



CAASTRO
ARC CENTRE OF EXCELLENCE
FOR ALL-SKY ASTROPHYSICS

at low Galactic latitude

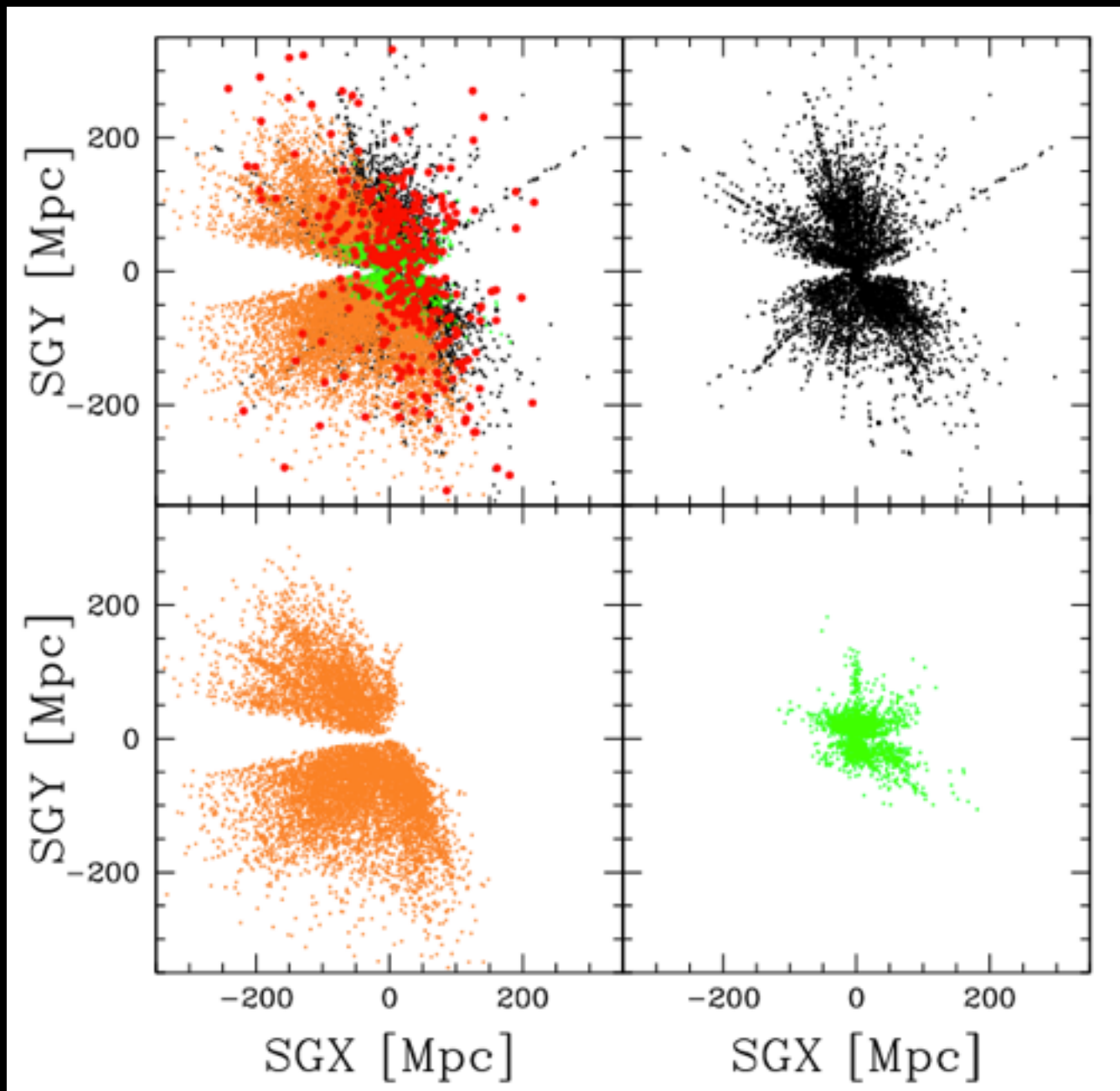
Peculiar velocity flow field ~~in the Zone of Avoidance~~ **Khaled Said**

Large Scale Structure and Galaxy Flows, Tuesday, July 5, 2016

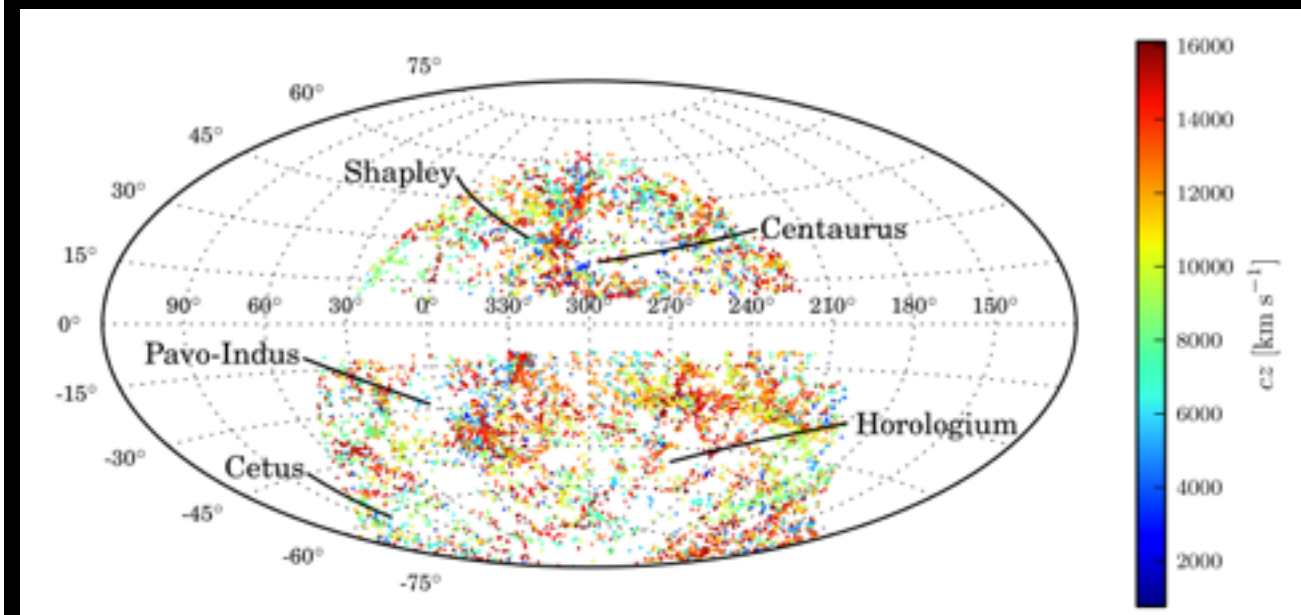
Supervisors: Renée C. Kraan-Korteweg & Thomas H. Jarrett (UCT)
Lister Staveley-Smith (ICRAR, UWA)

Collaborators: W. Williams, C. Springob, A. Schröder, W. van Driel & P. Henning

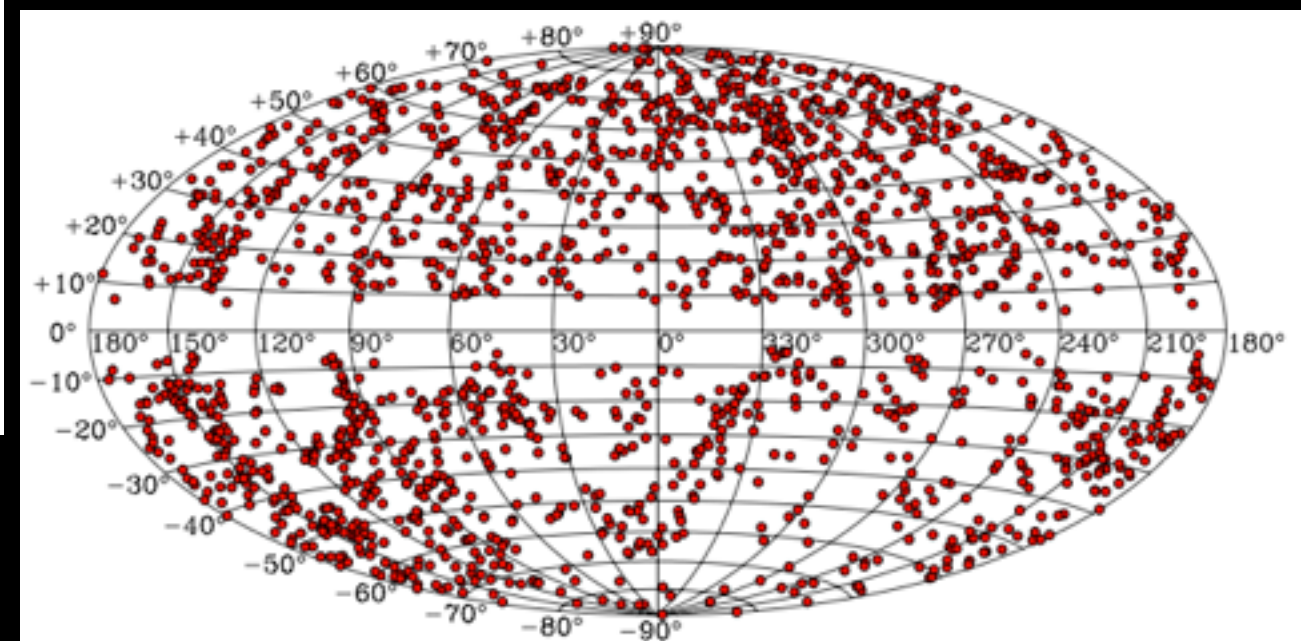
Motivation?



CF-3; Tully et al (2016)



6df; Springob et al (2014)



2MTF; Hong et al (2014)

How we map these galaxies?

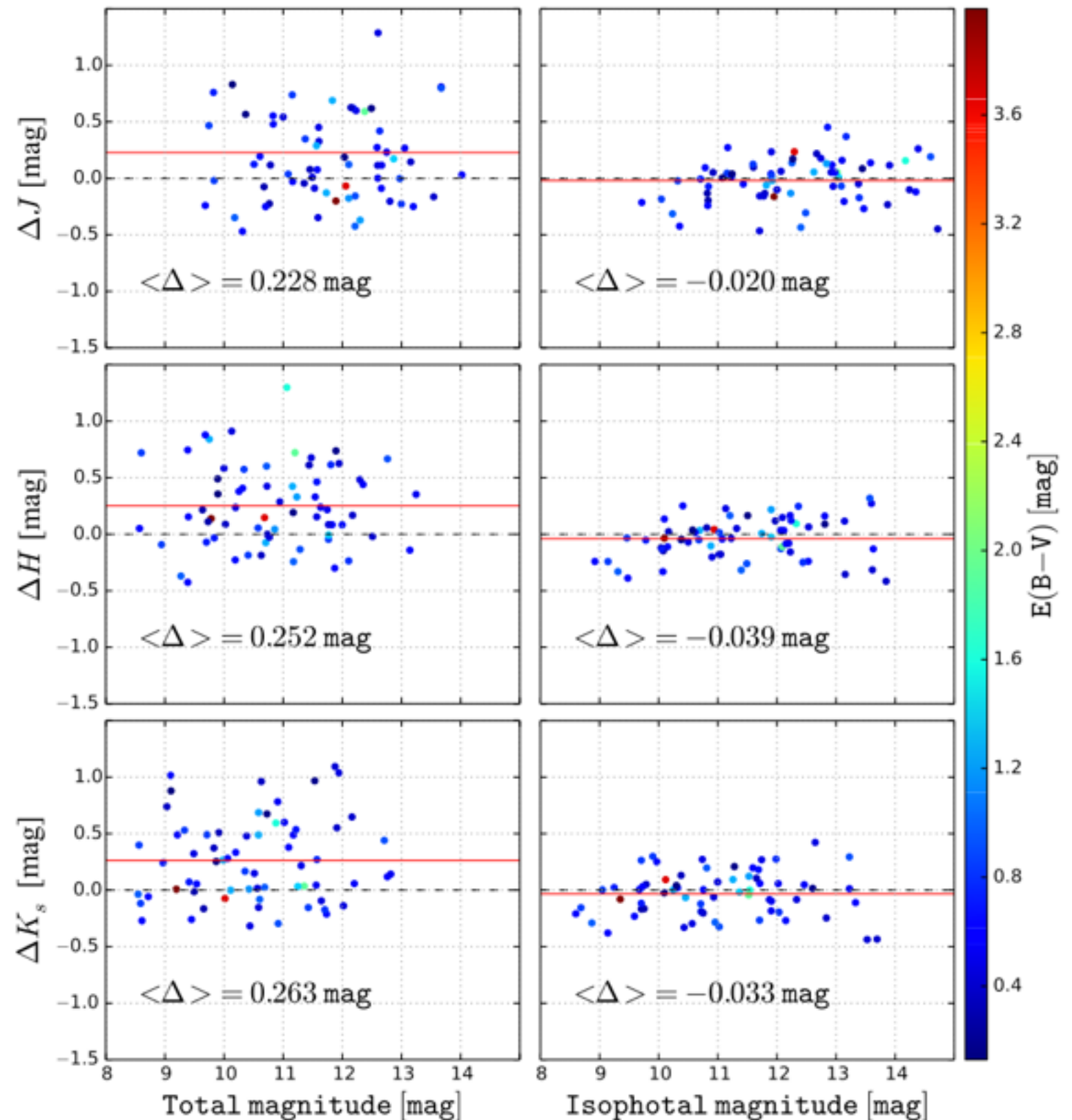
1. Calibrated TF relation to work in the ZOA
2. Follow-up NIR observations of HIZOA galaxies
3. 21-cm HI observations of the edge-on galaxies in the NIR imaging
4. Measuring distances and peculiar velocities

1. Calibrate TF relation to work in the ZoA

Why isophotal and not total magnitude?

- Depth of 2MASS survey.
- IRSF (0.45"/pix) & 2MASS (2"/pix)
- Difficulty to determine total magnitude in ZoA even with IRSF survey.
- High offsets between 2MASS and IRSF in total magnitude (create artificial peculiar velocity).
- Sample of 66 galaxies in ZoA.

$$\Delta m = m(2\text{MASS}) - m(\text{IRSF})$$



Said, Kraan-Korteweg & Jarrett (2015)

1. Calibrate TF relation to work in the ZoA

Sample of 888 galaxies used in 2MTF. I (Masters et al. 2008)

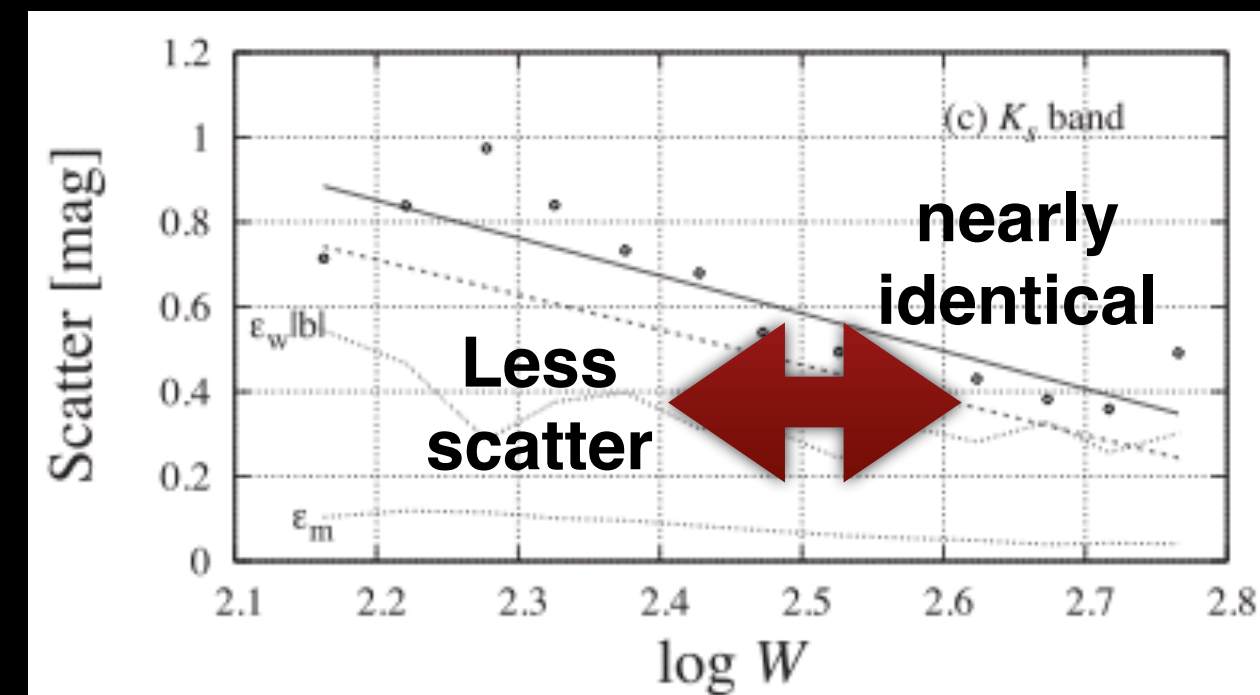
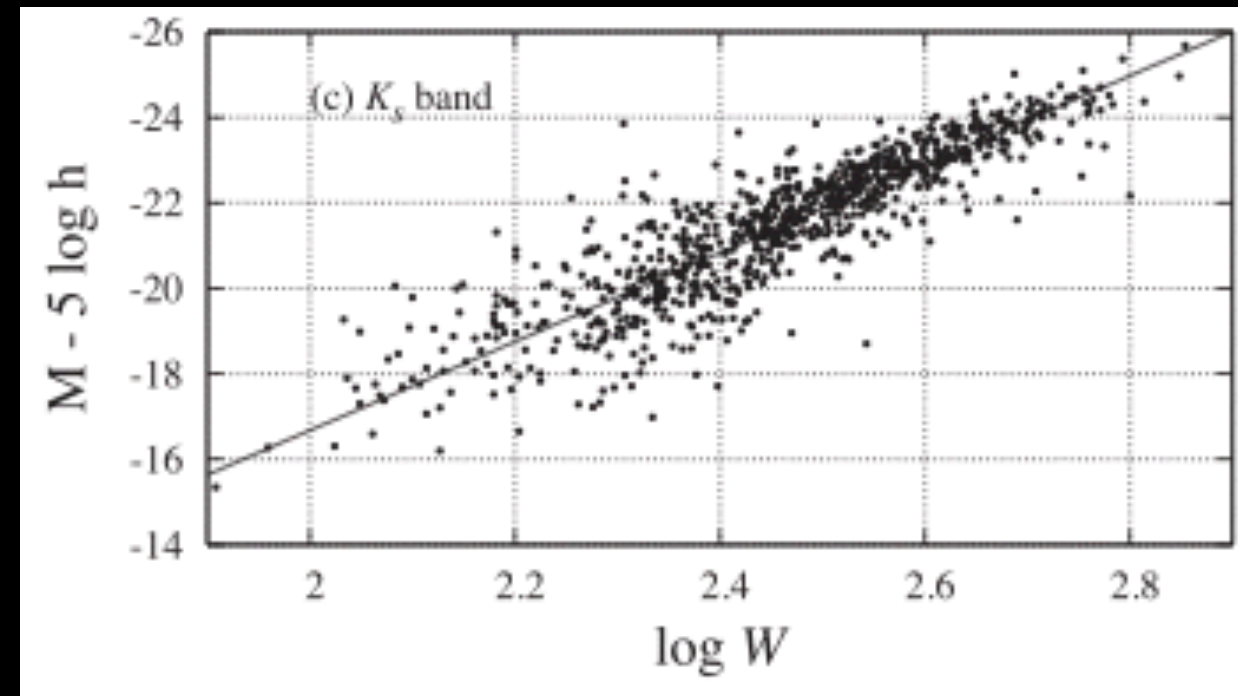
Bias correction:

1. Morphological correction.
2. Incompleteness Bias.
3. Cluster Size Bias.
 - Mean Distances to Cluster.
 - Sample Incompleteness.
4. Cluster Peculiar velocity.

K-Correction:

Internal Extinction:

Galactic Extinction:



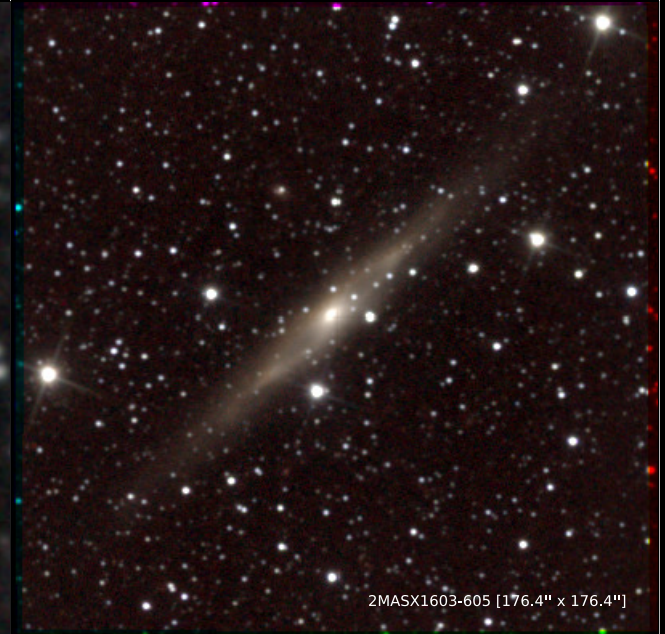
Said, Kraan-Korteweg & Jarrett (2015)

Outline!

1. Calibrated TF relation to work in the ZOA 
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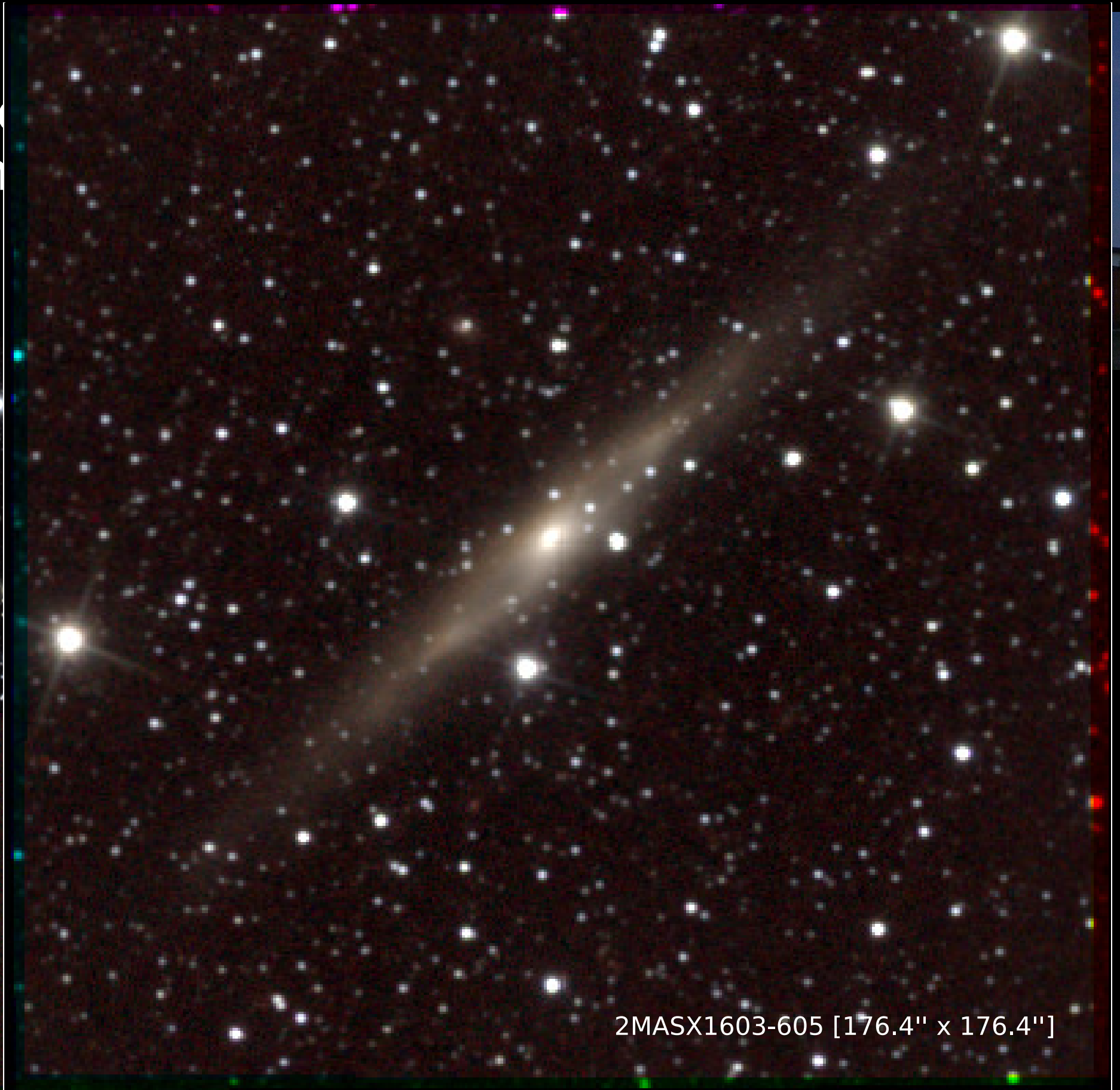
2. Follow-up NIR imaging of HIZOA

A total of 12 weeks were allocated exclusively to this project.



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2. Follow-up NIR imaging of HIZOA

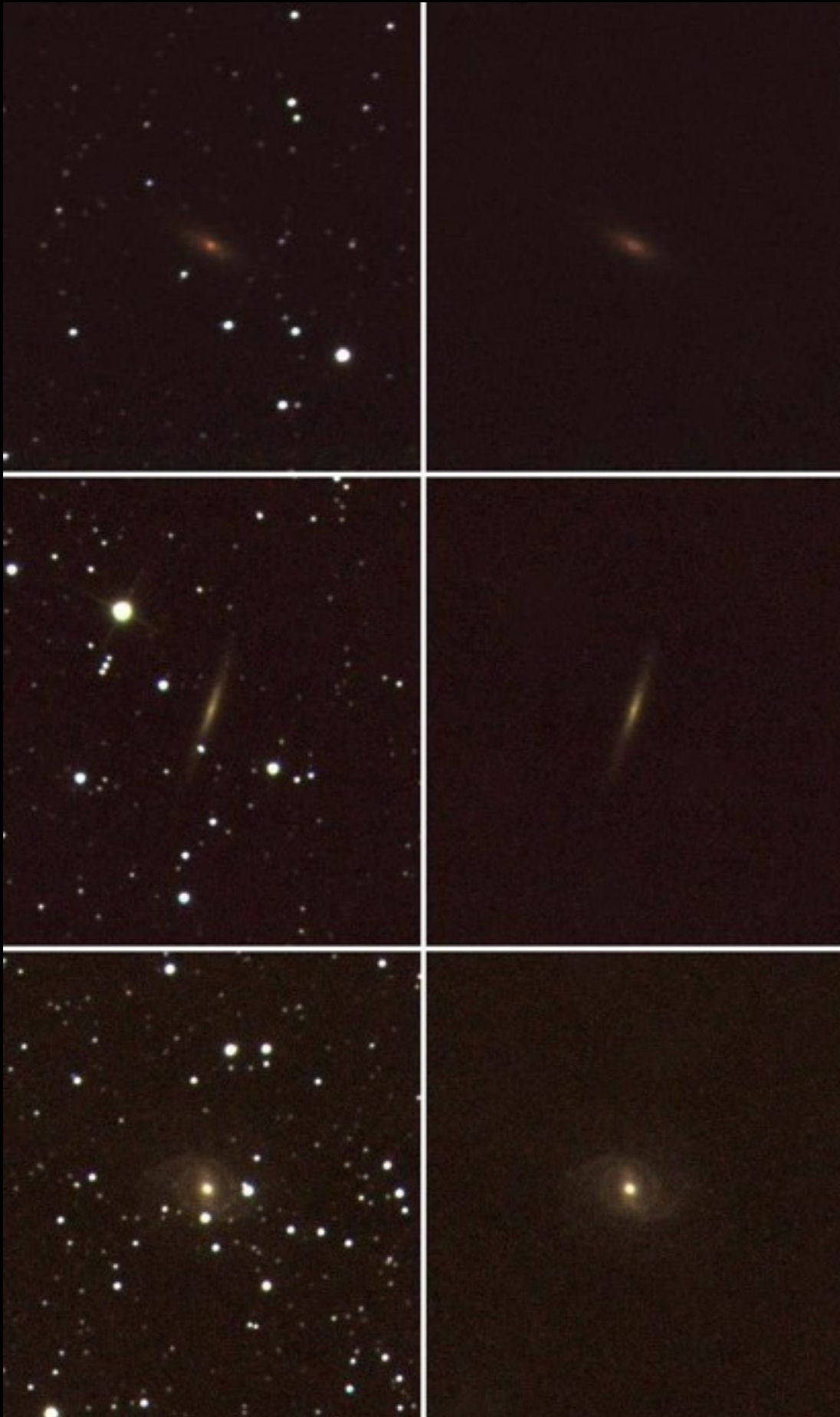
Photometry:

1. Find the galaxy.
2. Run star-subtraction.
3. Run photometry pipe-line.

Results:

ellipticity, isophotal radius,
isophotal magnitude, central
surface brightness, stellar
density.

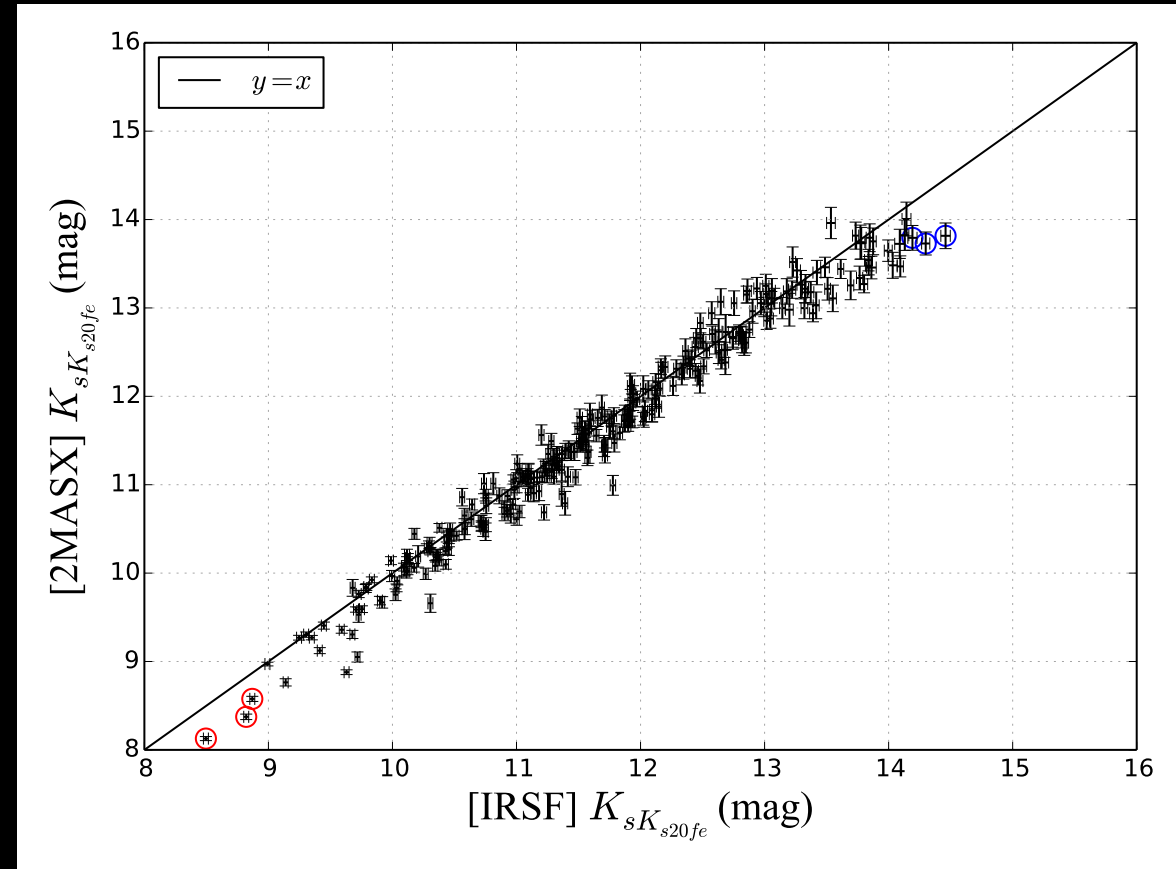
Said et al., submitted



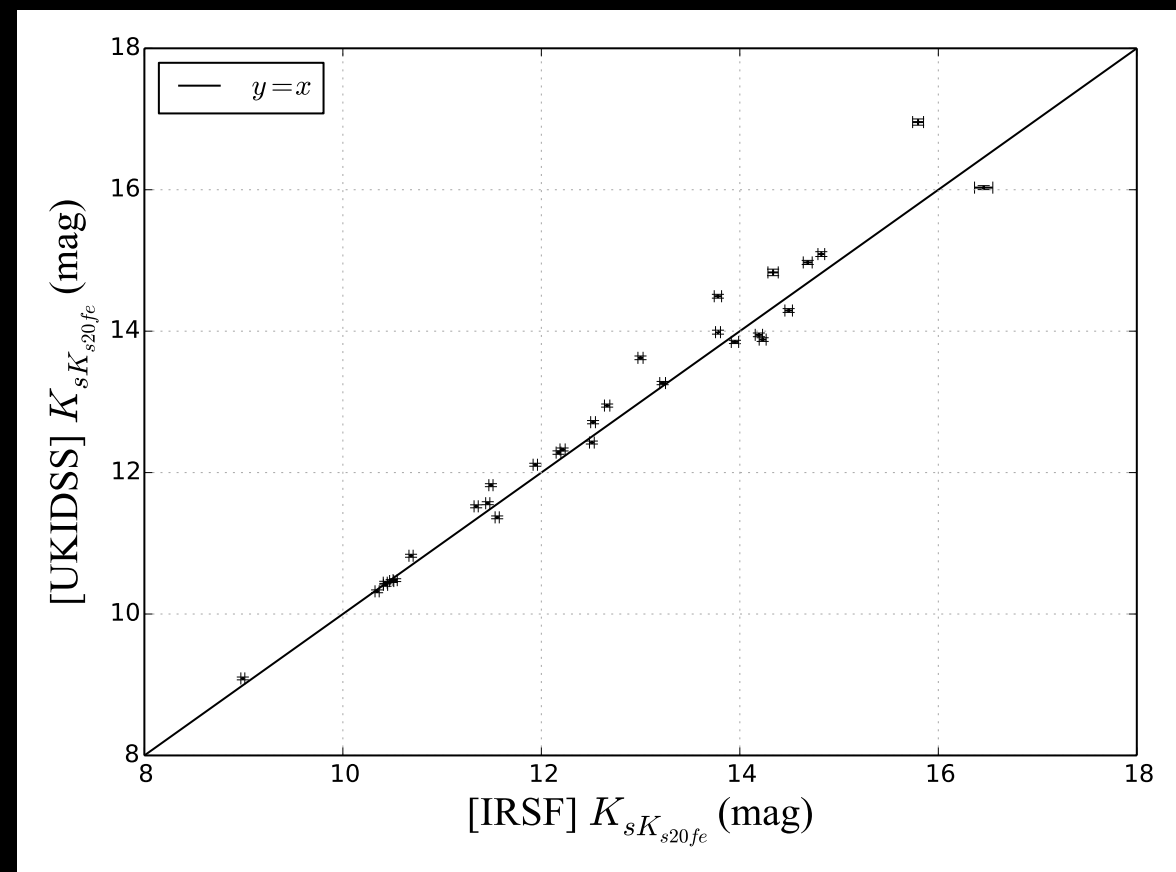
2. Follow-up NIR imaging of HIZOA

Comparisons

1. IRSF vs. 2MASS (285 galaxies)



2. IRSF vs. UKIDSS (30 galaxies; NE)

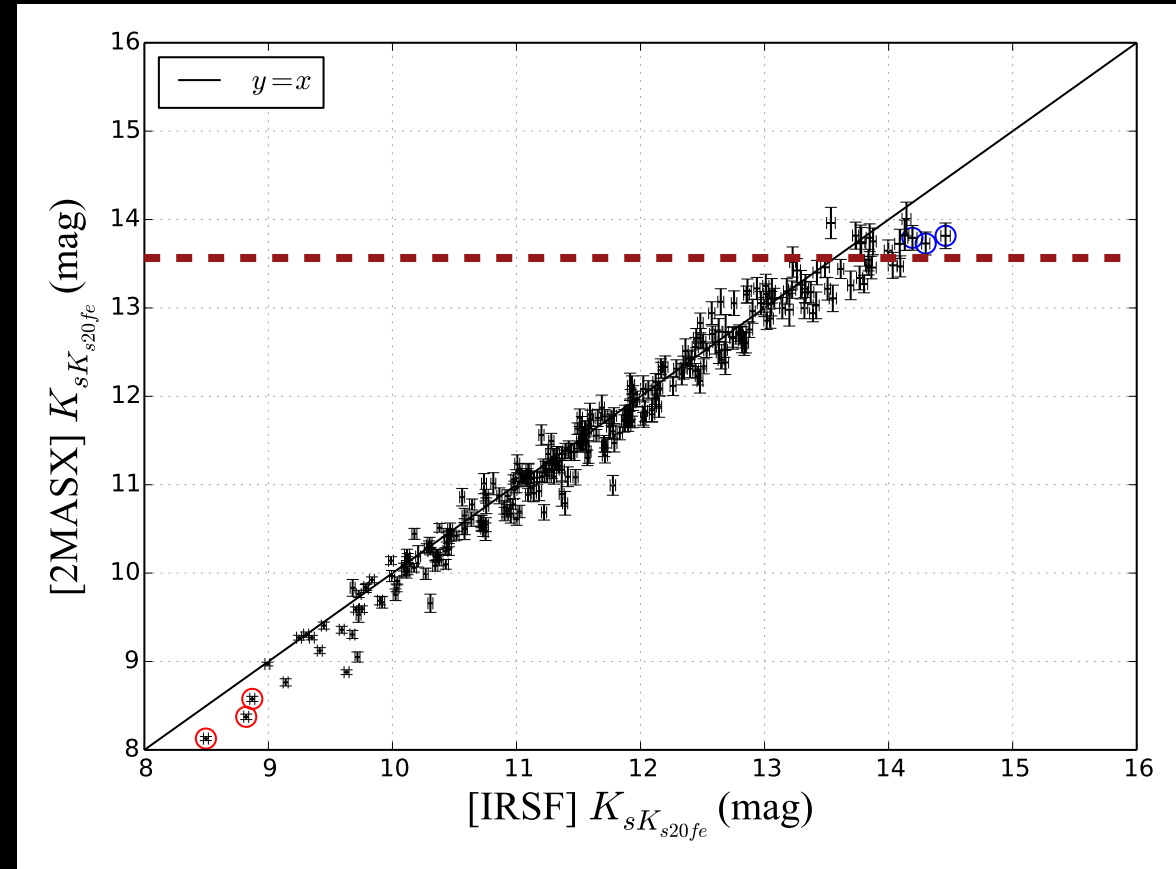


Said et al., submitted

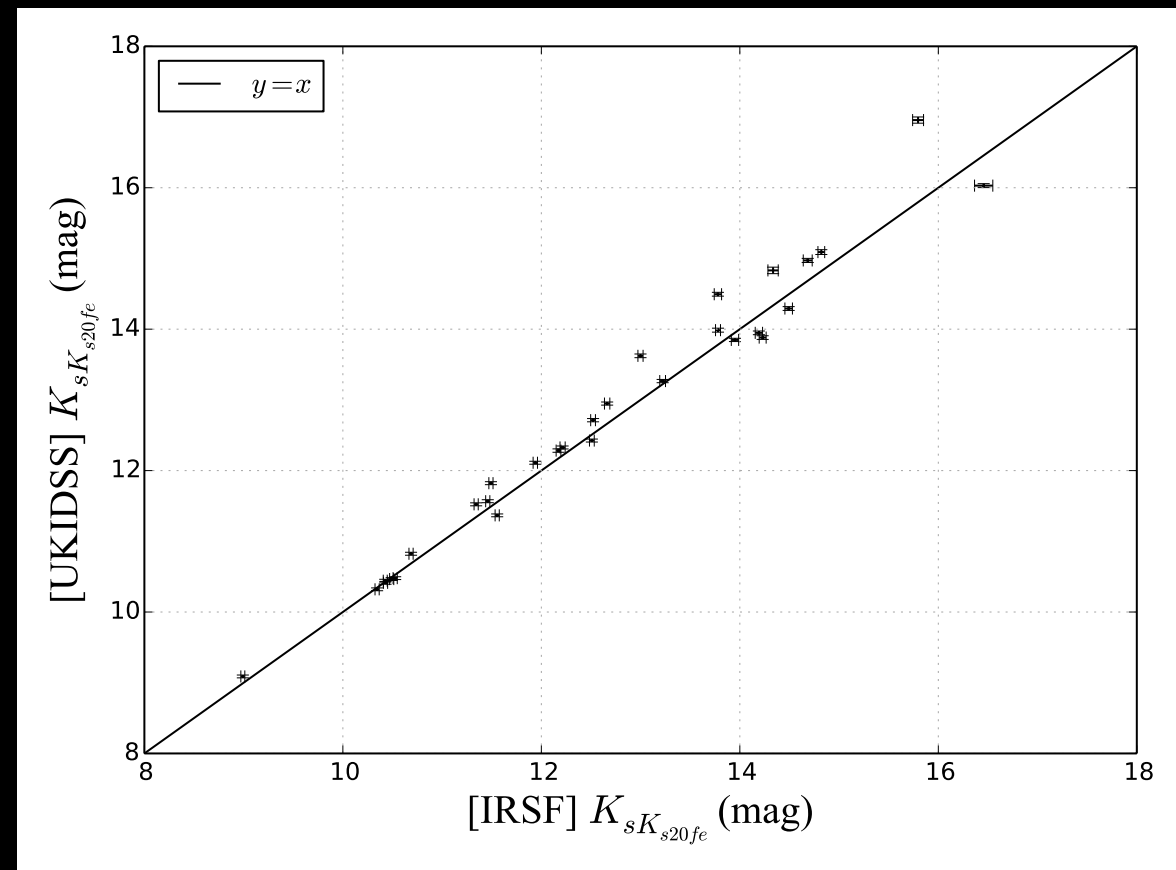
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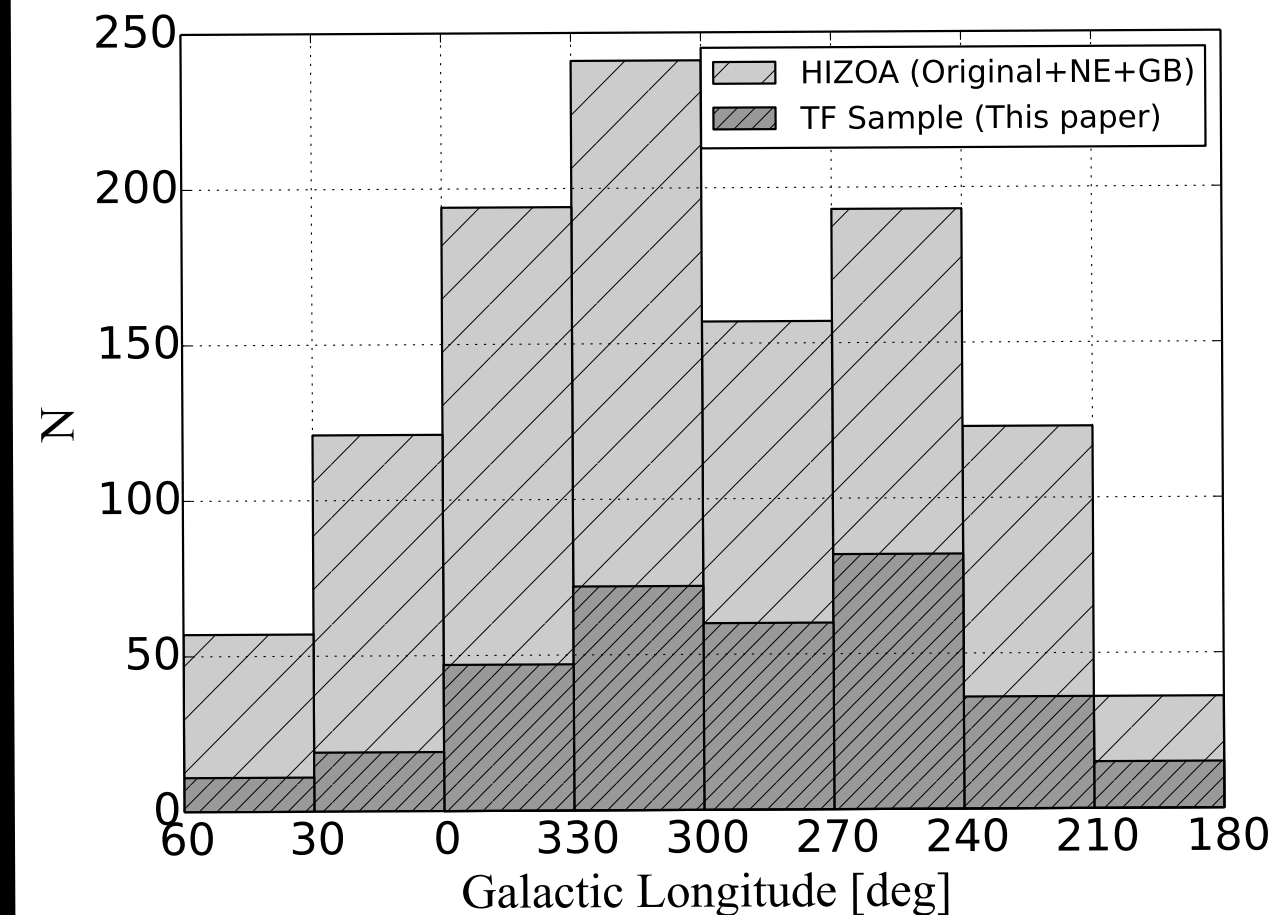
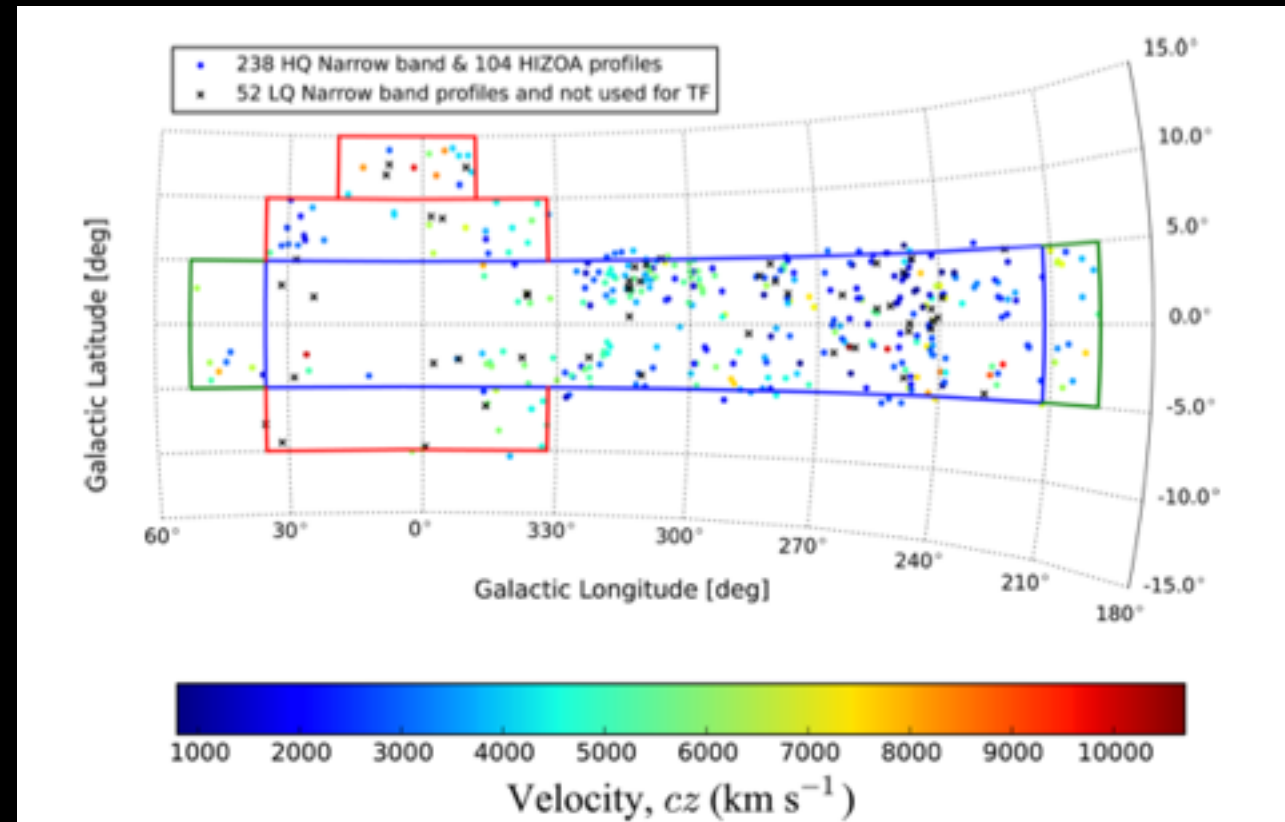
3. 21cm HI Follow-up of the NIR follow-up of the HIZOA

- 300 hours on Parkes radio telescope
- High Quality (HQ) narrow-band observations of 238 galaxies and 104 additional HIZOA galaxies with HQ H I profiles

Blue >>> Staveley-Smith et al (2016)

Green >>> Donley et al (2005)

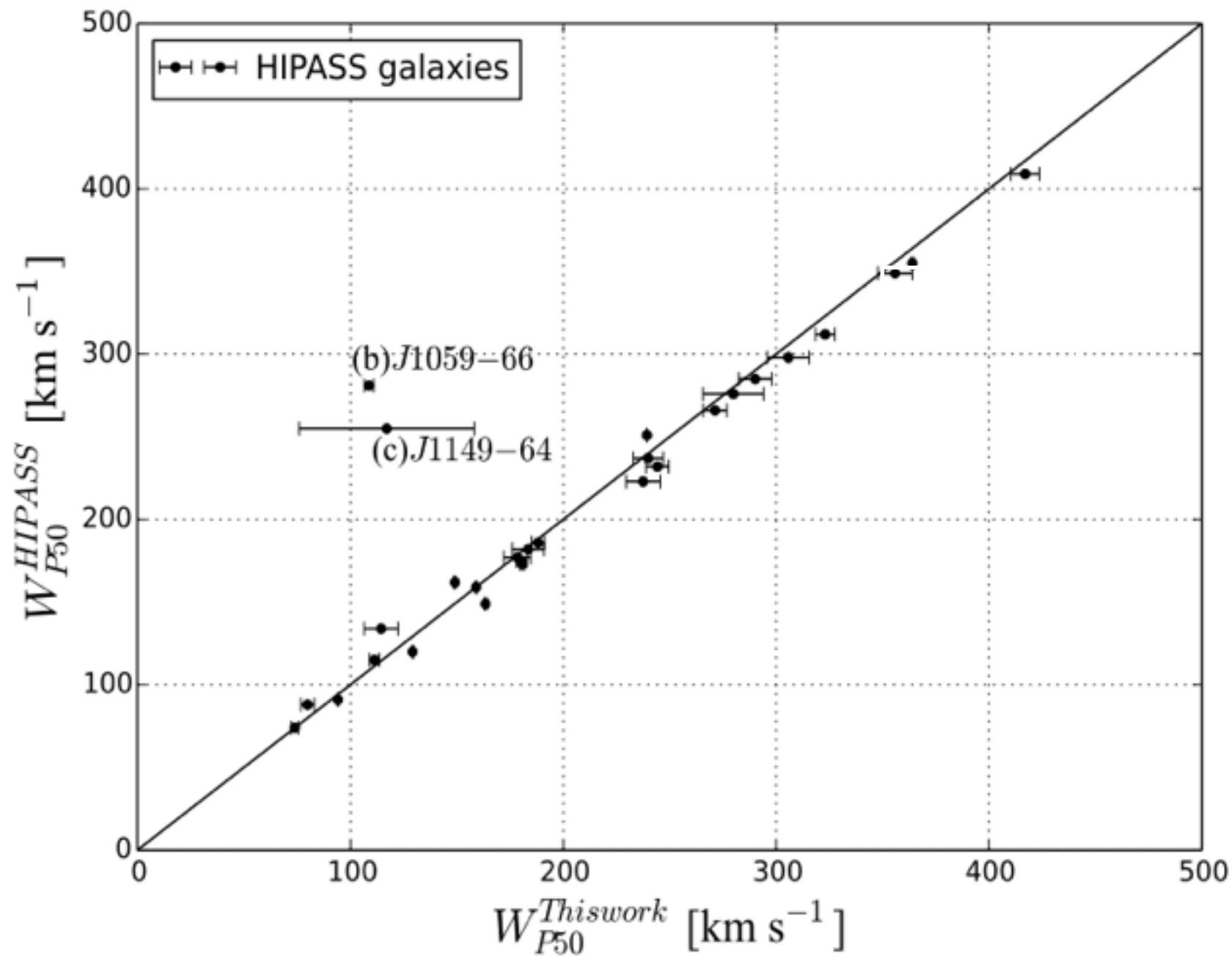
Red >>> Kraan-Korteweg (in prep.)



Said et al., (2016)

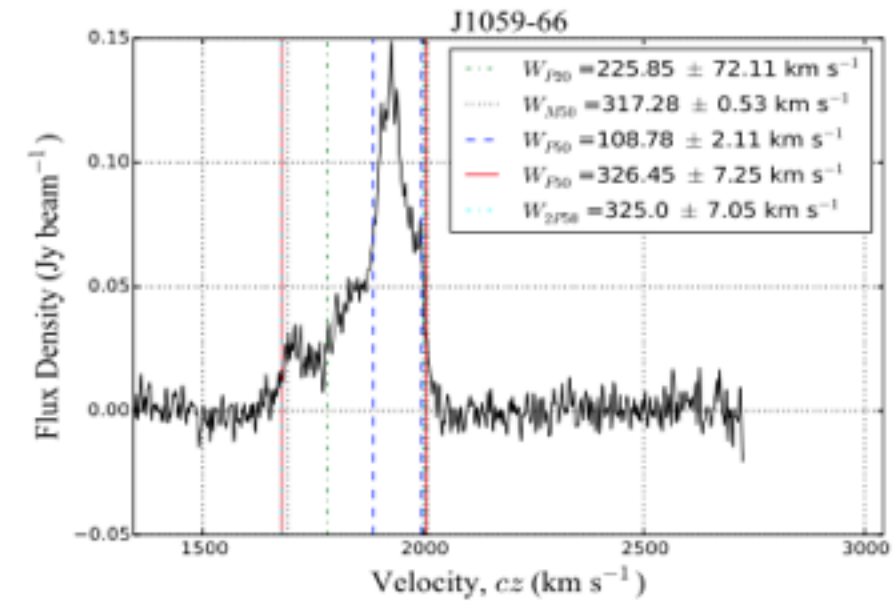
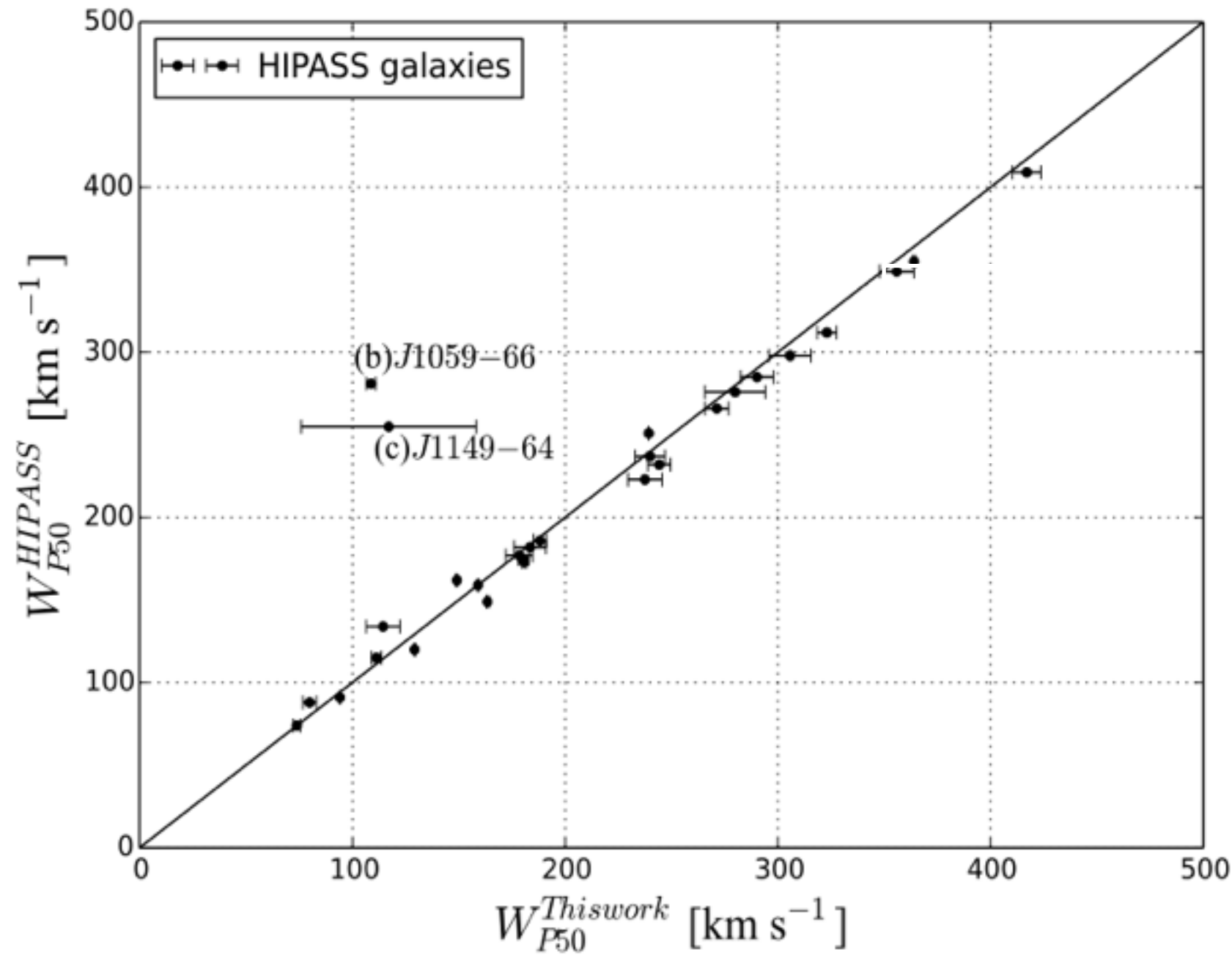
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Comparison

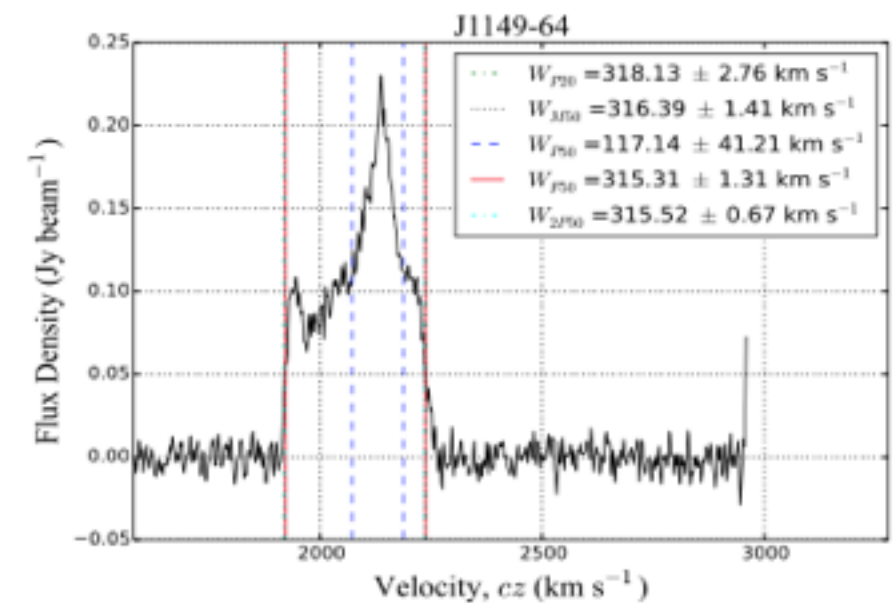


3. 21cm HI Follow-up of the NIR follow-up of the HIZOA




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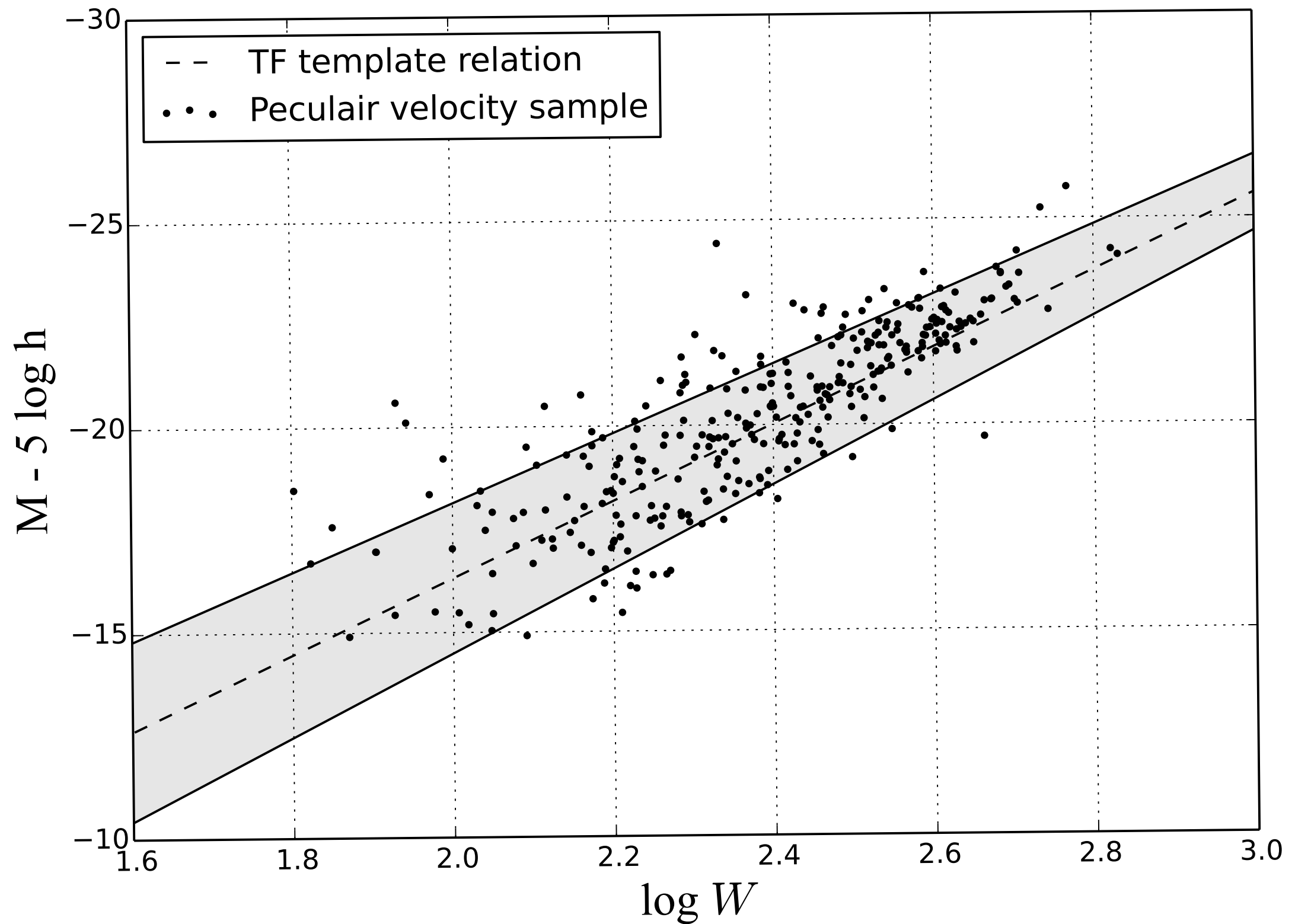
(b)



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4. Measuring Peculiar Velocities (PRELIMINARY)



in progress

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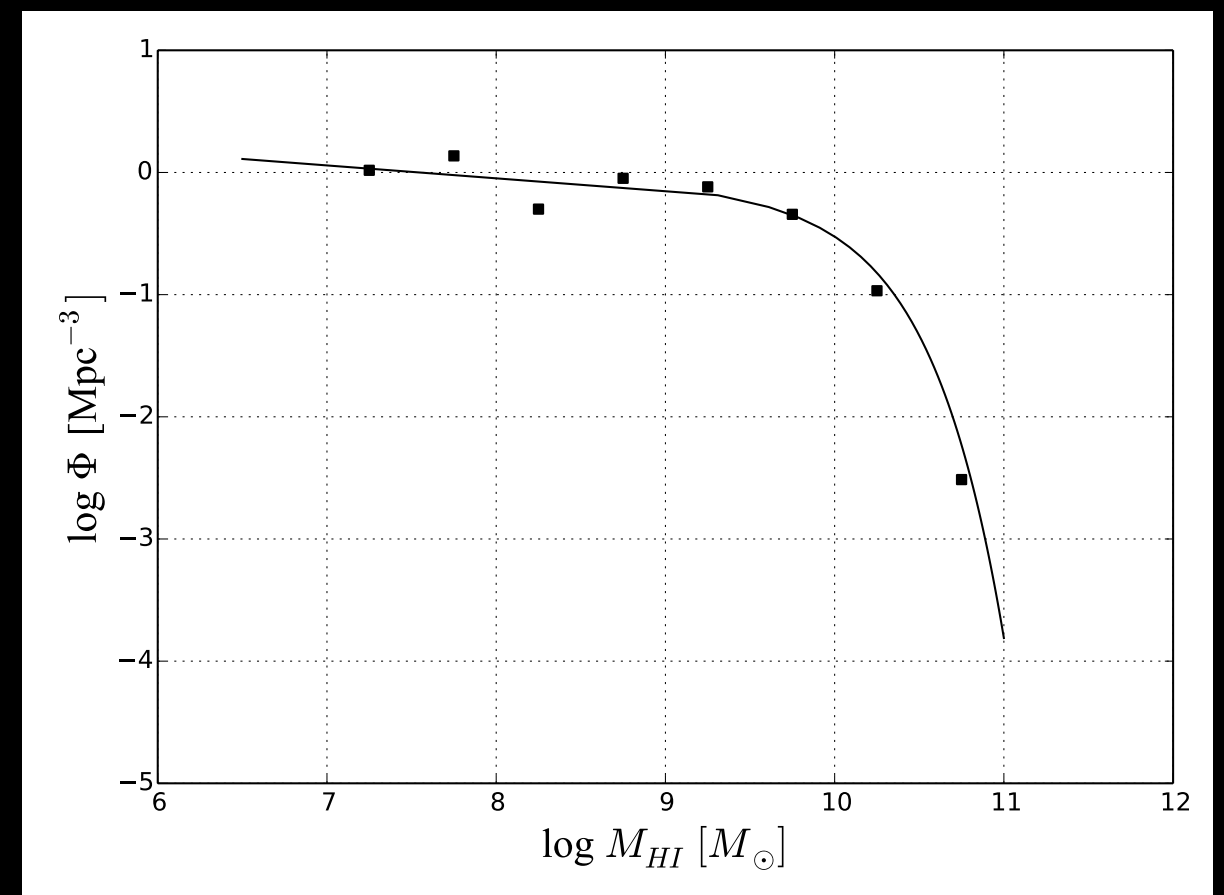
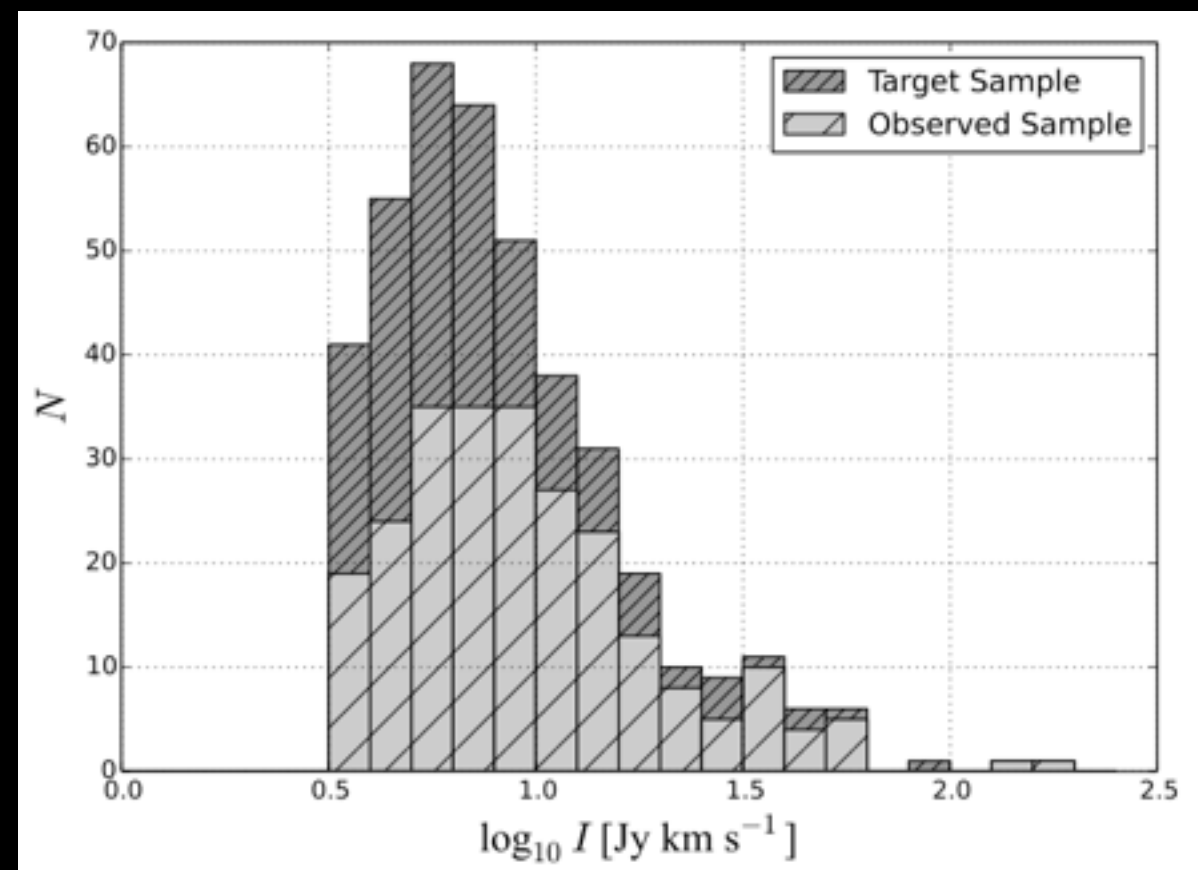
Same Method as in Springob et al. (6df;2014 & 2MTF; 2015)

Selection bias

- Inhomogeneous Malmquist bias (**negligible**)
- homogeneous Malmquist bias

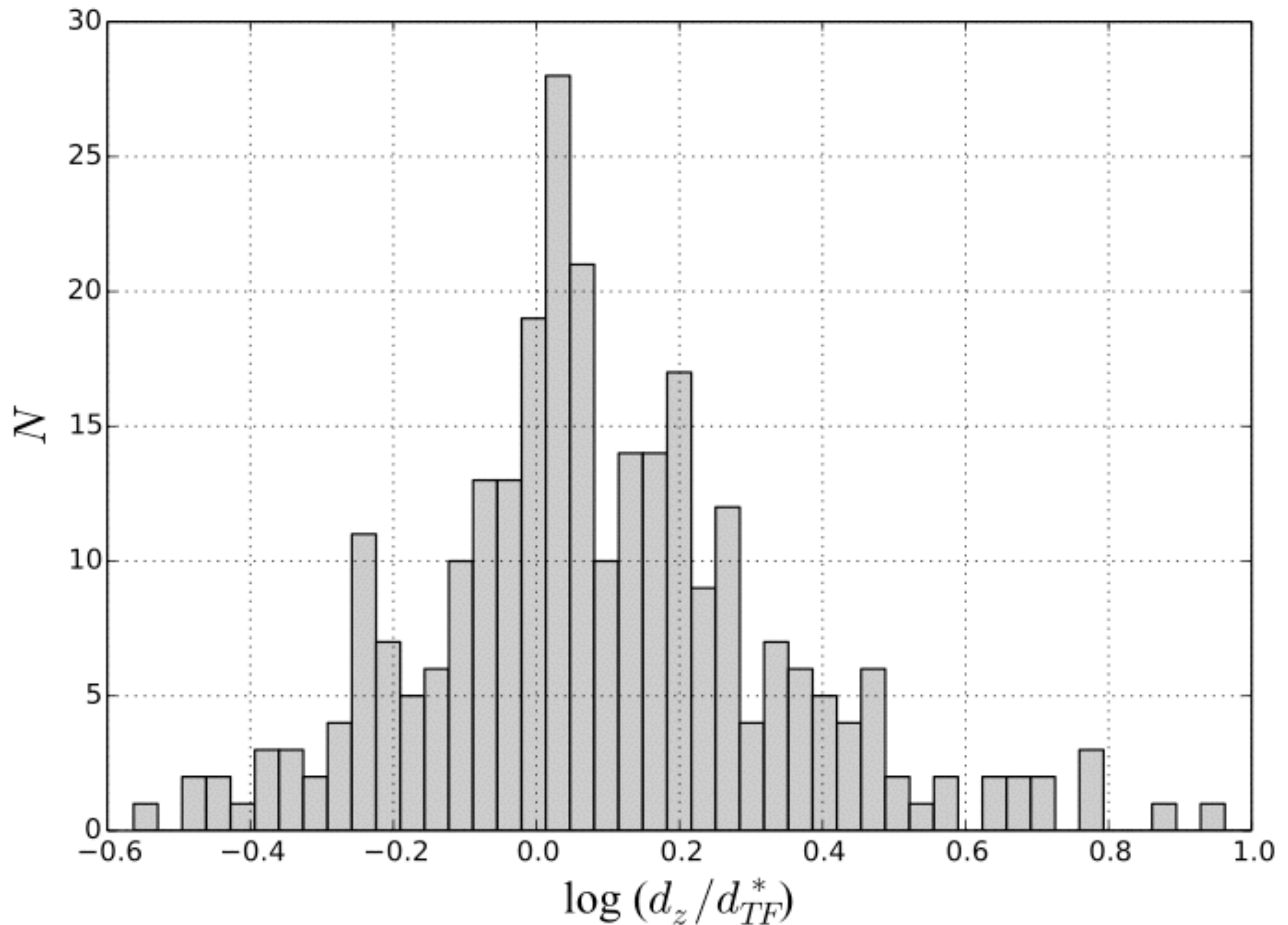
A. volume effect

B. selection effect



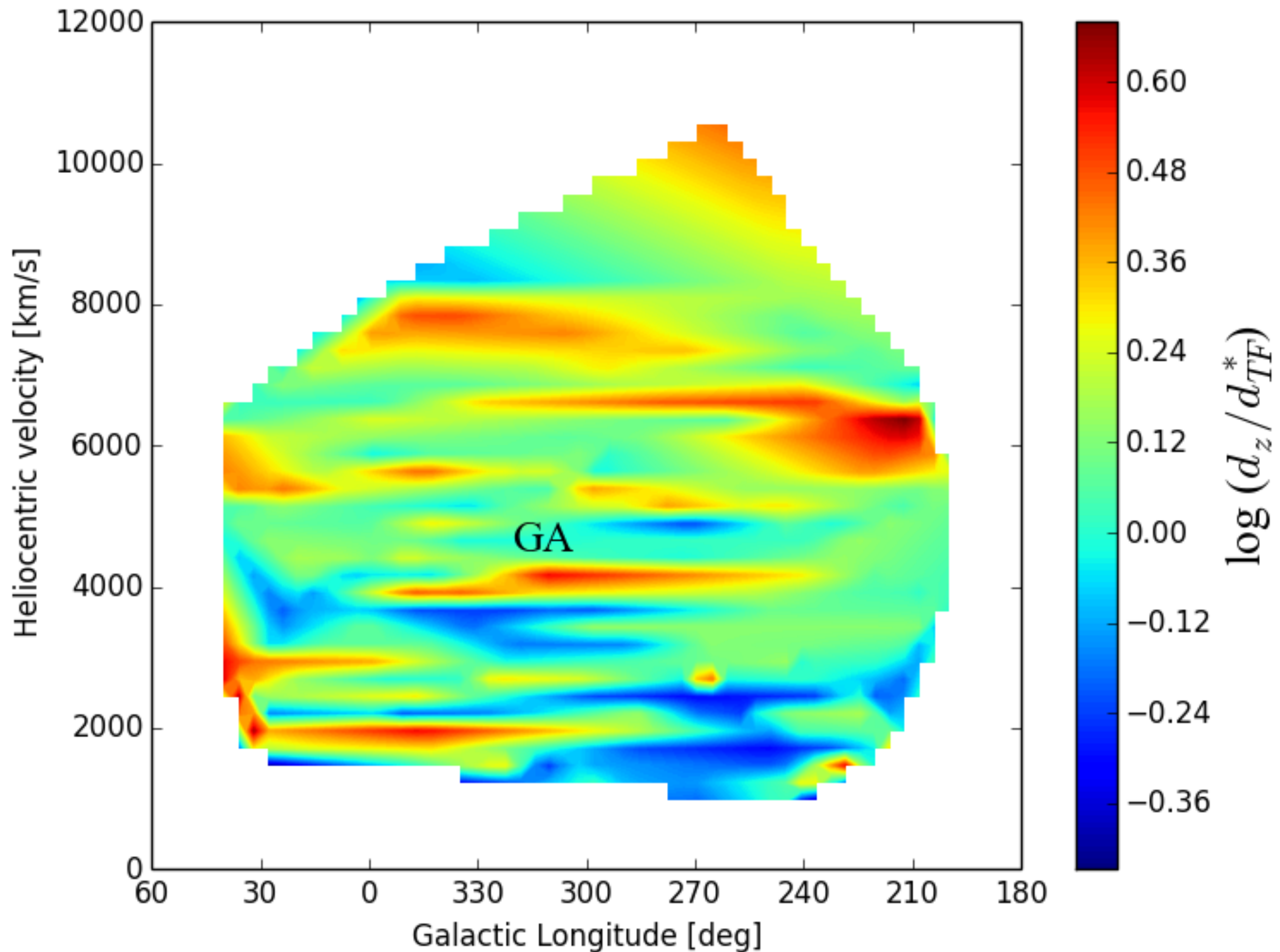
work in progress

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in progress

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in progress

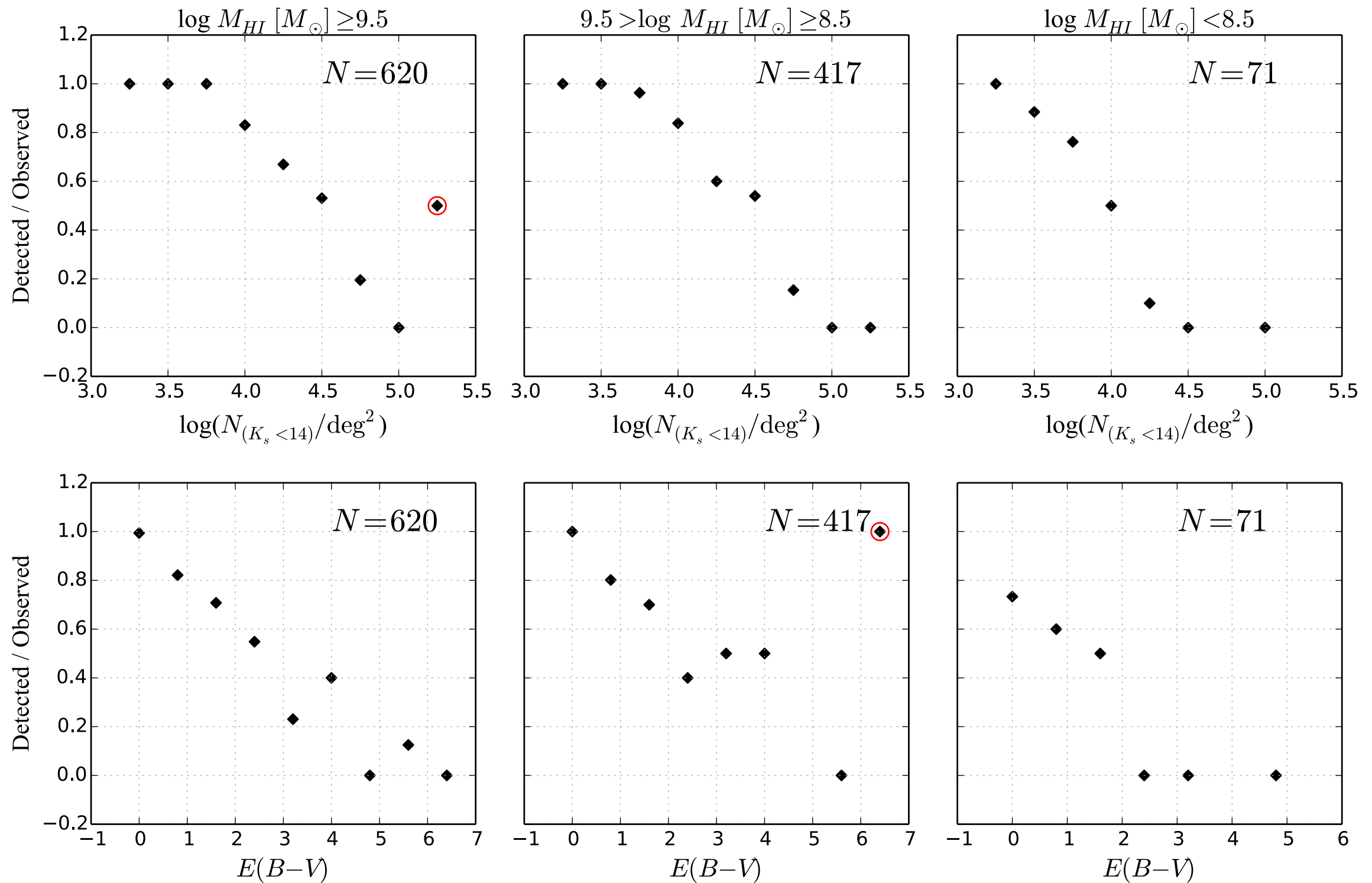
Summary & take home messages

- T-F Template relation (Said et al. 2015, MNRAS, 447, 1618); less scatter than 2MTF. I (for small galaxies, $\log W < 2.5$)
- NIR observations using the IRSF telescope in SA (Said et al., submitted); NIR photometry for over a thousand galaxies in the ZOA (catalog and Fits files will be available)
- 21cm radio observation using Parkes telescope in AU (Said et al. 2016, MNRAS, 457, 2366); 342 galaxies with $S/N > 5$ (catalog and Fits files are available)
- Distance and Peculiar velocity calculations; Work still in progress (stay tuned)
- Extend to Northern sky using Nancay & UKIDSS data; Anja Schröder talk

Extra slides

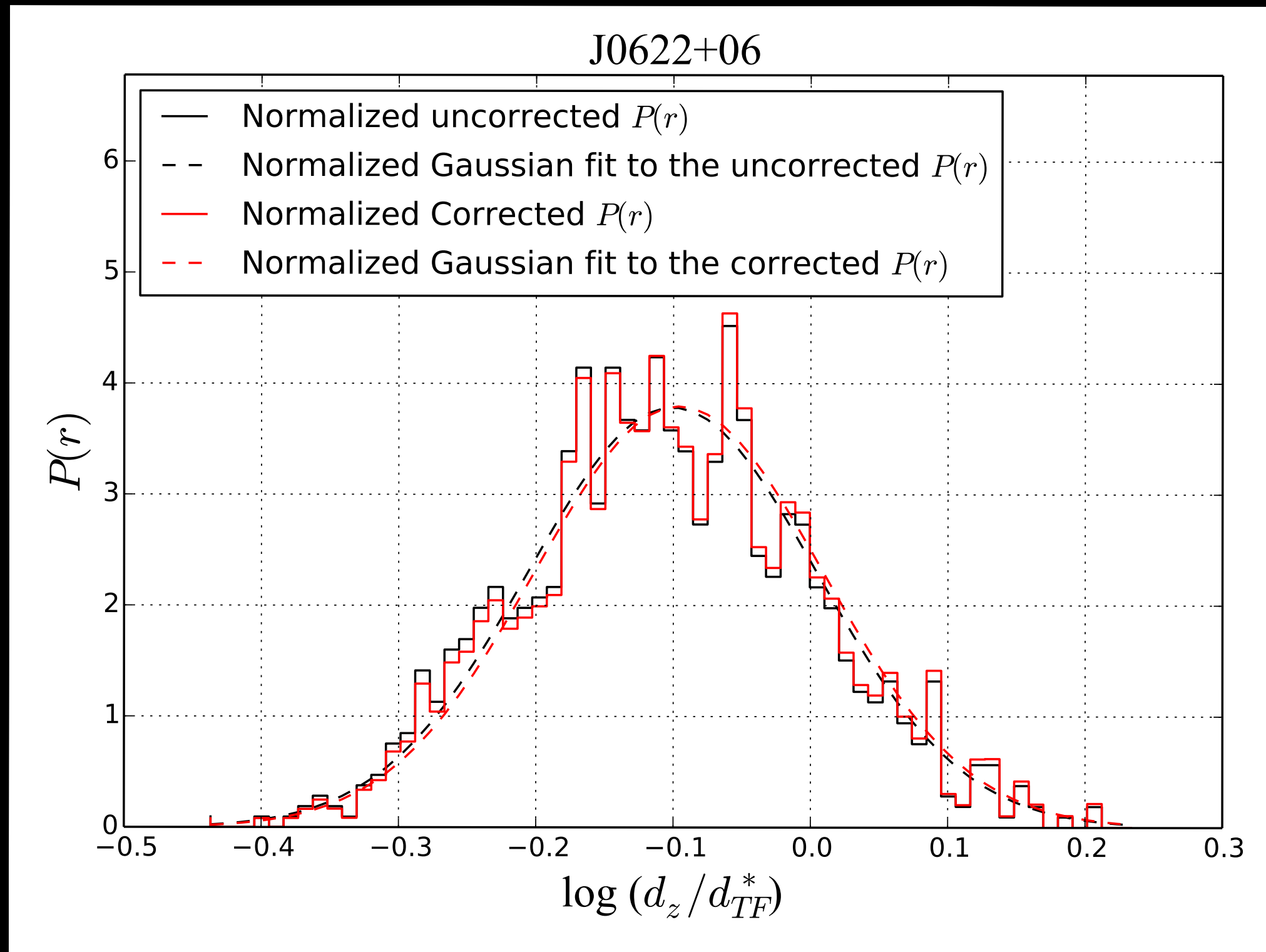
2. Follow-up NIR imaging of HIZOA

Completeness



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Same Method as in Springob et al. (2014, 2015)



in progress

J0744-13

