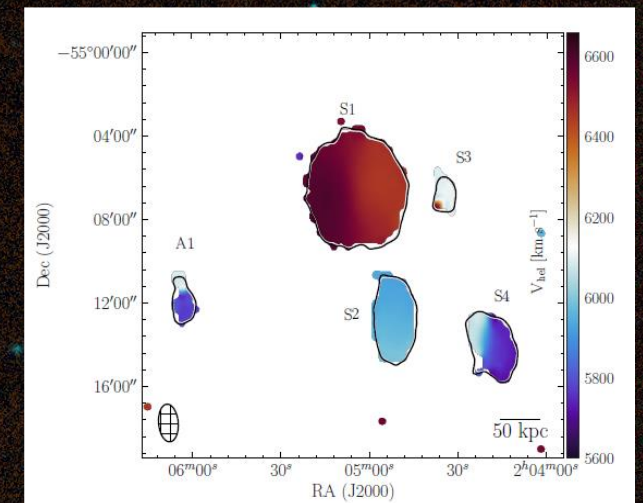
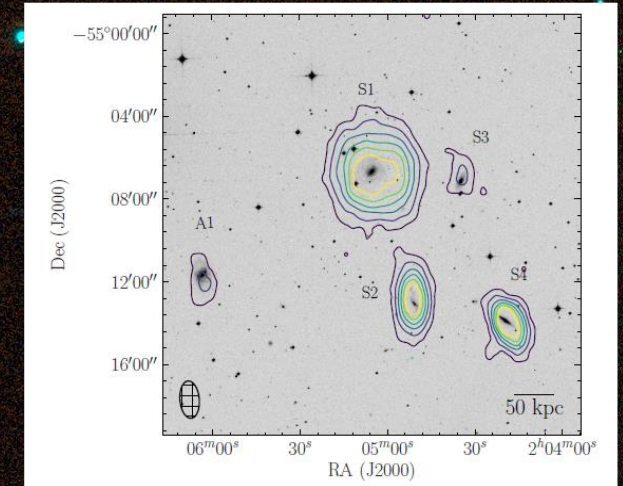


# MeerChoirs

- J0205-55
- Two sub-groups, “Group a” in SINGG
- Optical detections: 9
- HI detections: 4



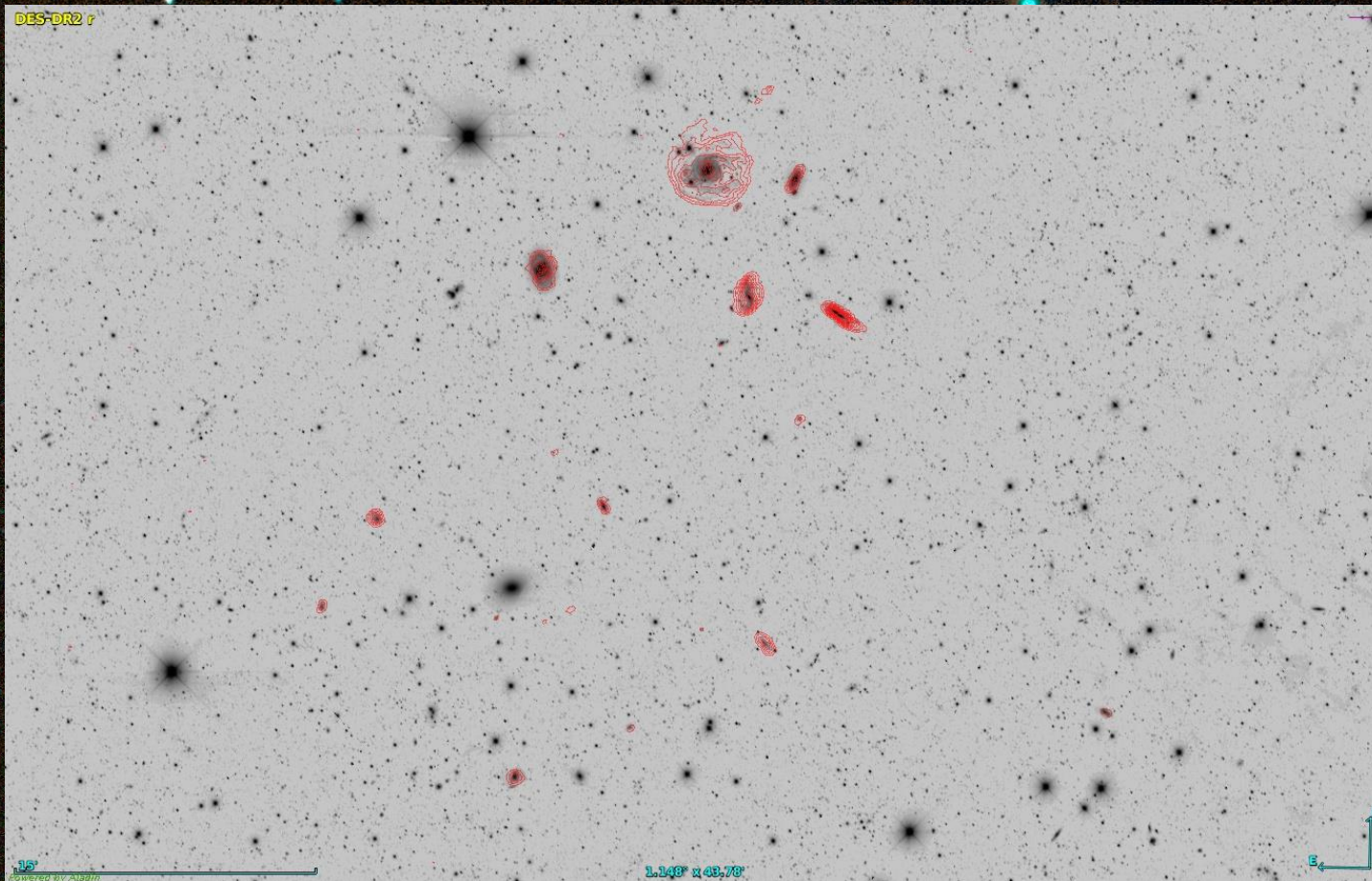
H $\alpha$  + R, Sweet+ 2013



HI Dzudzar+ 2021



# MeerChoirs Prelim Work

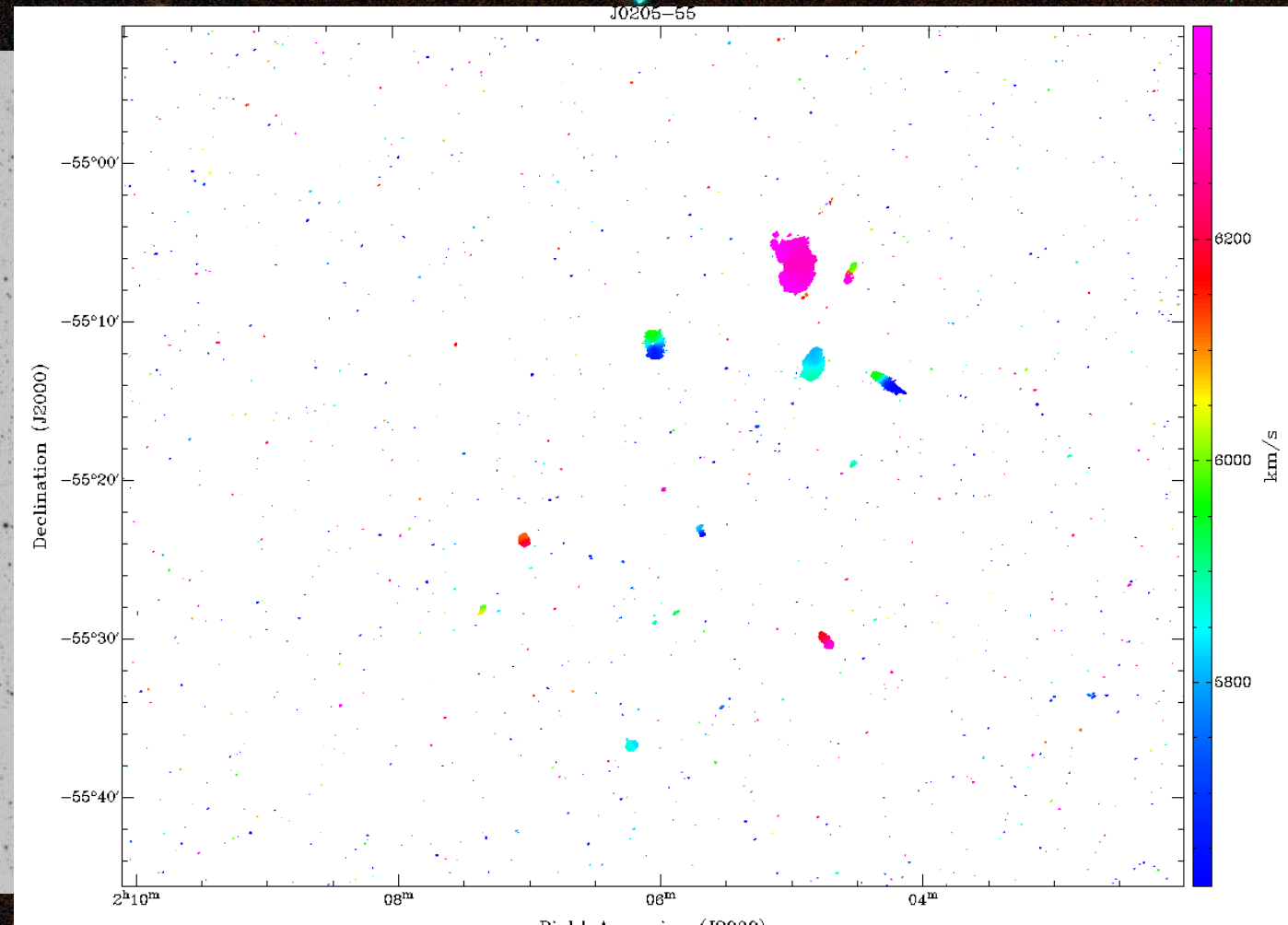
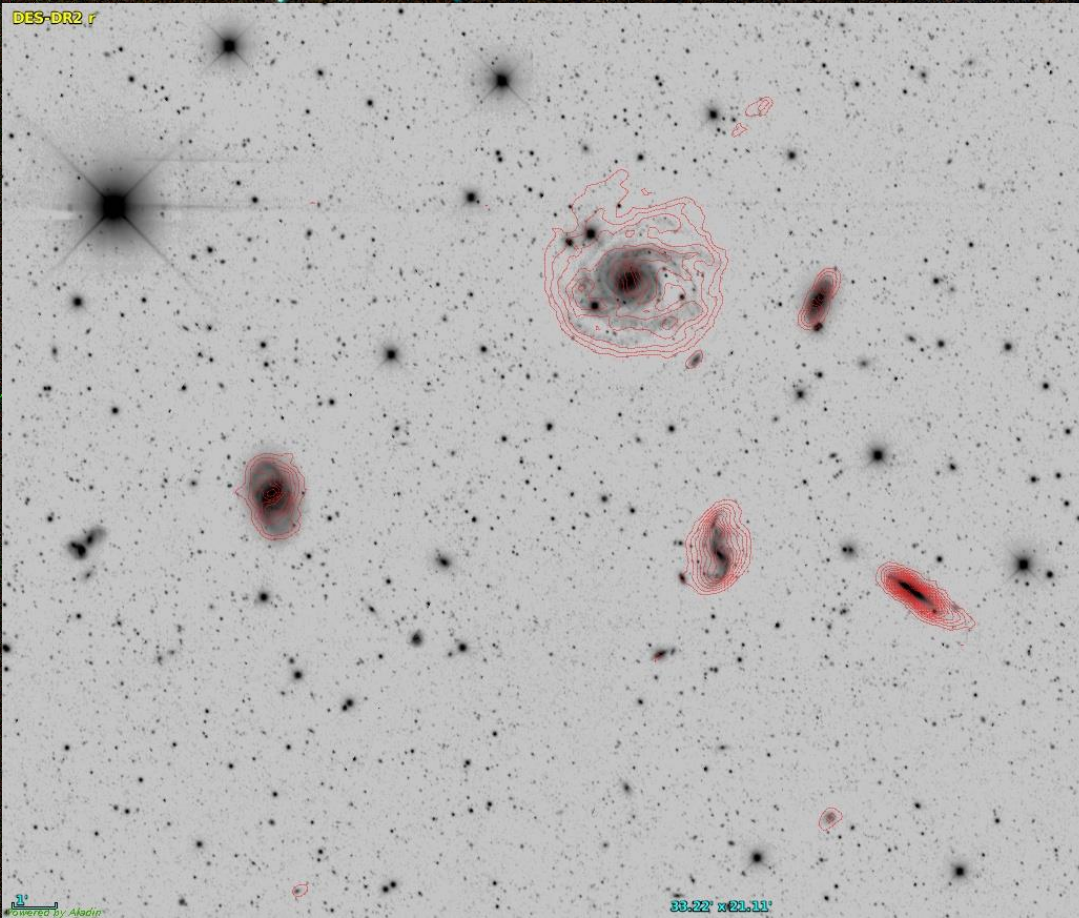


## Preliminary Shallow Imaging

- 5 Sources detected as before
- 2 new HI detections in same FOV
- ~6/7 additional HI detections in group



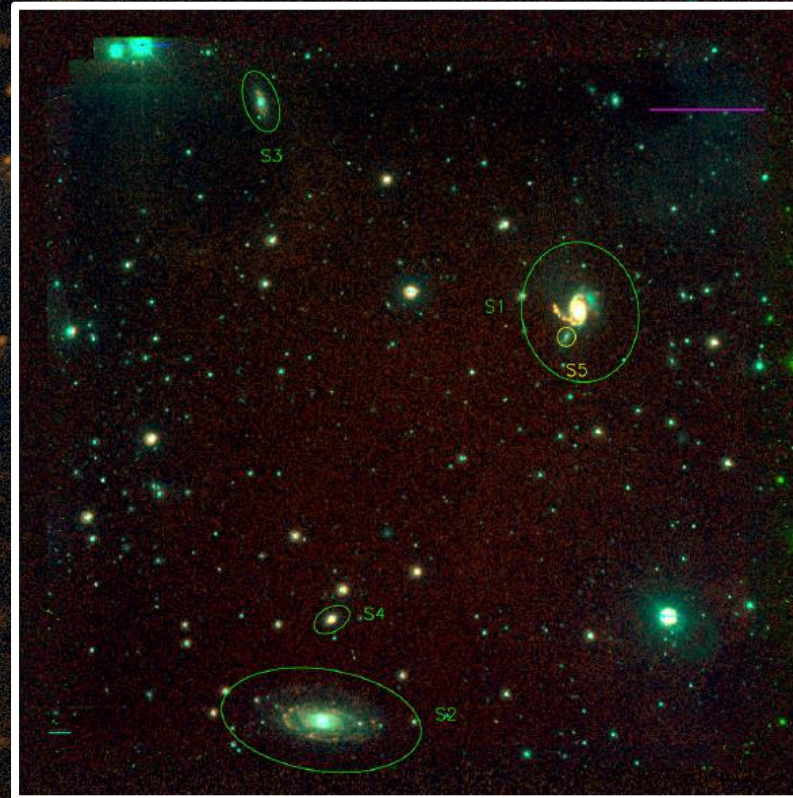
# MeerChoirs Very Preliminary





# MeerChoirs

- J0443-05
- Optical detections: 5
- No resolved HI

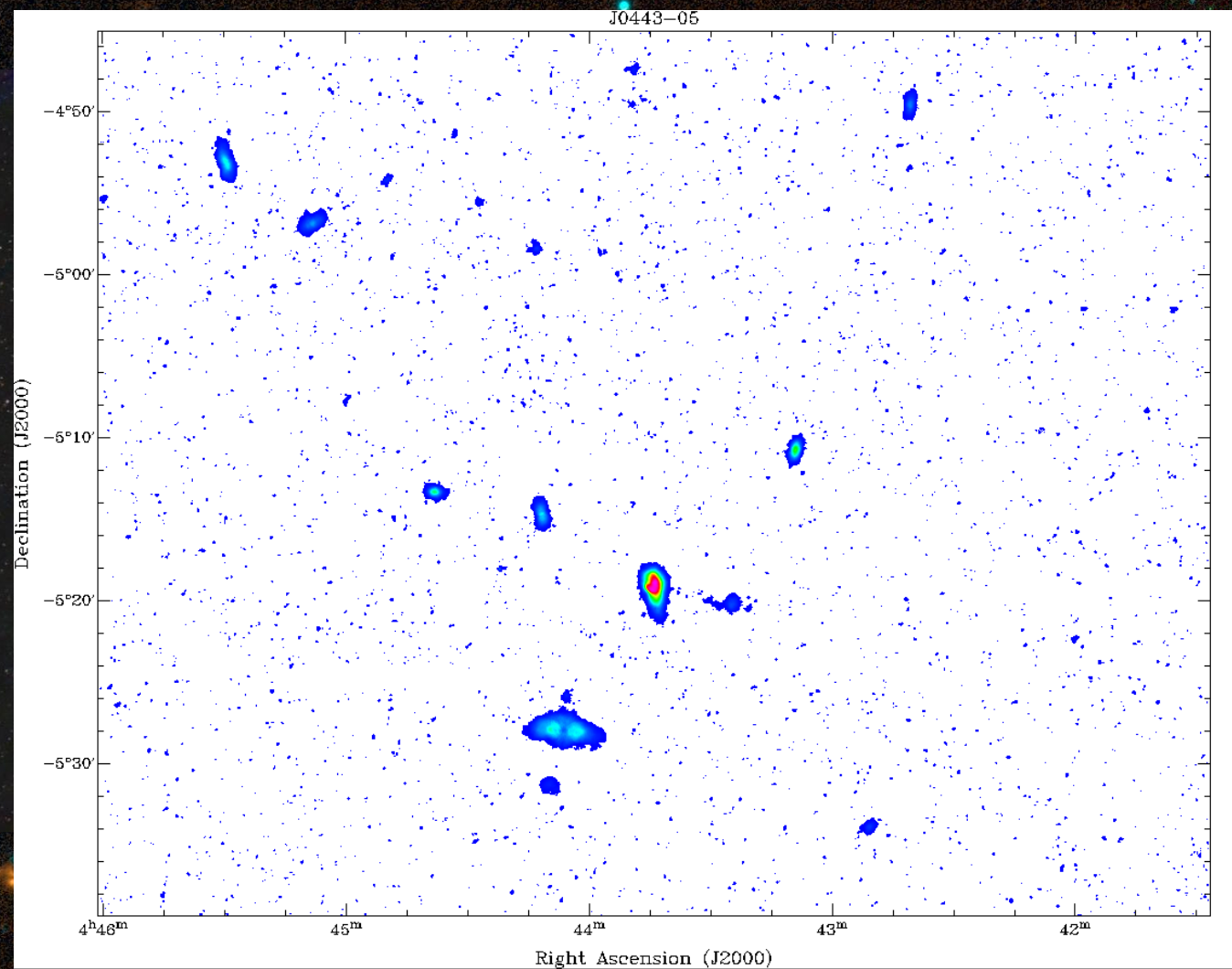


H $\alpha$  + R, Sweet+ 2013



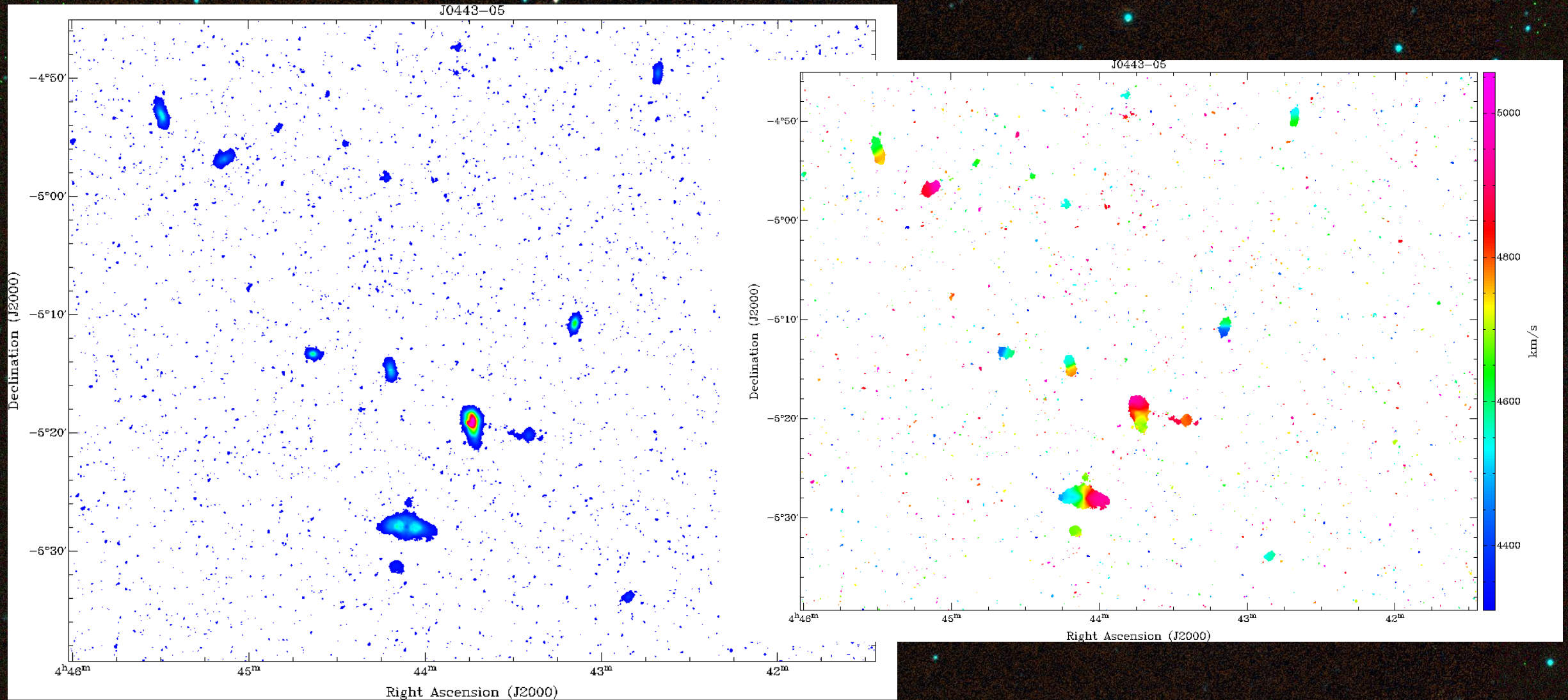
# MeerChoirs... Very Preliminary

j0443p1\_hi3a\_10



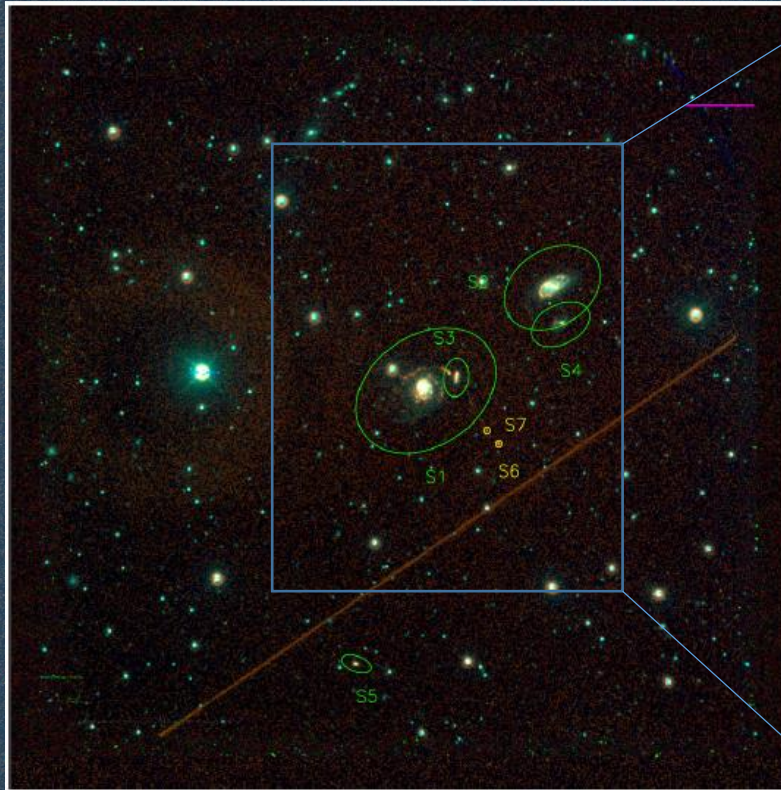


# MeerChoirs... Very Preliminary

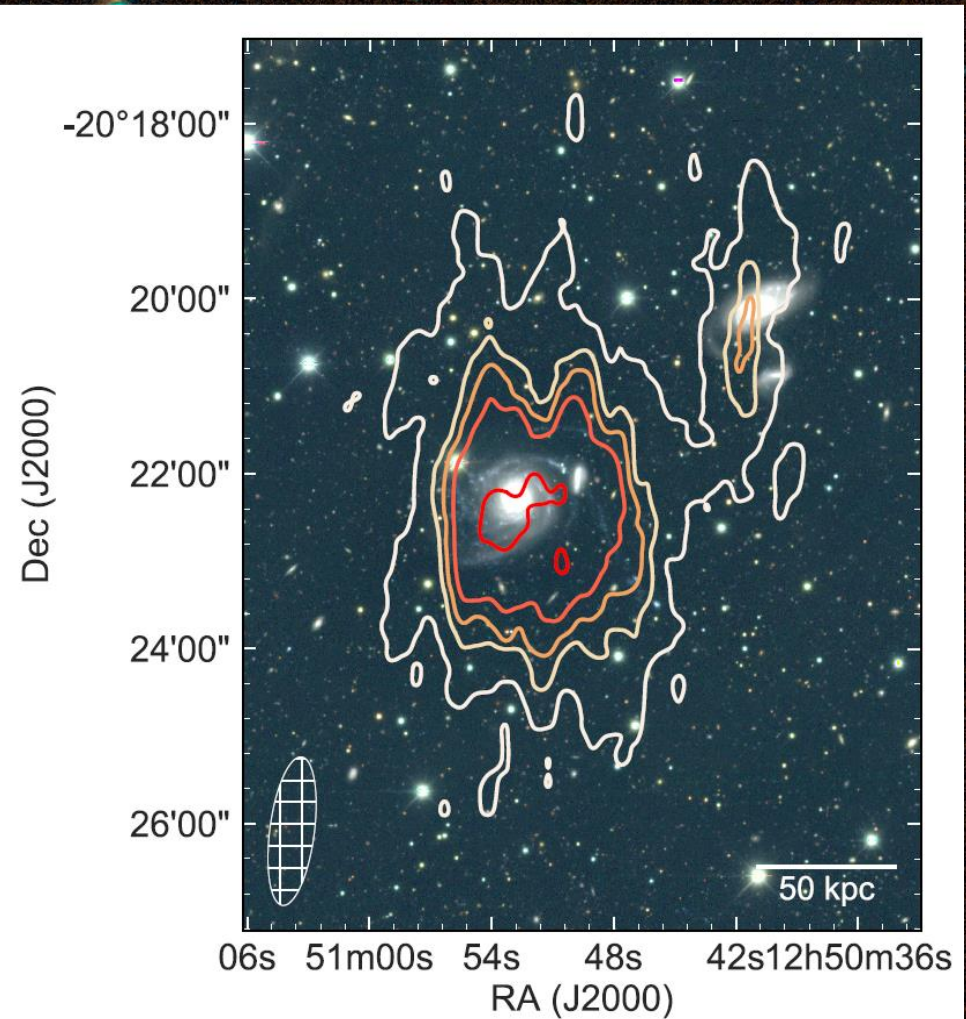




# MeerChoirs



Sweet + 2019 (Optical SINGG image)

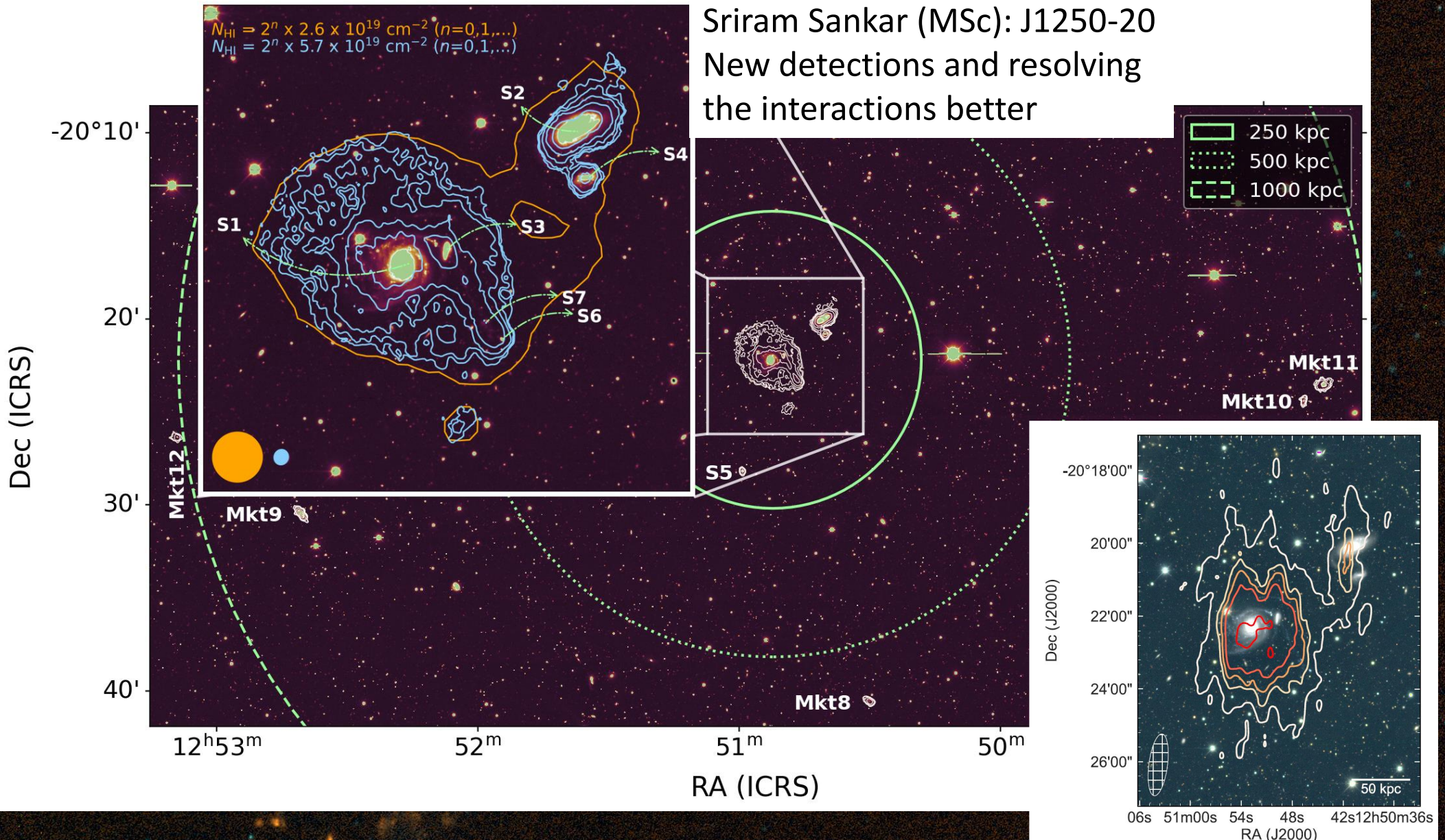


Dzudzar et al. 2019 (ATCA)



# MeerChoirs Results

Sriram Sankar (MSc): J1250-20  
 New detections and resolving  
 the interactions better





# MeerChoirs Results



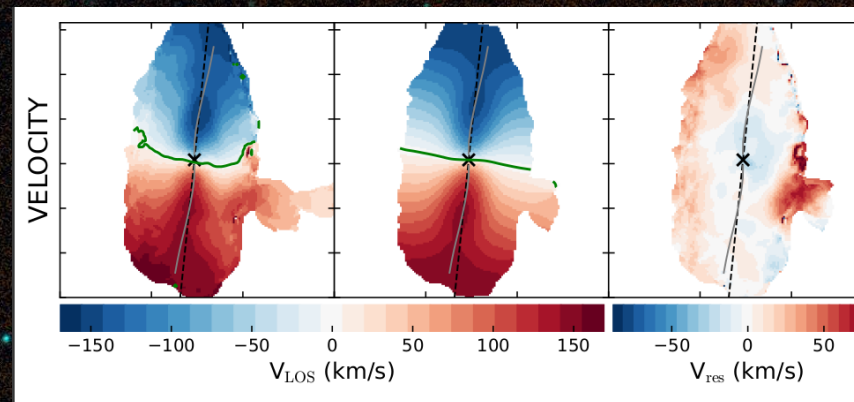
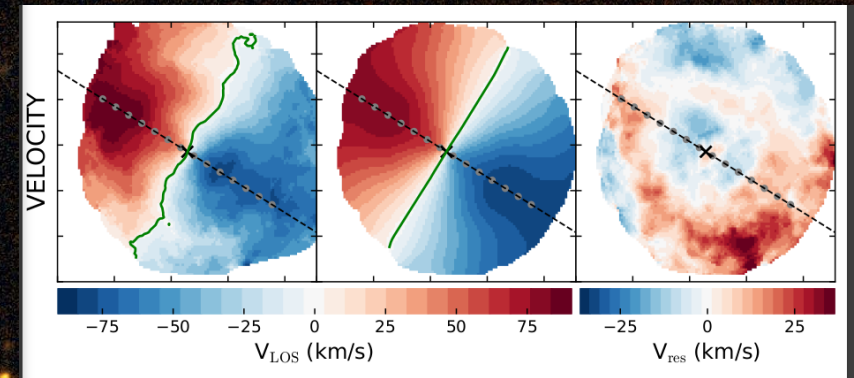
Sriram Sankar (MSc)  
J1250-20 Zoom in  
Optical + HI



# MeerChoirs Exciting Results... see Sriram Sankar's Talk



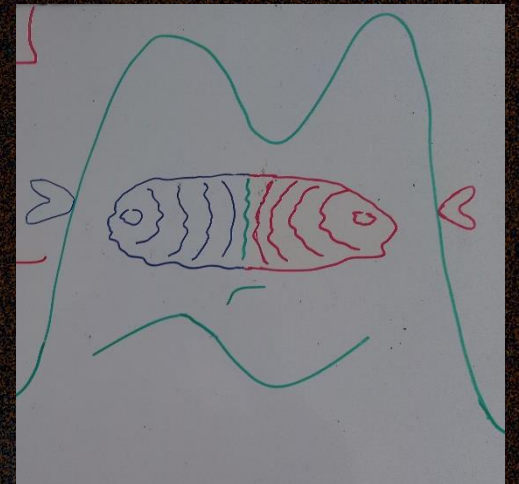
J1403-06, Arp 271





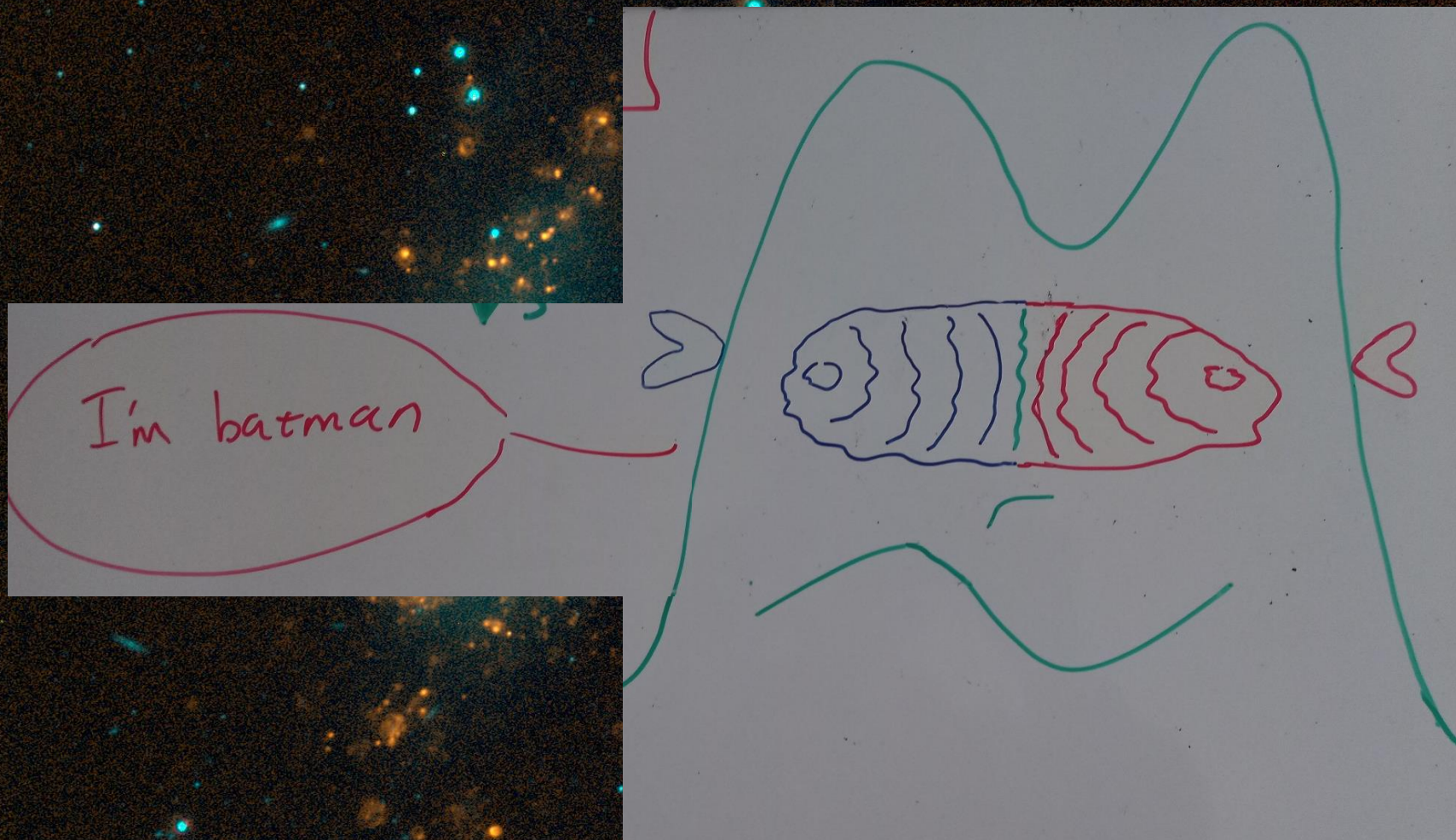
# MeerChoirs... next

- Sriram to finish J1250-20 and J1403-06 initial analysis for MSc
- Refinement of HI imaging (Using Caracal?) and data reduction for the groups
- Re-reducing rest of the data
- Analysis of HI and continuum data
- Follow up any missing data
- HI data for other interactions (LIRGs, Collisional rings)
- Lots of work to do, Collaboration welcome





# Thank You





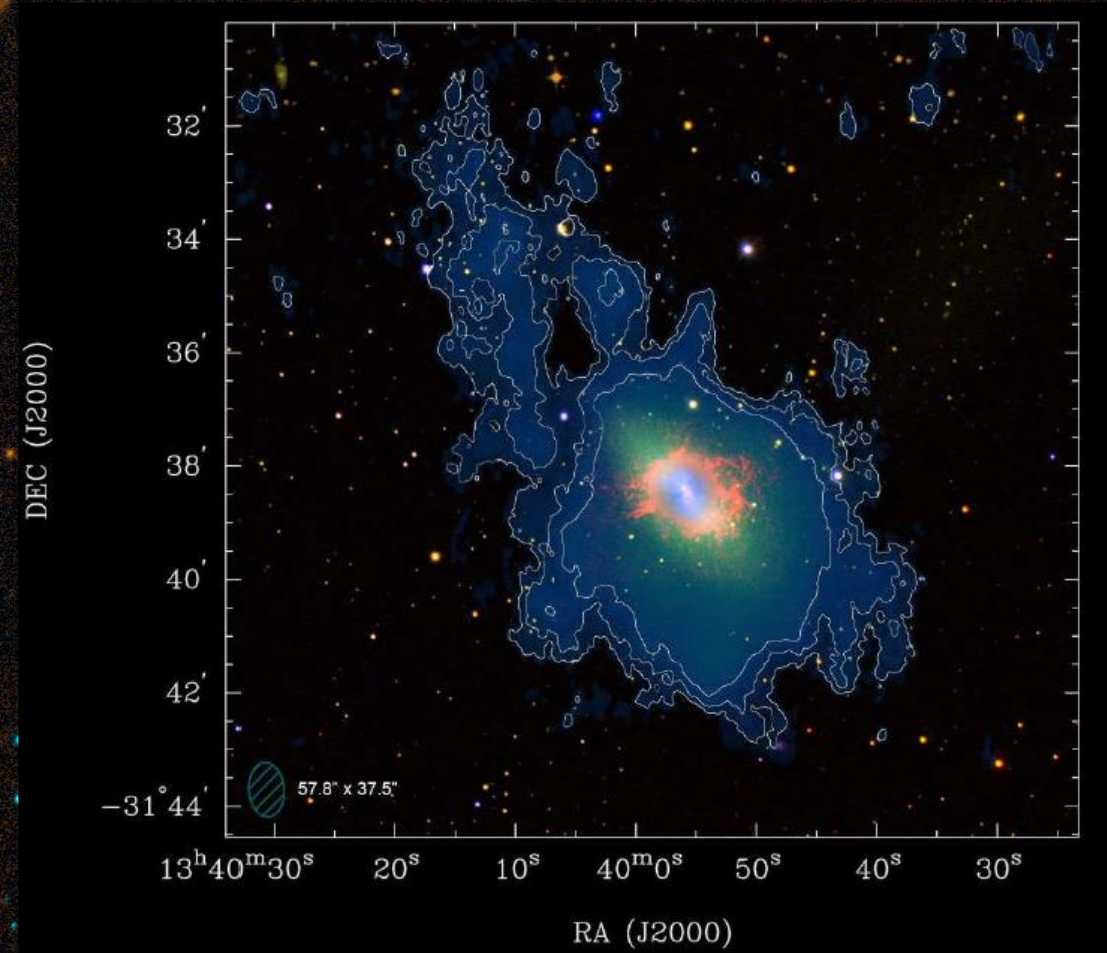
# MeerChoirs

The image shows a vast field of stars against a dark, grainy background. In the center, there is a dense cluster of stars, primarily in shades of orange, yellow, and light blue. This central cluster is surrounded by a more sparse field of stars, many of which are a bright cyan or light blue color. The overall appearance is that of a star-forming region or a specific stellar population.



# NGC 5253

- Starburst
- HI and Ionized Gas Outflow
- Possible Infalling Cloud
- In the M83 group



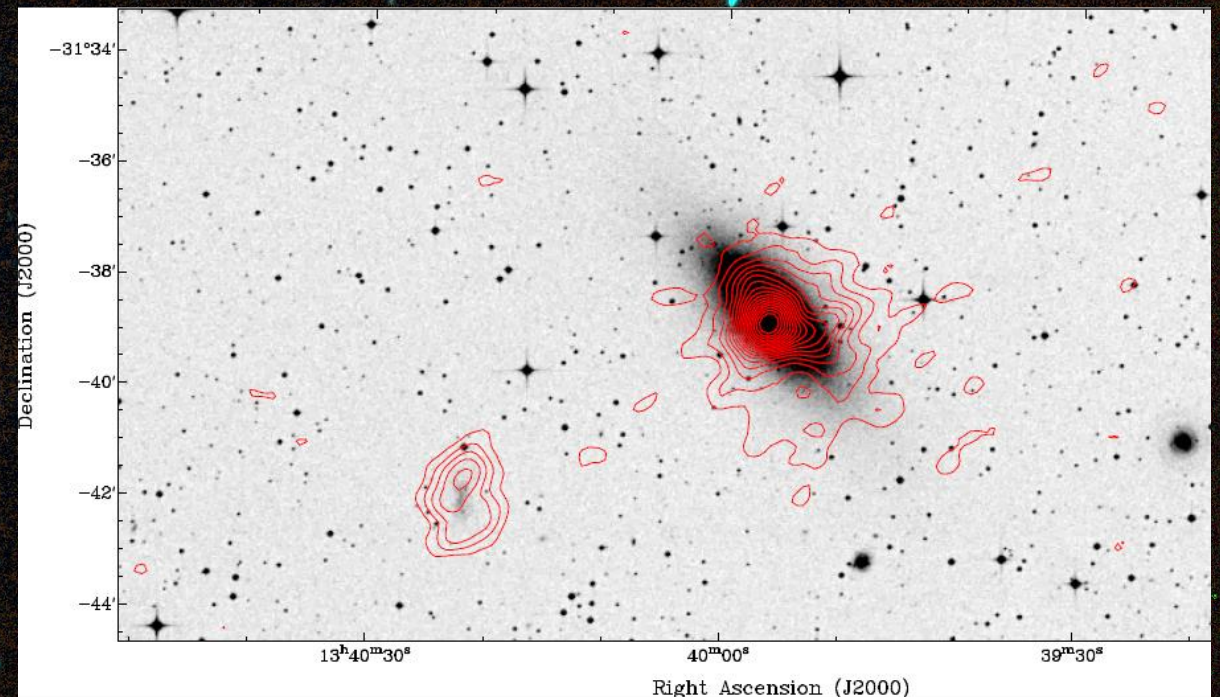
Optical + HI overlay;  
Lopez-Sanchez + 2012



# NGC 5253

- MeerKAT-16 Observations
- Detect anomalous gas, planned to propose for deeper and higher resolution observations from full MeerKAT array

HI Overlaid on Optical



With help from G. Jozsa, T. Randriamampandry



# MeerChoirs

The image shows a vast field of stars against a dark, grainy background. In the center, there is a dense cluster of stars, primarily in shades of orange, yellow, and light blue. This central cluster is surrounded by a more sparse field of stars, many of which are a bright cyan or light blue color. The overall appearance is that of a star-forming region or a specific stellar population.



