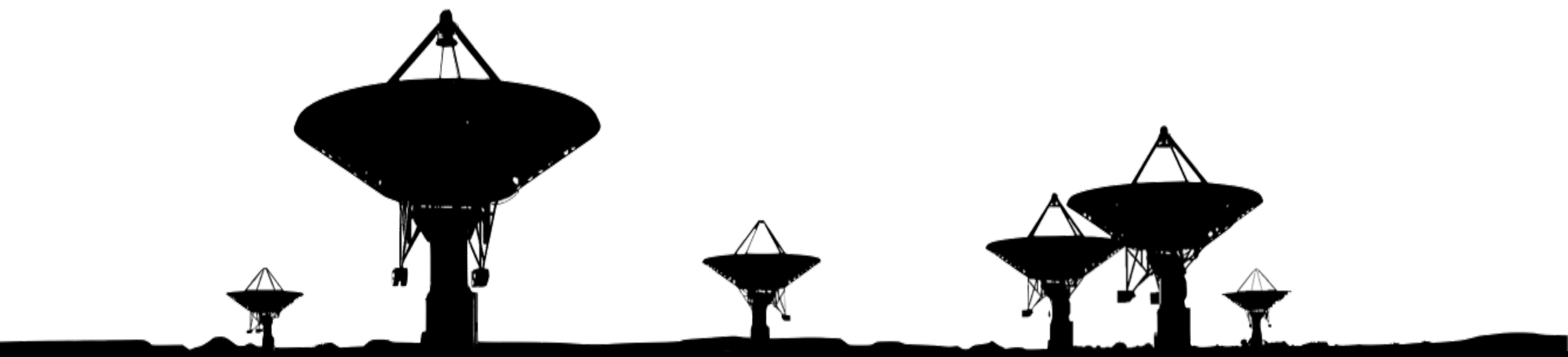
MHONGOOSE

MeerKAT HI Observations of Nearby Galactic Objects: Observing Southern Emitters

MeerKAT Deep Nearby Galaxies HI Survey

Yiannis Bagetakos



ASTRON

Life Cycle of Gas in Galaxies

ASTRON 2015

university of groningen 2014 | 400 years

MHONGOOSE

MeerKAT HI Observations of Nearby Galactic Objects: Observing Southern Emitters

Erwin de Blok (PI)	ASTRON	The Netherlands
Philippe Amram	Lab. Astroph. Marseille	France
Lia Athanassoula	Lab. Astroph. Marseille	France
Chantal Balkowski	Obs de Paris	France
Matt Bershady	Univ of Wisconsin	USA
Rob Beswick	Jodrell Bank	UK
Frank Bigiel	Univ Berkeley	USA
Sarah Blyth	Univ of Cape Town	South Africa
Albert Bosma	Lab. Astroph. Marseille	France
Roy Booth	HartRAO	South Africa
Antoine Bouchard	McGill Univ	Canada
Elias Brinks	Univ of Hertfordshire	UK
Claude Carignan	Univ de Ouagadougou	Burkina Faso
Laurent Chemin	Obs de Paris	France
Françoise Combes	Obs de Paris	France
John Conway	Chalmers Univ	Sweden
Simon Cross	SKA SA	South Africa
Jayanne English	Univ Manitoba	Canada
Benoit Epinat	Lab. Astroph. Marseille	France
Bradley Frank	Univ of Cape Town	South Africa
Jason Fiege	Univ Manitoba	Canada
Jay Gallagher	Univ of Wisconsin	USA
Brad Gibson	Univ Lancaster	UK
George Heald	ASTRON	Netherlands
Trish Henning	Univ New Mexico	USA
Benne Holwerda	Univ of Cape Town	South Africa
Jasper Horrell	SKA SA	South Africa
Helmut Jerjen	RSAA, ANU	Australia

Hans-Rainer Klöckner	Oxford Univ	UK
Bärbel Koribalski	ATNF	Australia
Renée Kraan-Korteweg	Univ of Cape Town	South Africa
Stephane Leon	ESO	Chile
Adam Leroy	NRAO	USA
Ilani Loubser	UWC	South Africa
Stacy McGaugh	Univ of Maryland	USA
Gerhardt Meurer	ICRAR	Australia
Martin Meyer	ICRAR	Australia
Se-Heon Oh	Univ of Cape Town	South Africa
Tom Oosterloo	ASTRON	Netherlands
D.J. Pisano	West Virginia University	USA
Simon Ratcliffe	SKA SA	South Africa
Jerry Sellwood	Rutgers Univ	USA
Eva Schinnerer	MPIA	Germany
Anja Schröder	HartRAO	South Africa
Kartik Sheth	NRAO	USA
Kristine Spekkens	RMC	Canada
Snezana Stanimirovic	Univ of Wisconsin	USA
Kurt van der Heyden	Univ of Cape Town	South Africa
Wim van Driel	Obs de Paris	France
Lourdes Verdes-Montenegro	IAA, Granada	Spain
Fabian Walter	MPIA	Germany
Bradley Warren	ICRAR	Australia
Tobias Westmeier	ATNF	Australia
Eric Wilcots	Univ of Wisconsin	USA
Ted Williams	Rutgers Univ	USA
Patrick Woudt	Univ of Cape Town	South Africa
Albert Zijlstra	Univ Manchester	UK

HI: what's left to do

The connection, over time, between **star formation, HI, dynamics** and **accretion**, is one of the main issues to address in the coming years through *large, deep surveys* of the H I in the *local* and *distant* Universe

- How do galaxies assemble and evolve?

- How is star formation regulated?

- How are outer disks and cosmic web linked?

MHONGOOSE science

High resolution:

- star formation
- dynamics
- structure of the ISM

High sensitivity:

- cosmic web
- accretion

MeerKAT

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An array 64 receptors with 13.5 m diameter dishes
Will be integrated into the mid-frequency component of SKA

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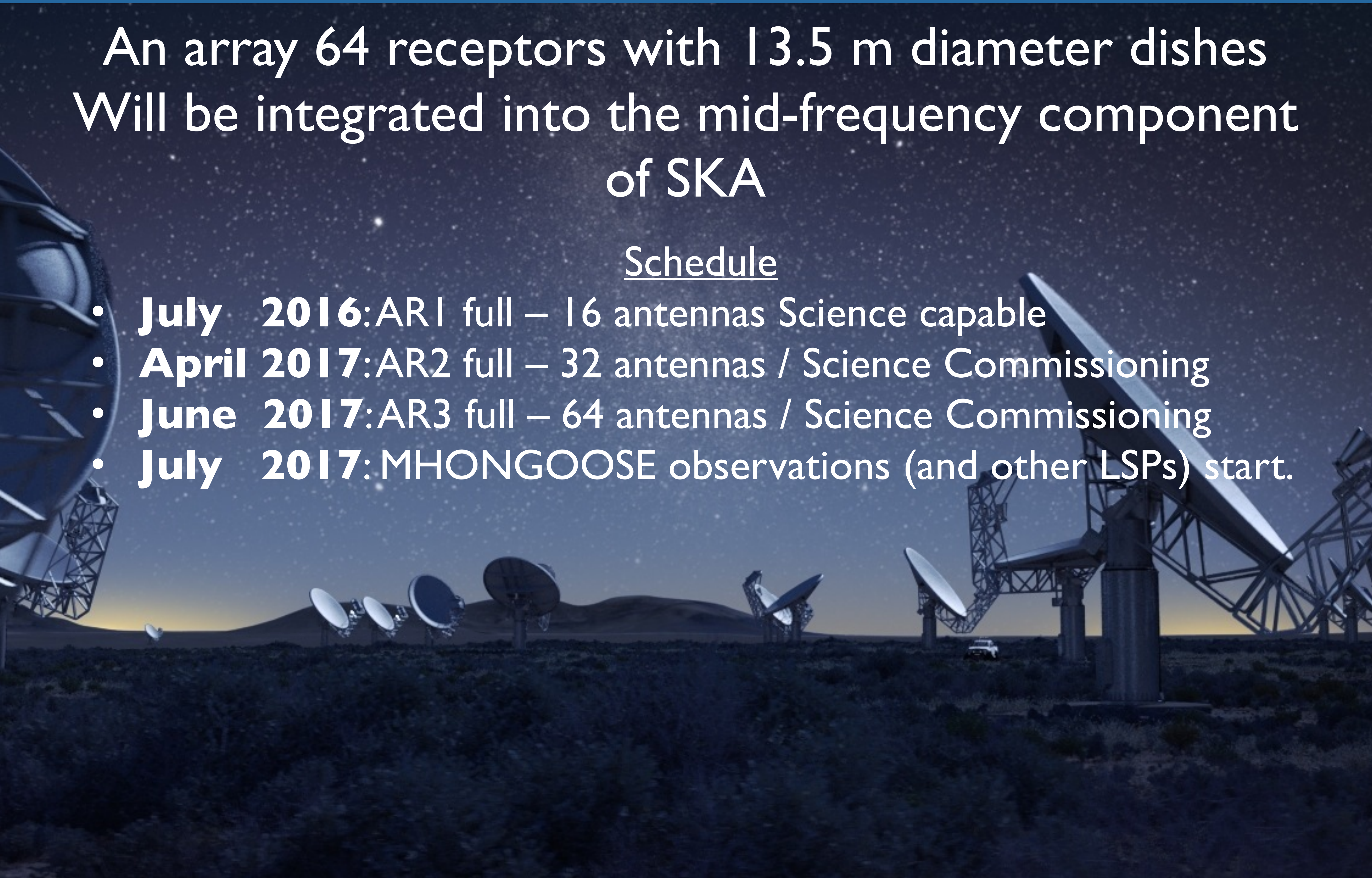
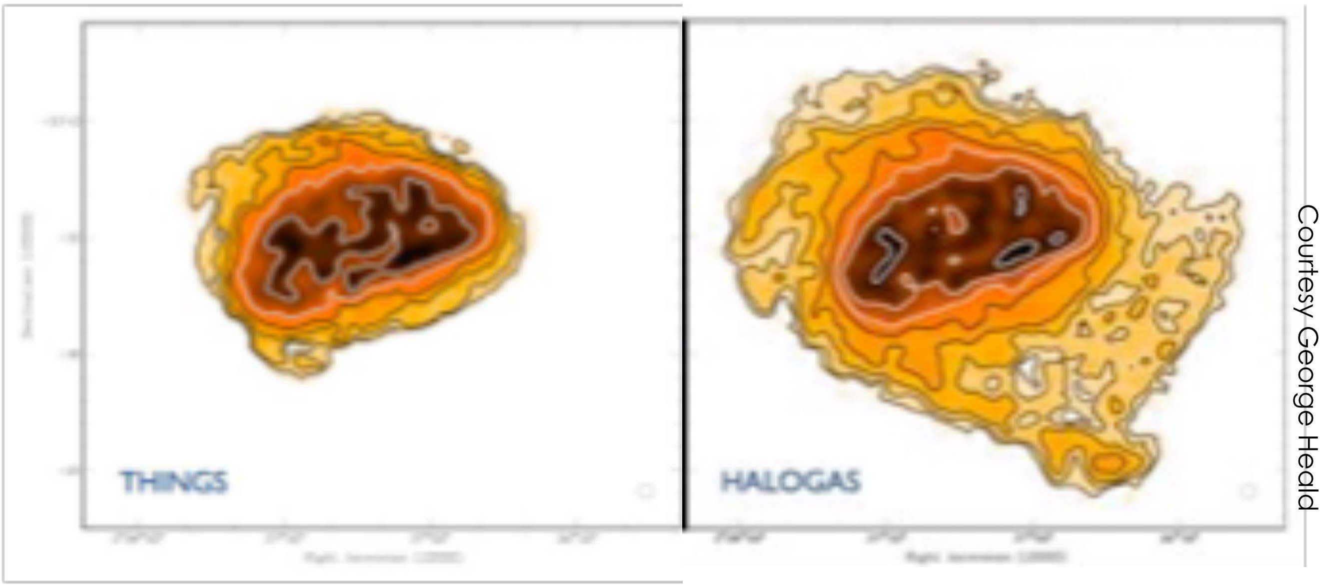


Schedule

- **July 2016**: AR1 full – 16 antennas Science capable
- **April 2017**: AR2 full – 32 antennas / Science Commissioning
- **June 2017**: AR3 full – 64 antennas / Science Commissioning
- **July 2017**: MHONGOOSE observations (and other LSPs) start.

High-sensitivity Science

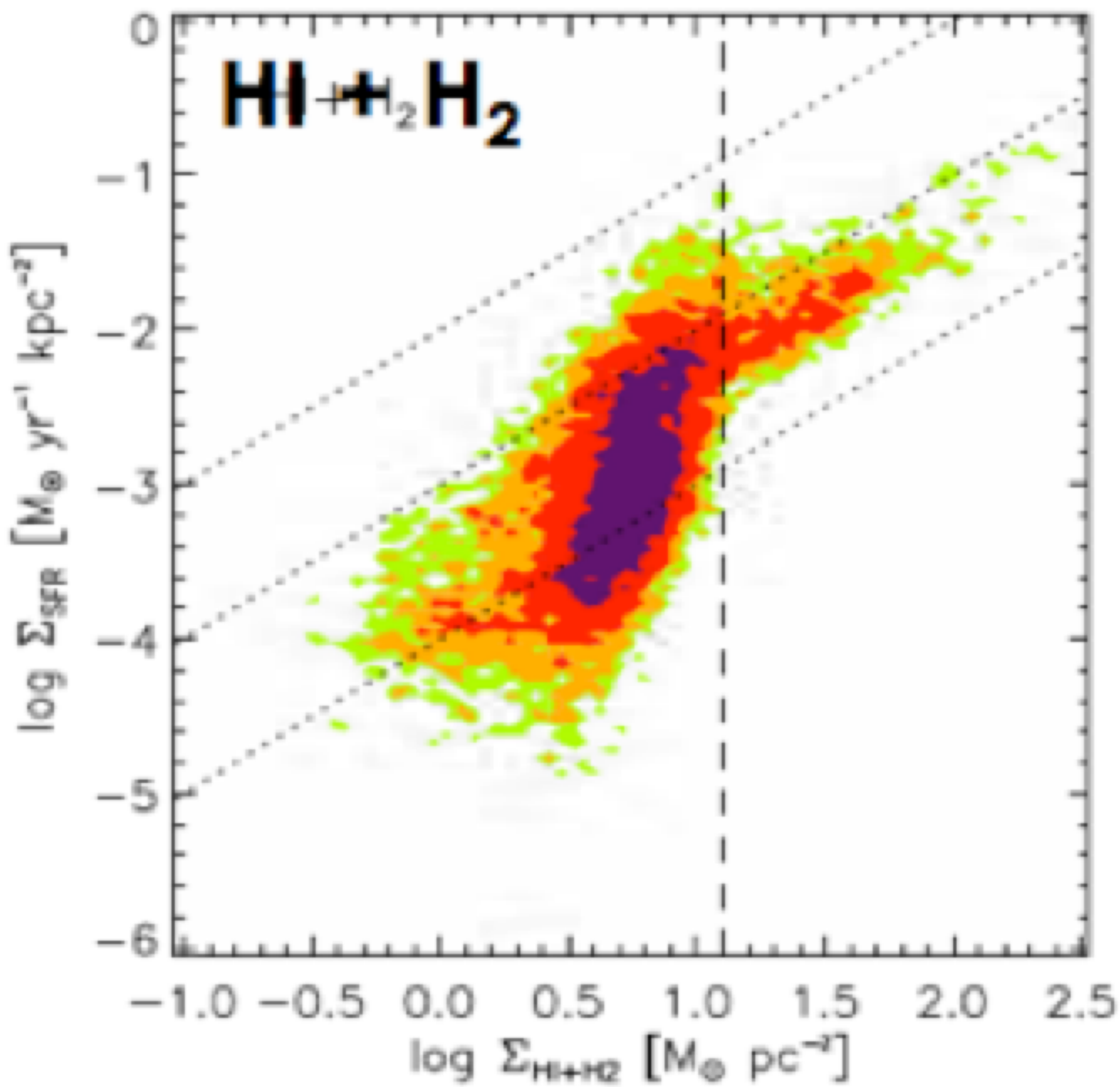
- Sample 25 times longer than THINGS
- 200h per galaxy
- 30 galaxies
- Accretion, cosmic web, dynamics beyond disk
- Equivalent to HALOGAS but different parameter range
- $5\sigma = 1.3 \cdot 10^{19}$ cm^{-2} at 30" for 16 km s^{-1} FWHM HI line at 5 km s^{-1} channel spacing or 5.10^{17} cm^{-2} at 90"



Courtesy George Heald

High-res Science

- Structure of the HI component
- Local links between gas and star formation
- Ratio of UV and Hα to HI in the outskirts



Bigiel et THINGS

Selecting a Sample

HI detection

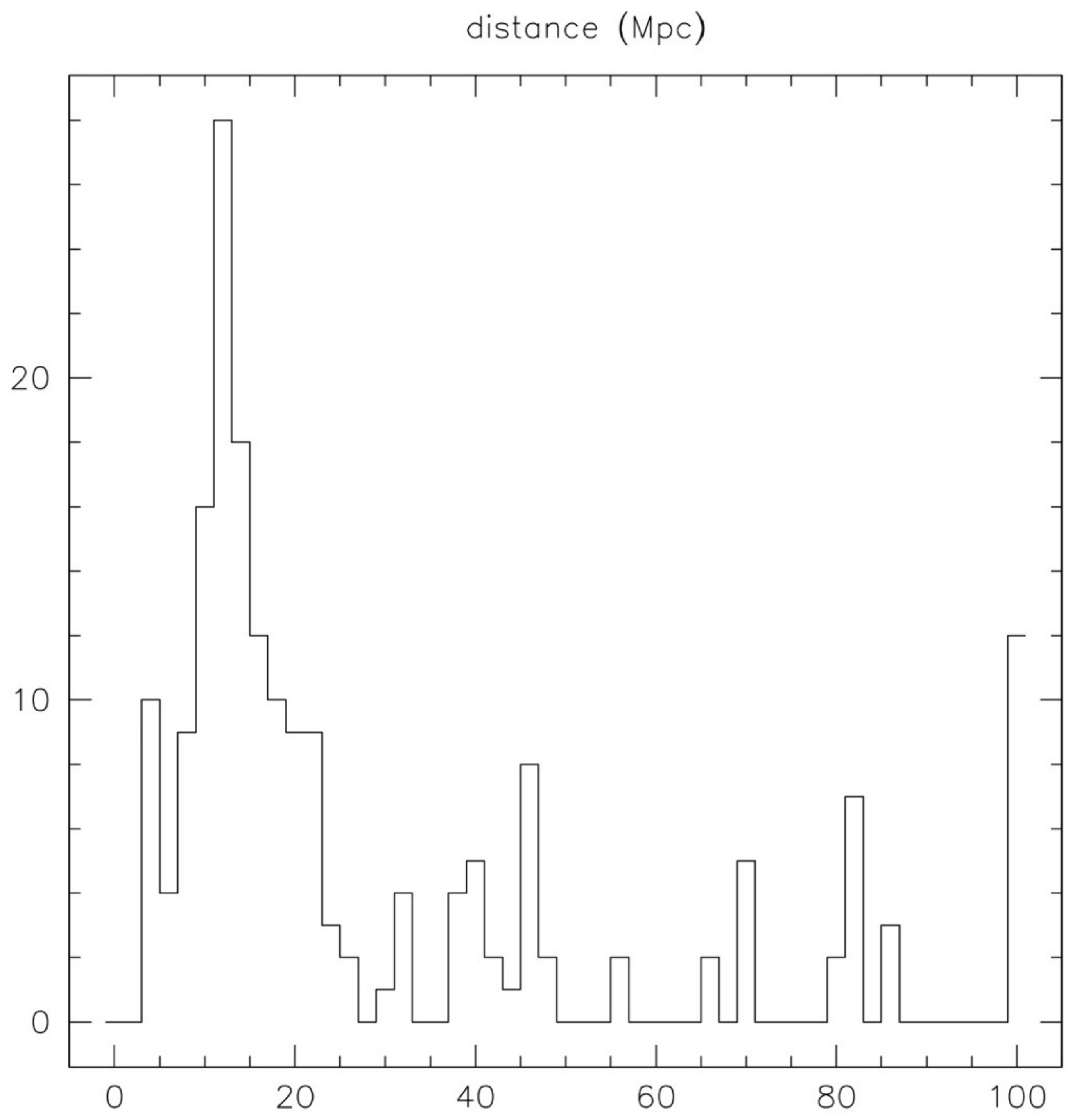
- HIPASS-based sample
- Galactic latitude |b| > 30°, Galactic standard of rest velocity > 200 km s^{-1}
- Projected distance from the LMC > 10°

Detected in SINGG (Survey for Ionization in Neutral Gas Galaxies) and SUNGG (Survey for Ultraviolet emission in Neutral Gas Galaxies) (P.I. Meurer)

- Hα, photometry, WISE and GALEX are available → 200 sources

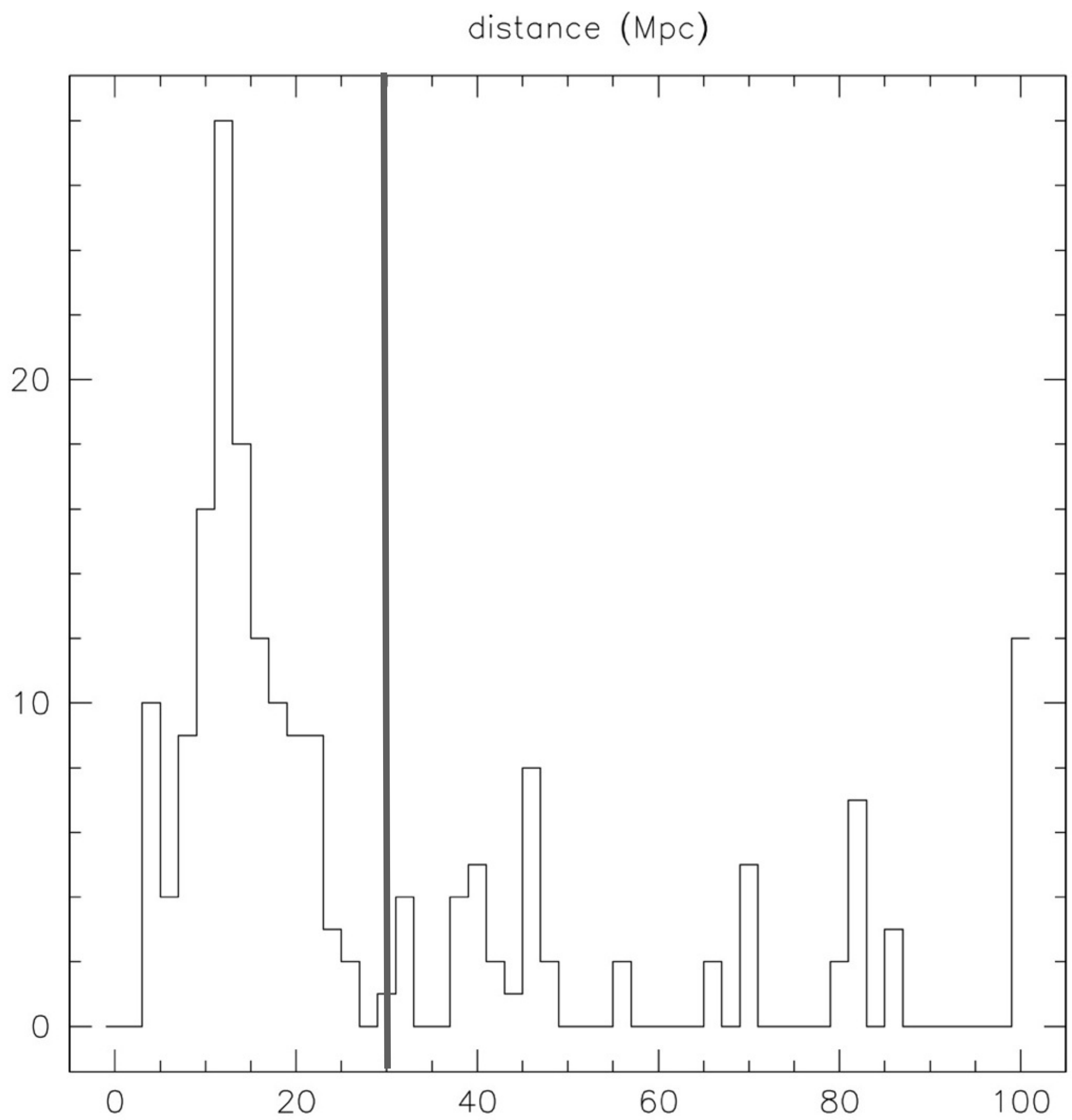
Multiple Hα detections for one HI source (i.e. background galaxies). Removing these double detections → 151 galaxies.

Pre-cursor Sample



- A cut at 30 Mpc (MeerKAT beam is 1 kpc)
- Galaxies with dec < -10
- Exclude galaxies in Paolo Serra's Fornax survey region.
- → 88 galaxies

Pre-cursor Sample



- A cut at 30 Mpc (MeerKAT beam is 1 kpc)
- Galaxies with dec < -10
- Exclude galaxies in Paolo Serra's Fornax survey region.
- → 88 galaxies

Pre-cursor Sample

- We want a representative number of galaxies as uniformly as possible over $\log(M_{HI})$

$6 < \log M_{HI} < 8$	5
$8 < \log M_{HI} < 8.5$	16
$8.5 < \log M_{HI} < 9$	18
$9 < \log M_{HI} < 9.5$	26
$9.5 < \log M_{HI} < 10$	15
$10 < \log M_{HI} < 11$	7

- 5 galaxies per bin → 30 galaxies, but which?

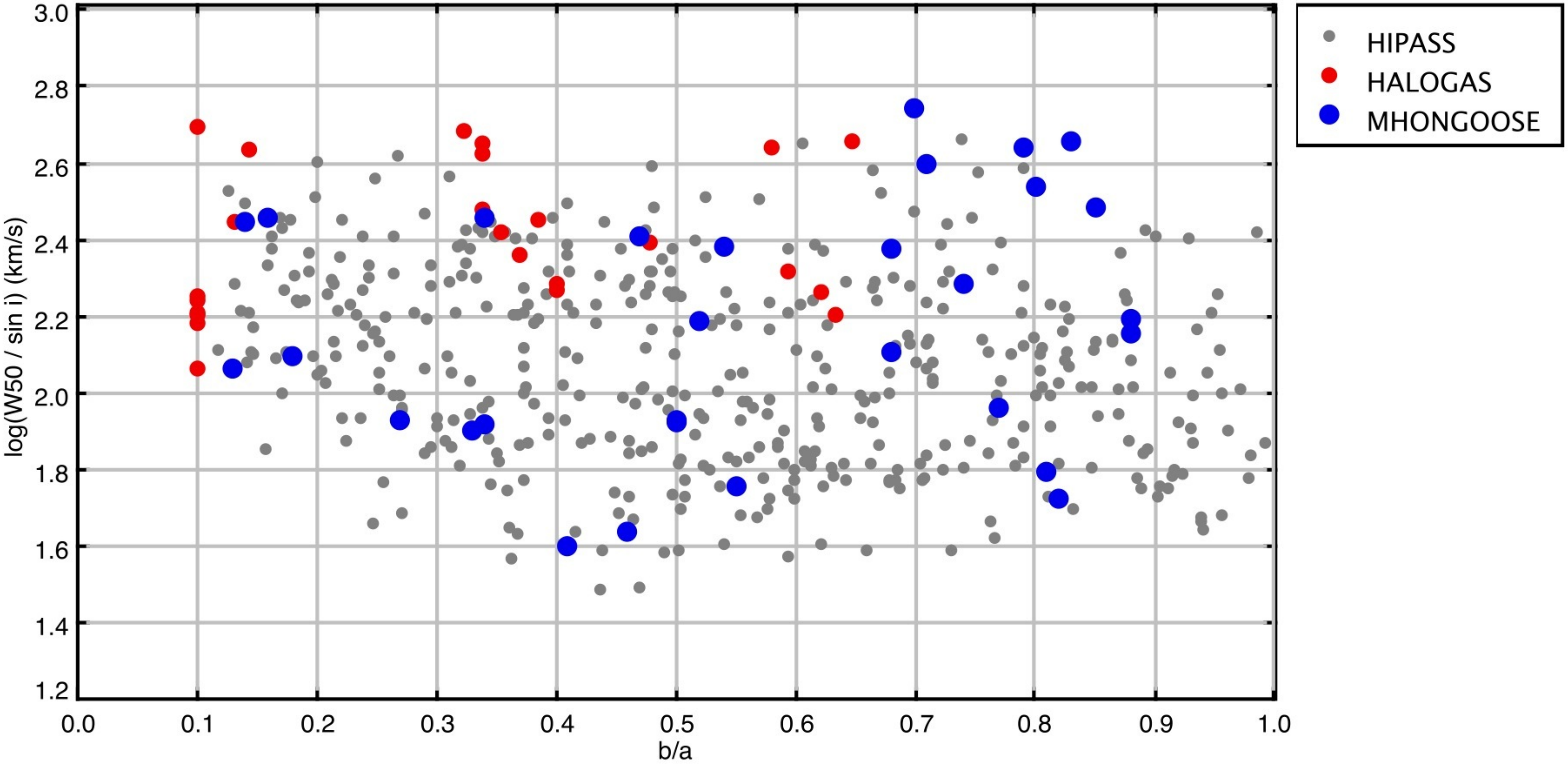
Selecting a sample

Criteria for the MHONGOOSE final sample

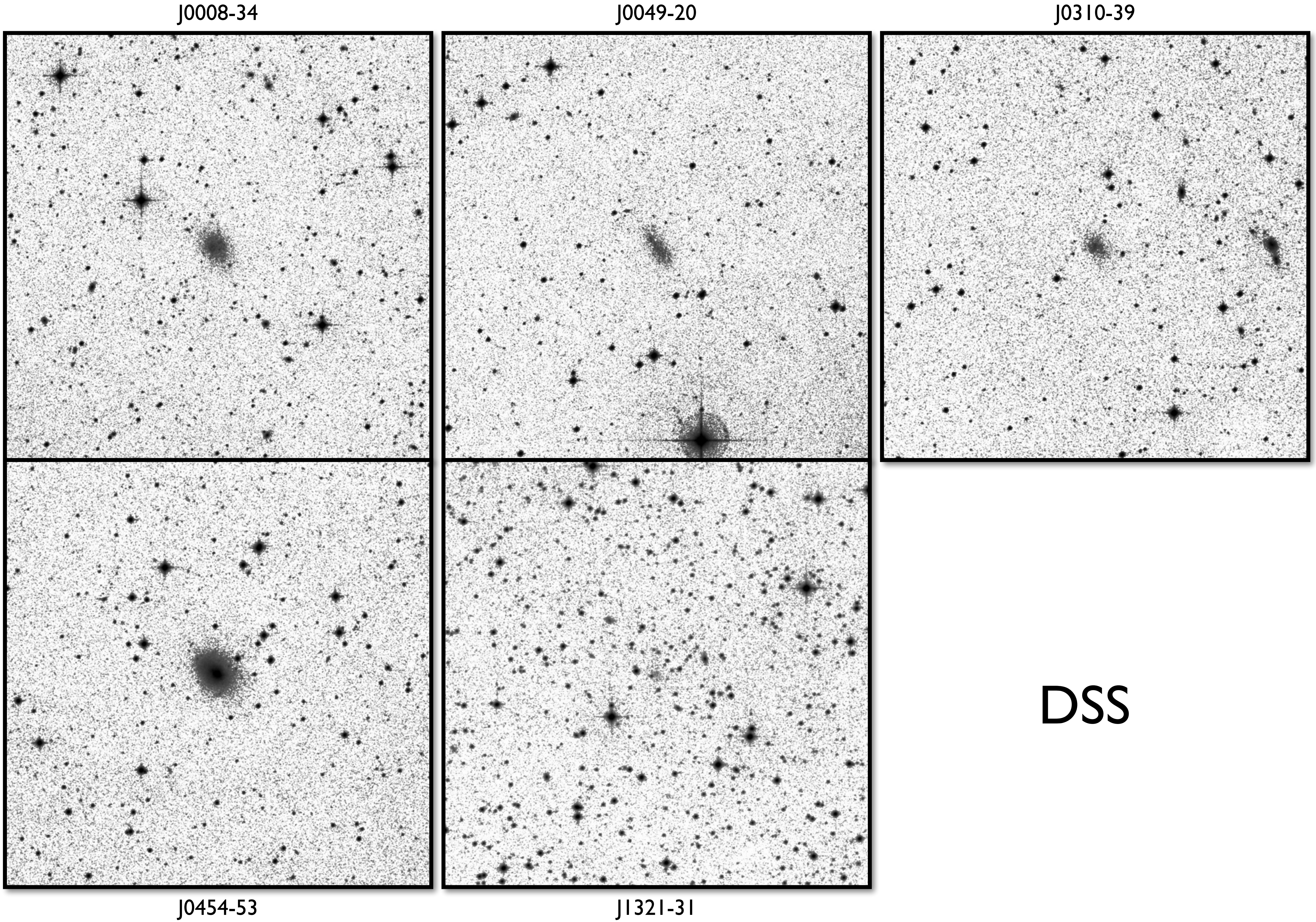
- Exclude galaxies with obvious quality issues
- Exclude interacting galaxies
- Best edge-on, face-on and intermediate inclination
- A range in surface brightness and SFR

Ranked the remaining

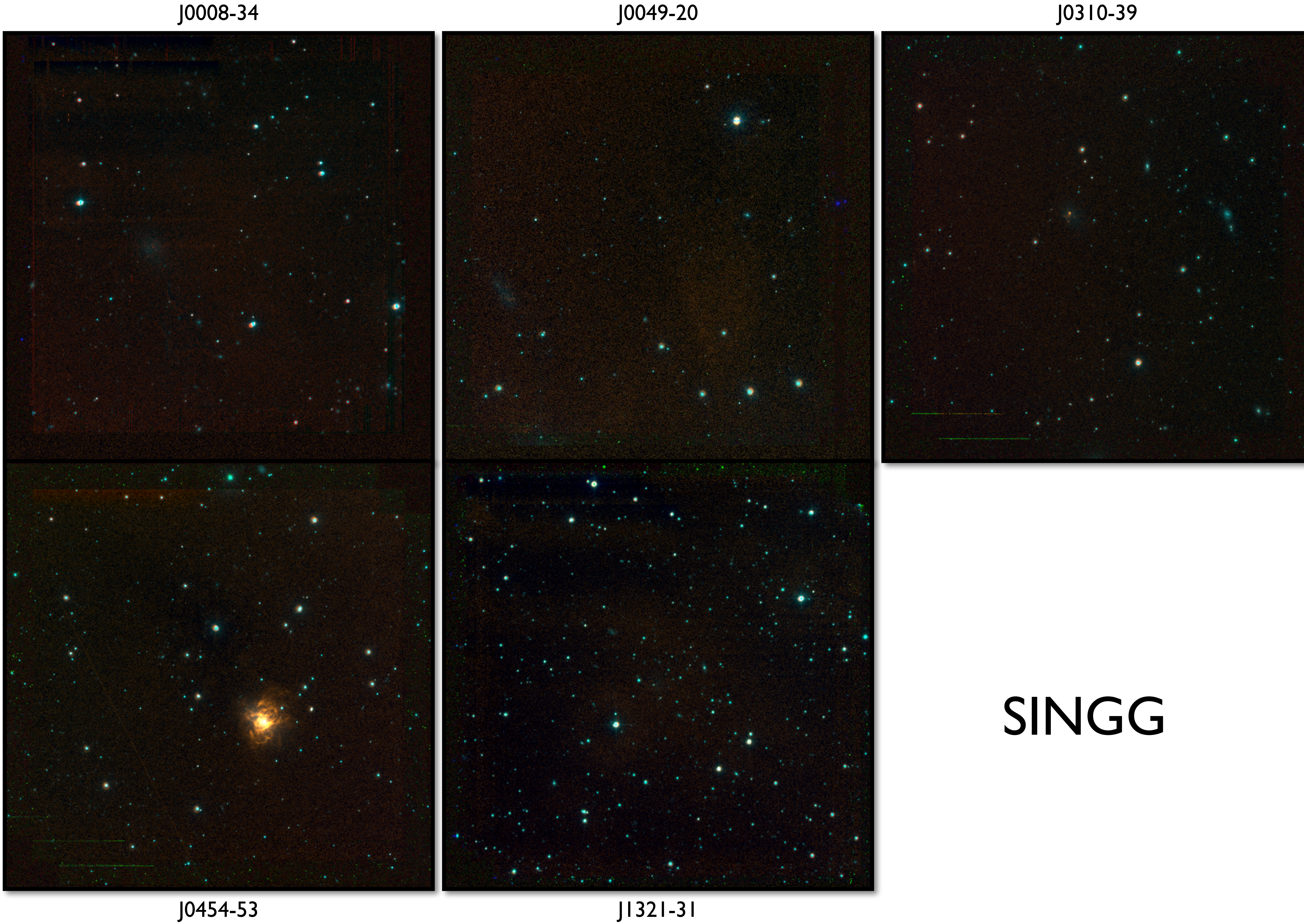
Selecting a sample



$6 < \log M_{HI} < 8$ group 1

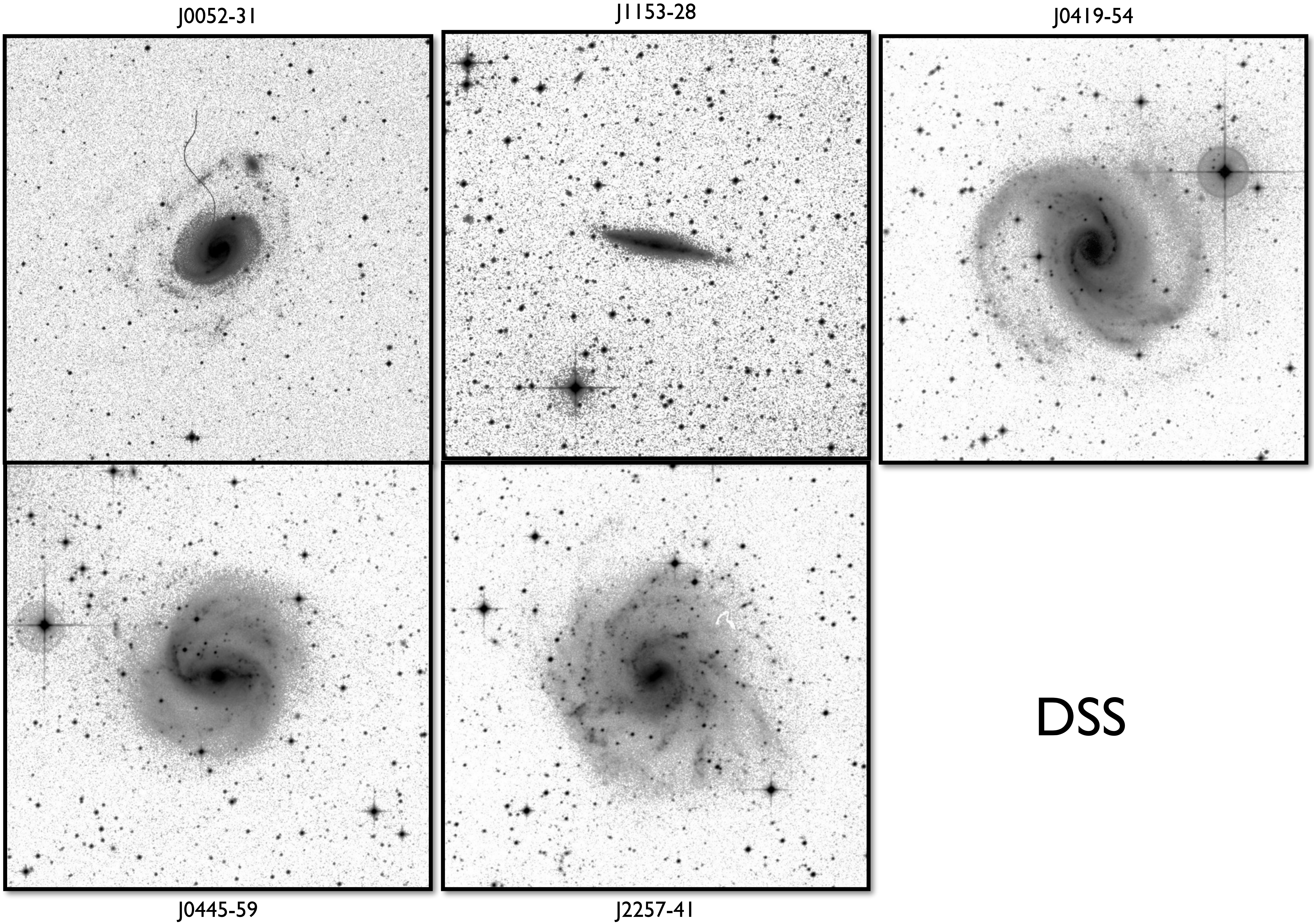


6 < $\log M_{HI}$ < 8 group 1



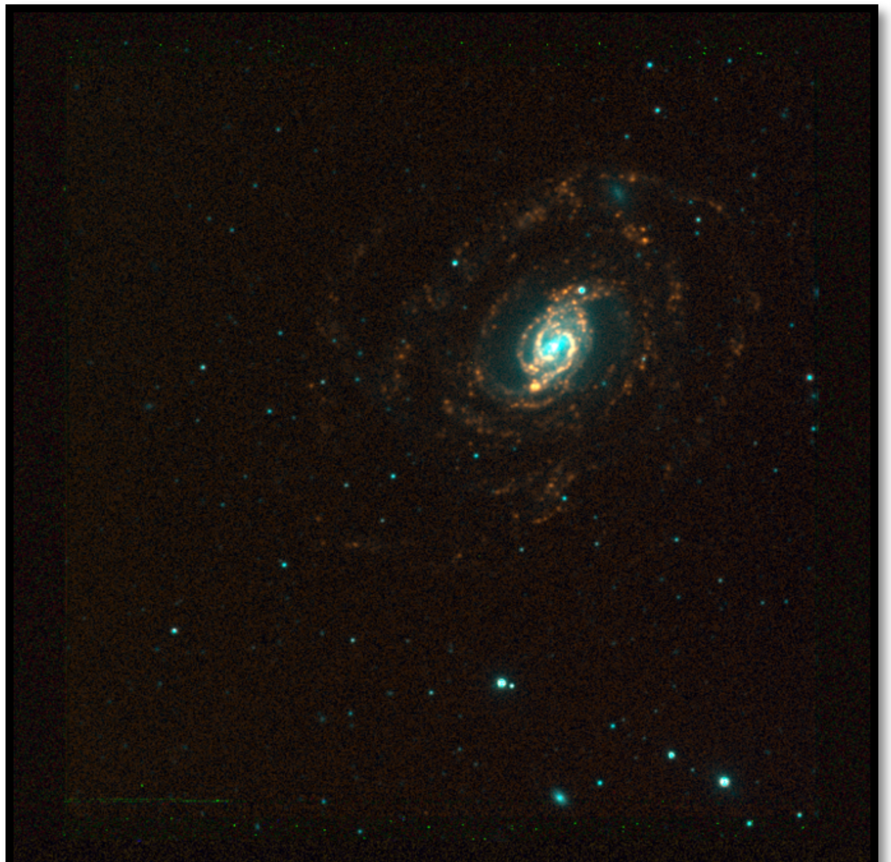
SINGG

$10 < \log M_{HI} < 10.5$ group 6



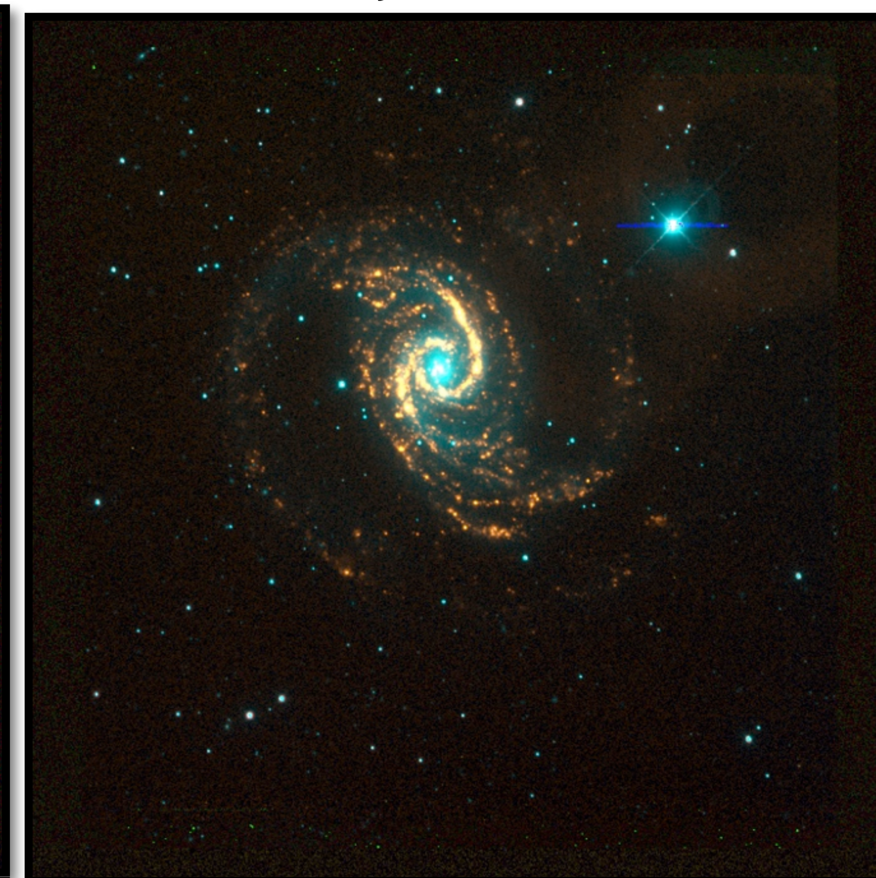
$10 < \log M_{HI} < 10.5$ group 6

J0052-31

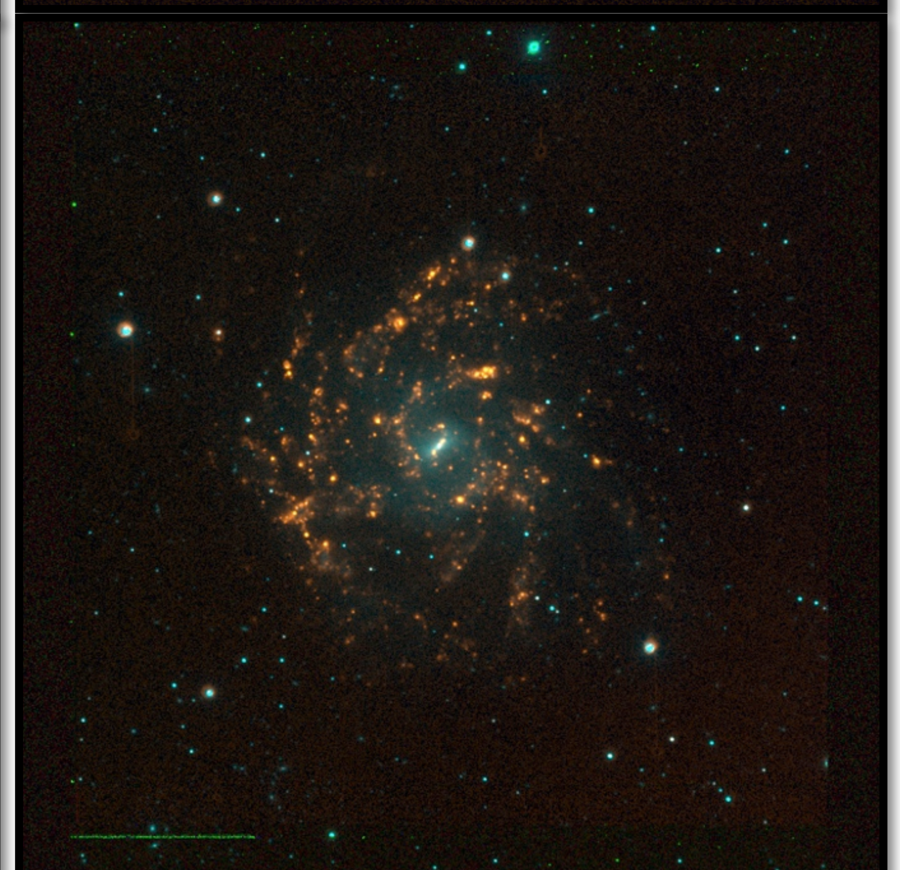


J1153-28

J0419-54



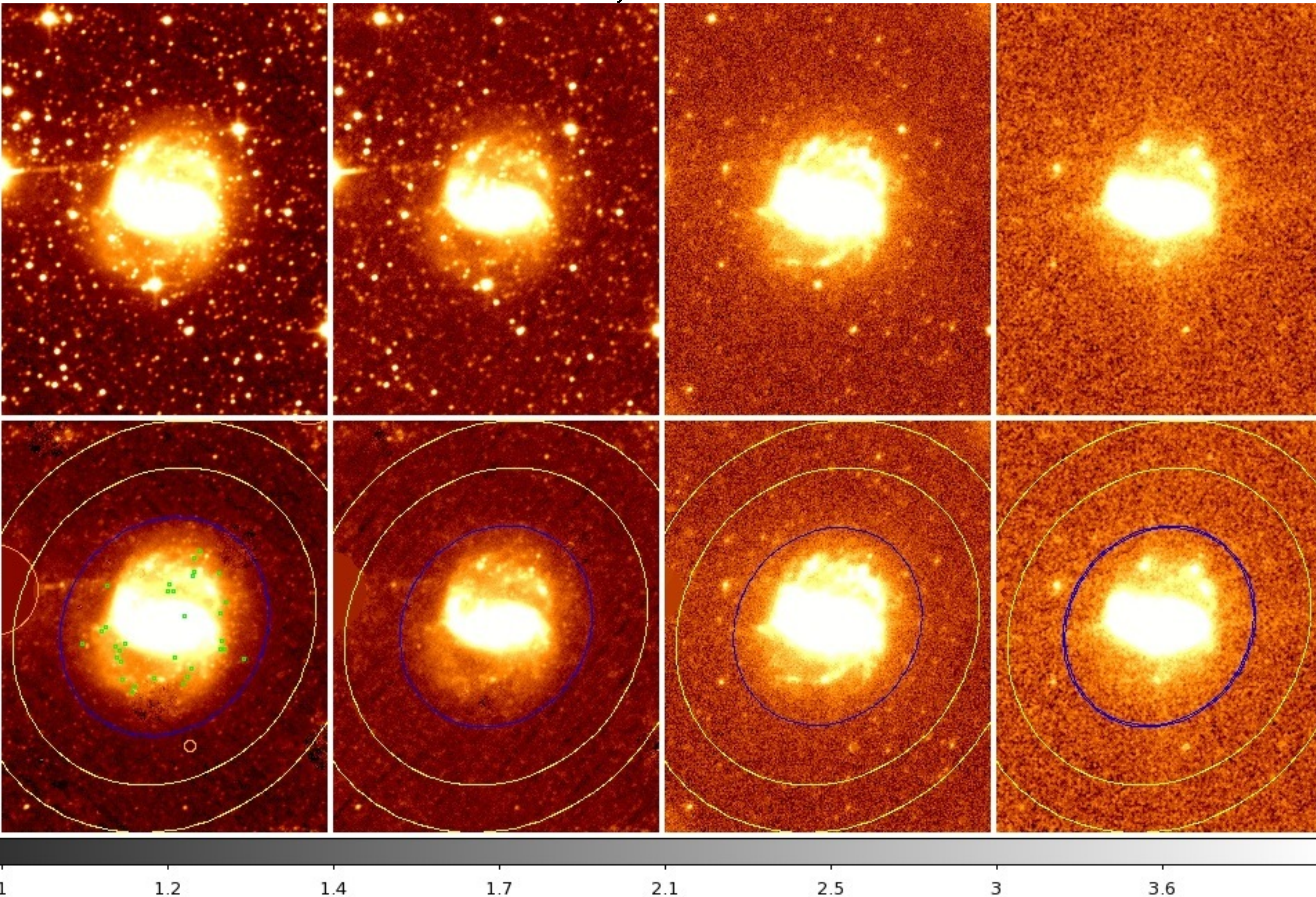
J0445-59



J2257-41

SINGG

J0445-59

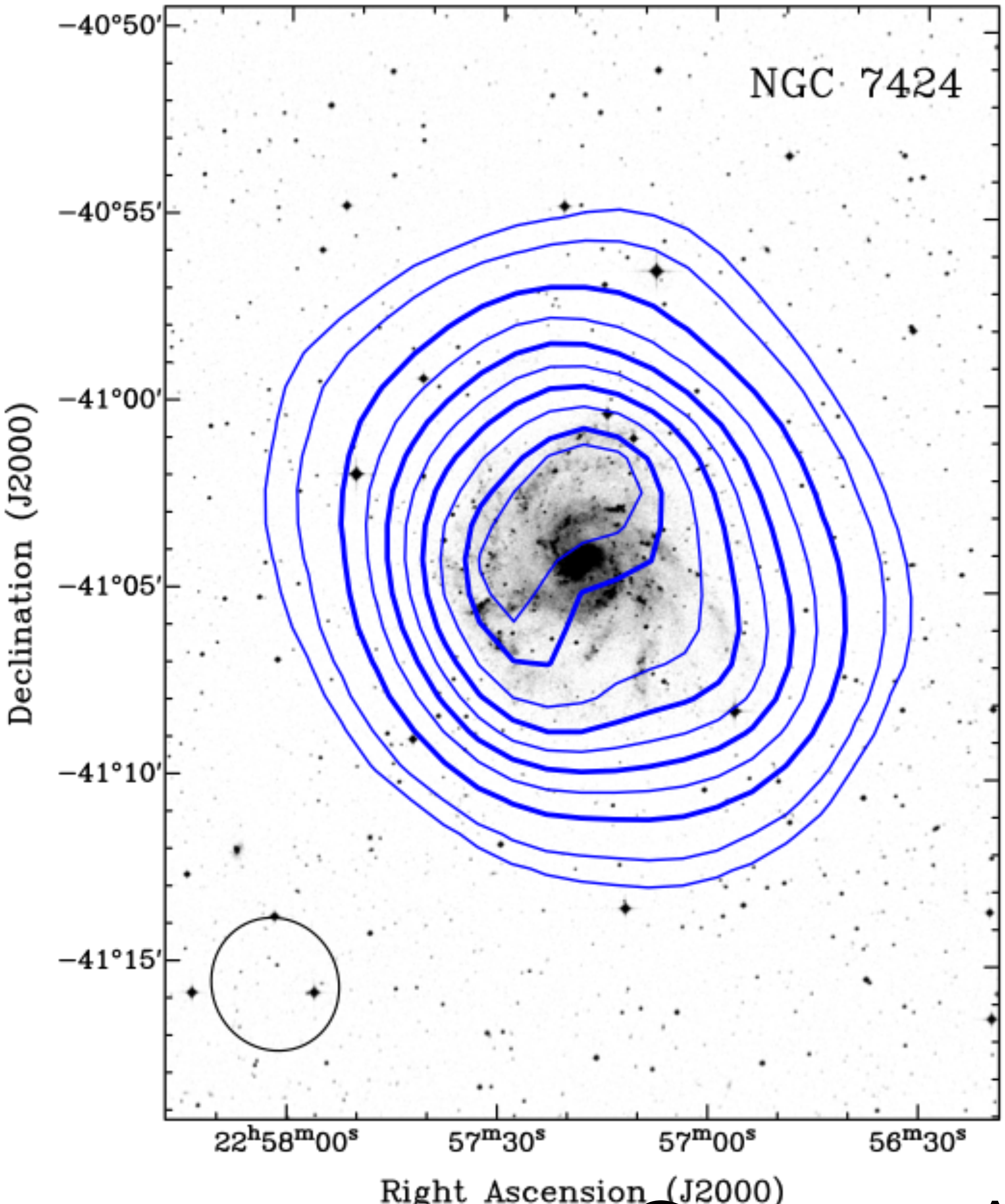


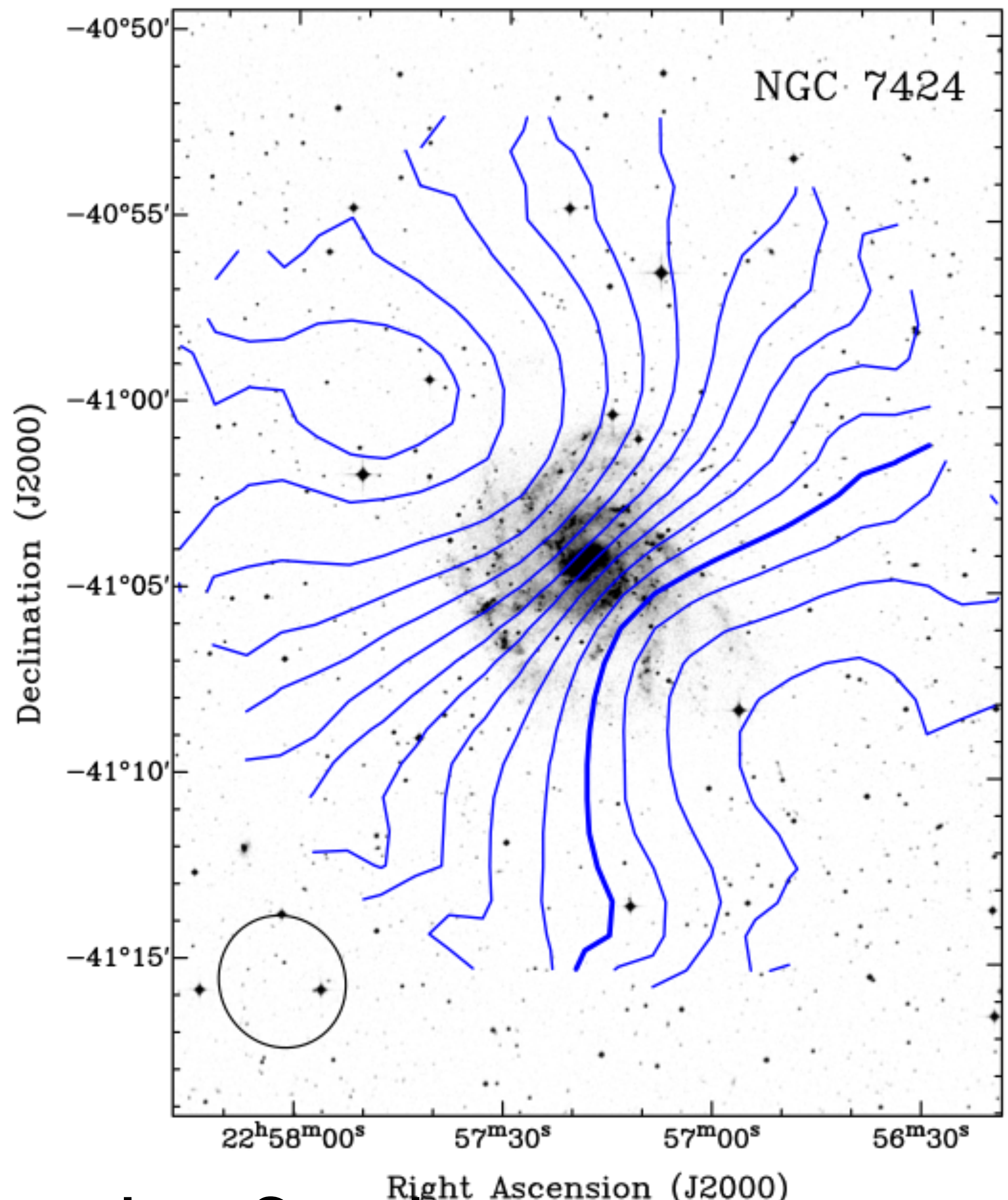
WISE, courtesy Tom Jarrett

KAT-7

KAT-7

KAT-7 first results





Courtesy Amidou Sorgho

Further info…

mhongoose.astron.nl