



MeerKat Evolution of HI with ~~SKA~~ pathfinders

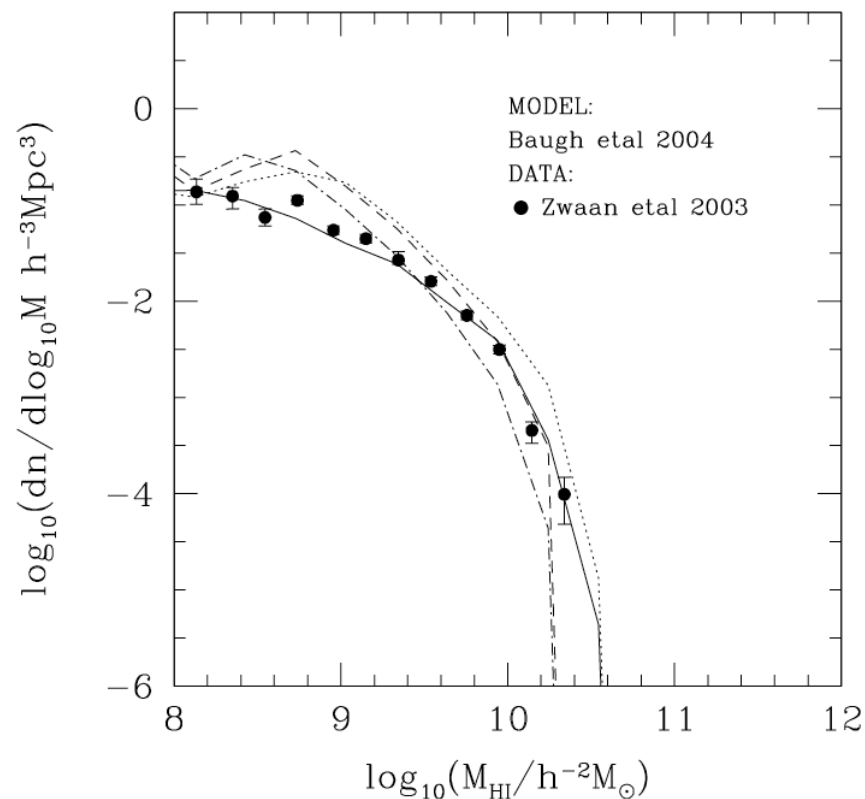
Kurt van der Heyden
Dept. of Astron., UCT

Sarah Blyth, Erwin de Blok,
Antoine Bouchard, Benne Holwerda



Evolving Gas Content of Galaxies

- Data points HIPASS HIMF (Zwaan et al (2003))
- Models by Baugh et al 2004
- Models have modest evolution near M_{HI}^* . Higher evolution at high- and low-mass ends



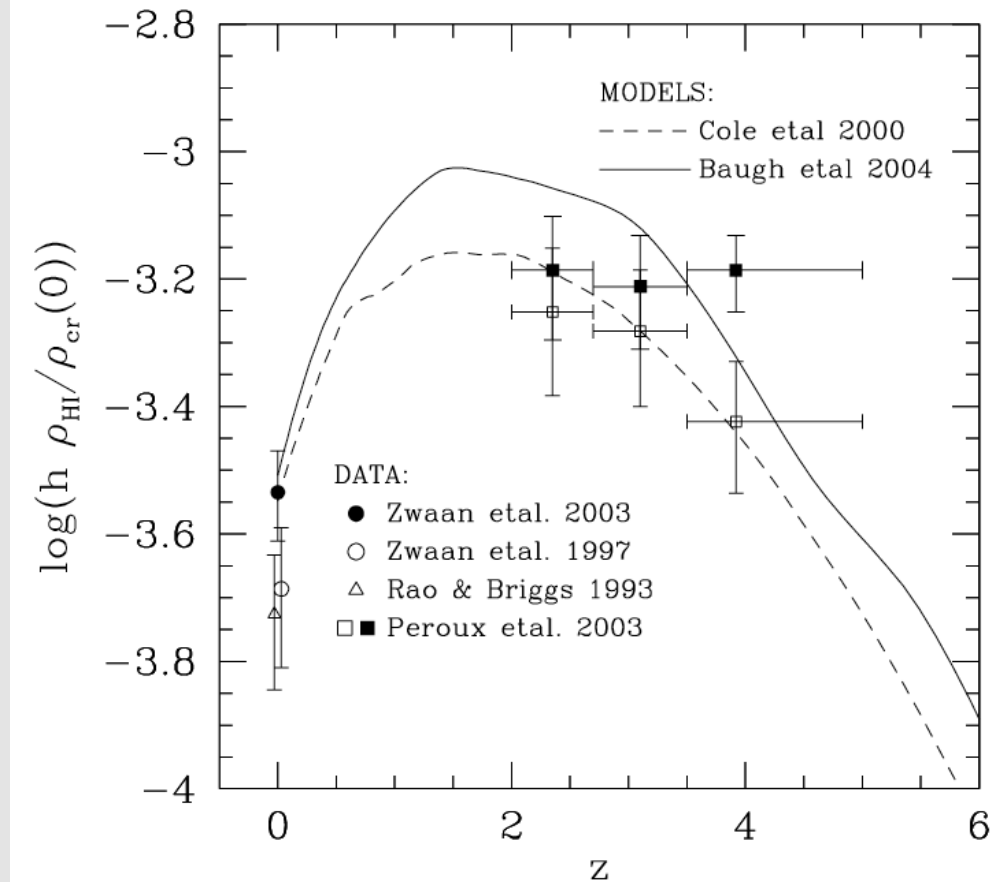
Baugh et al. 2004

$z = 0$ (solid), $z = 1$ (dotted)
 $z = 3$ (dashed), $z = 4$ (dot-dashed)

The Evolving Gas Content of Galaxies

SFR

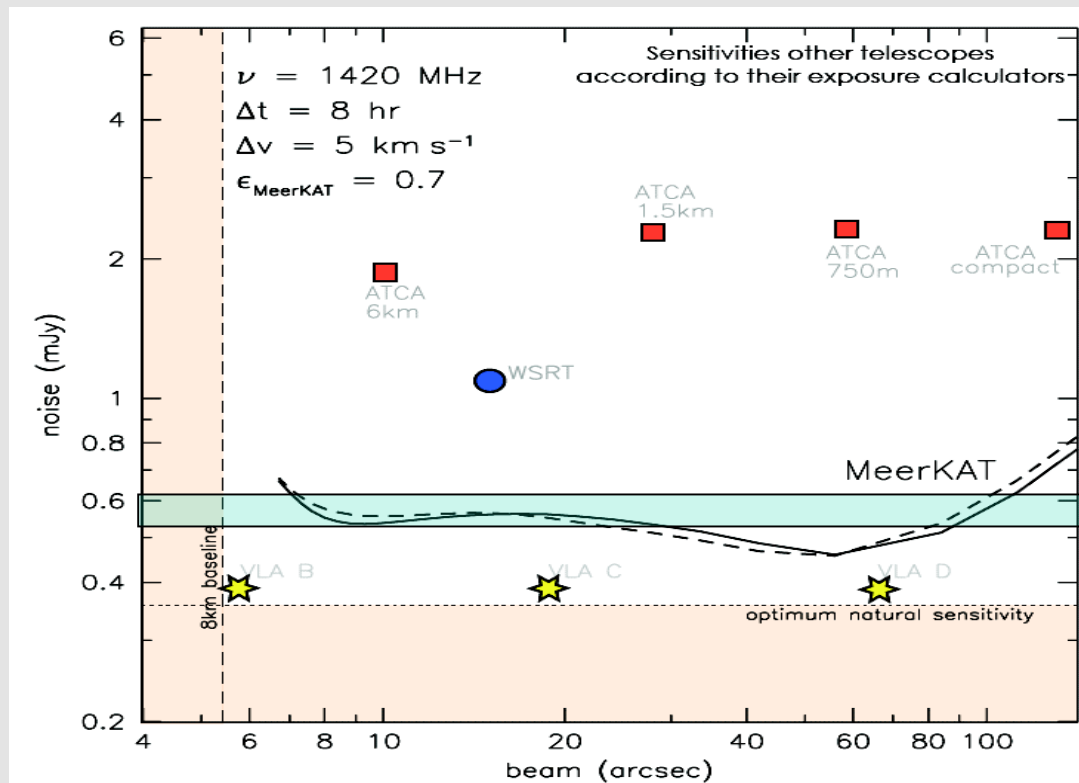
- $z < 0.8$: Rapid increase
- $z = 0.8 - 3$ Flat
- $z > 3$: Fall-off ?



MeerKAT Sensitivity

MeerKAT specs

- 80 dishes
- Dish diameter - 12m
- T_{sys} - 30 K
- Primary beam - 1°
- ϵ_A - 0.7
- ϵ_C - 1

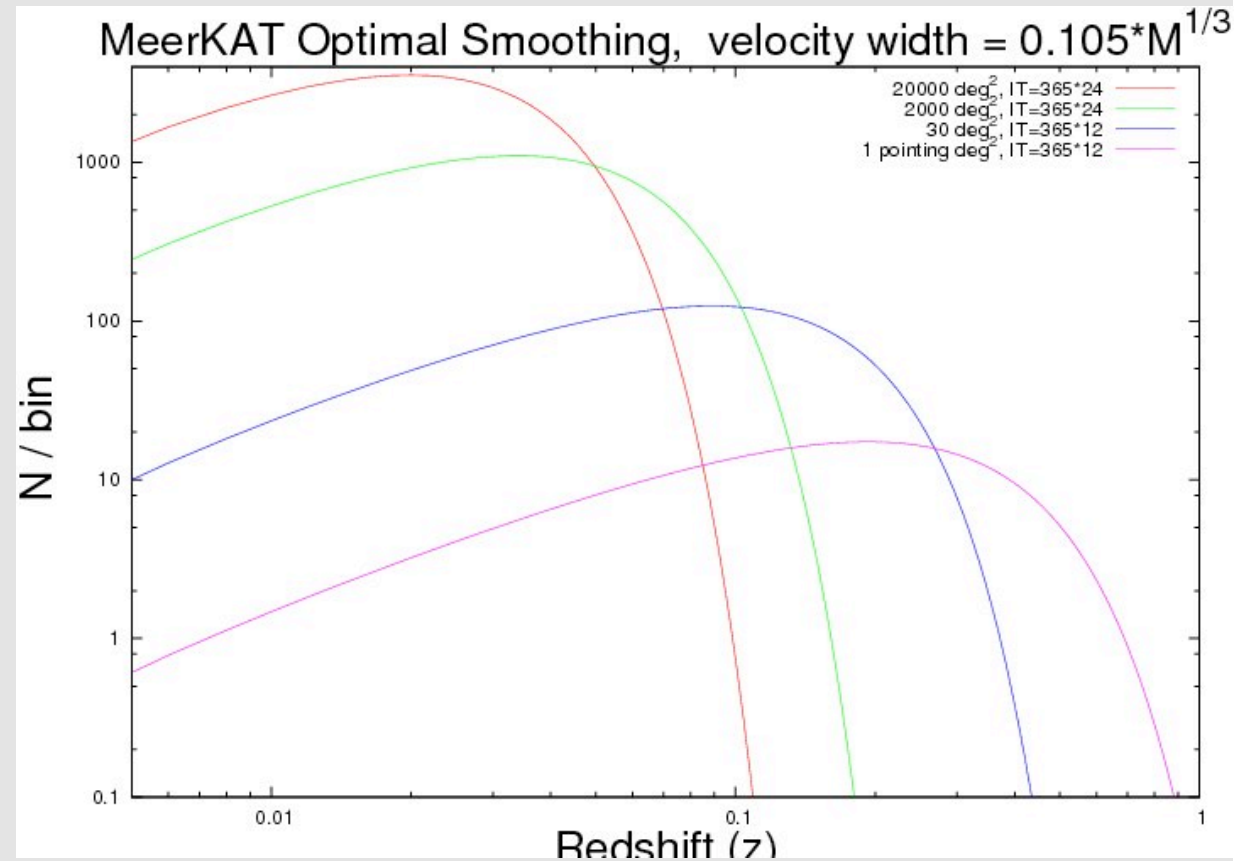


*de Blok et al.
This meeting*

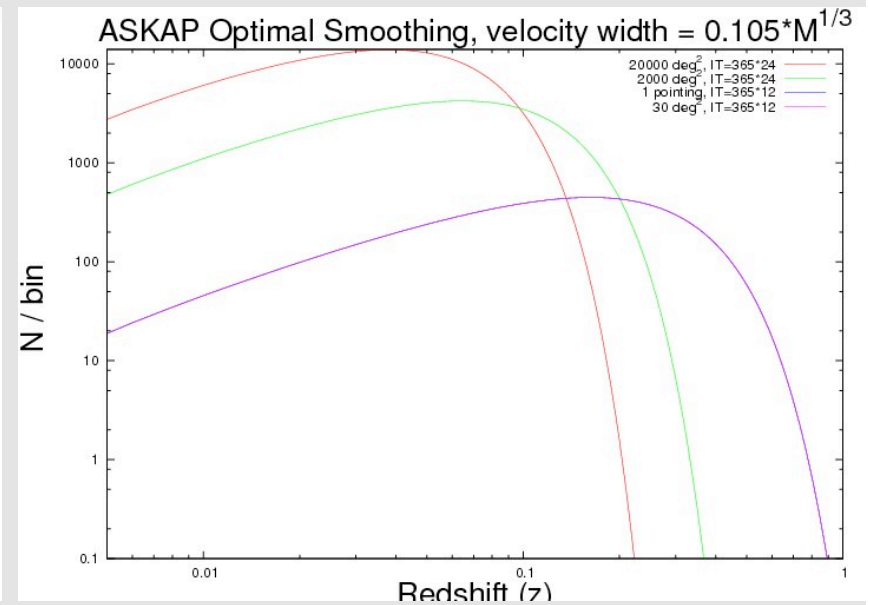
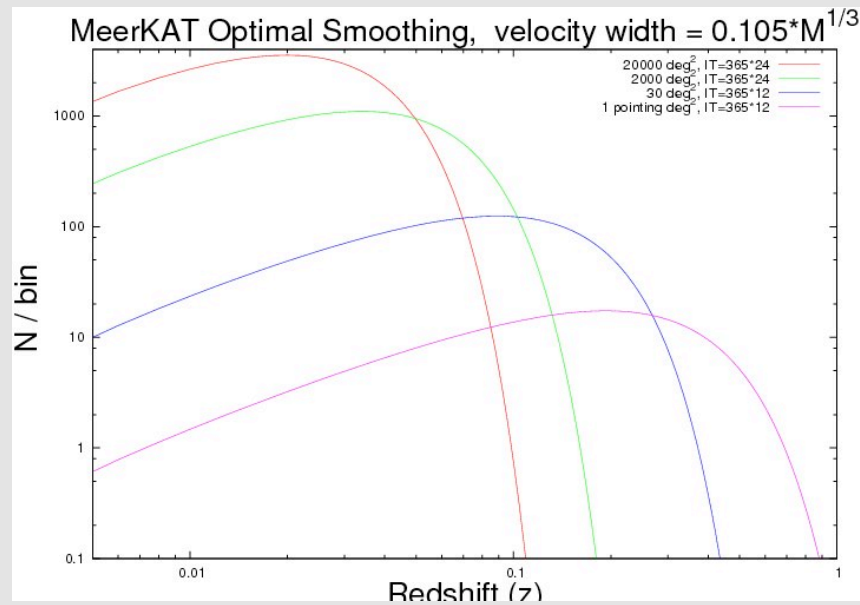
Number Counts

Assumptions

- Non-evolving HIMF (Zwaan et al. 2005)
- Constant rms with redshift
- Constant beam size (i.e. 1°)
- Unresolved sources
- $V = 0.105M^{1/3}$
- Demand $>5\sigma$ detections

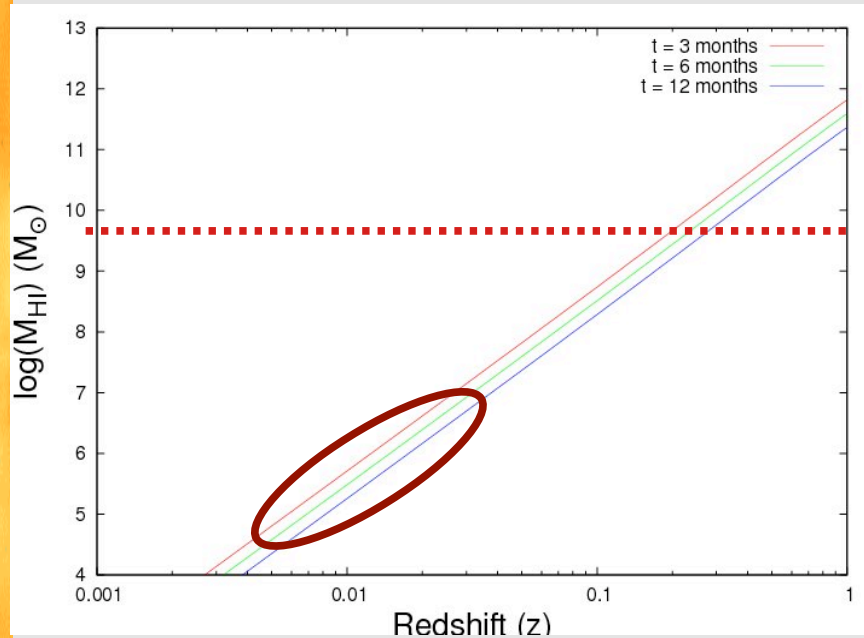


MeerKAT/ASKAP synergy?

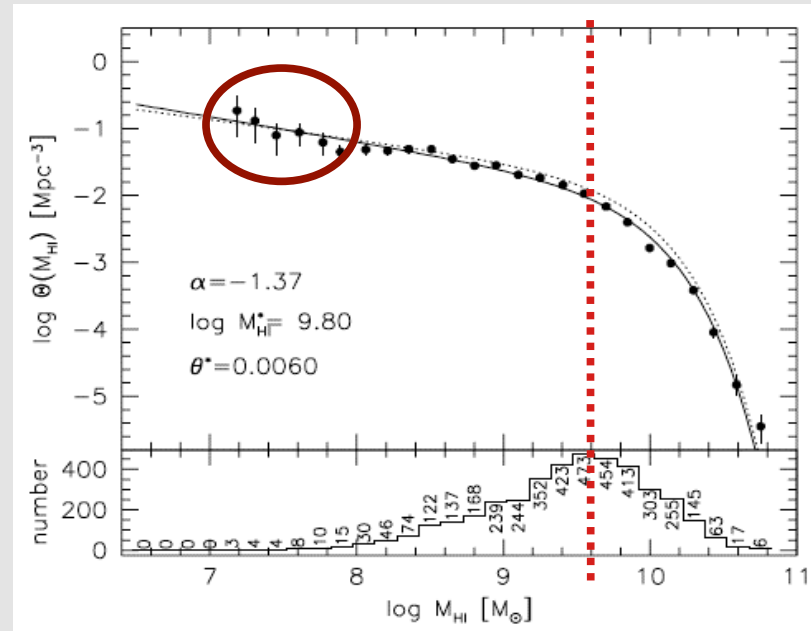


Detection Limits

min HI mass (5σ (peak flux))



Low- z HIMF



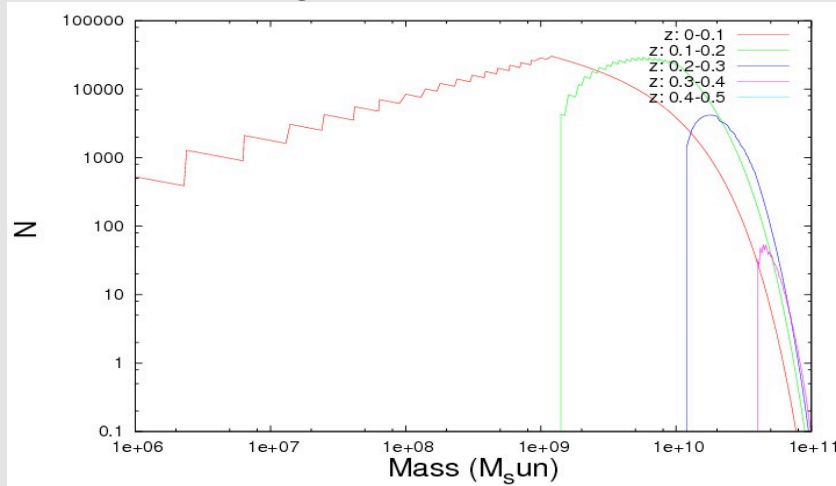
Zwaan et al (2005)

See A. Bouchard's talk:

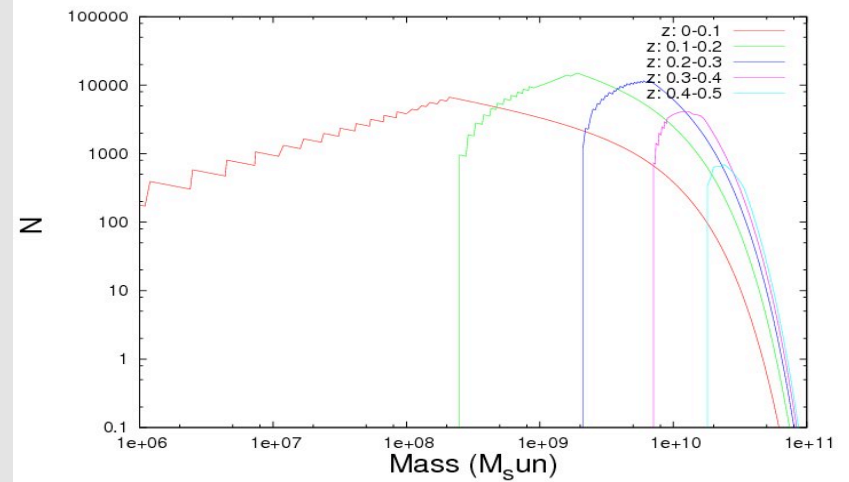
Dwarf galaxies & local Cosmic Web

Survey Counts

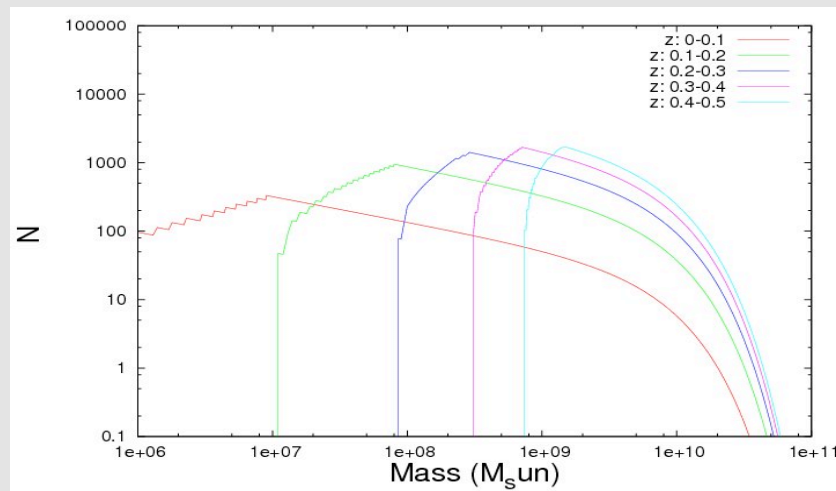
20 000 deg², 12m, 5 σ (peak flux)



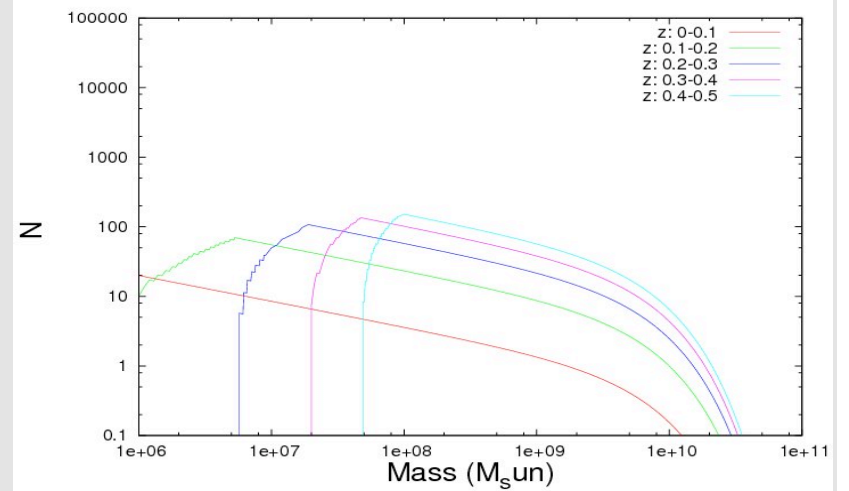
2 000 deg², 12m, 5 σ (peak flux)



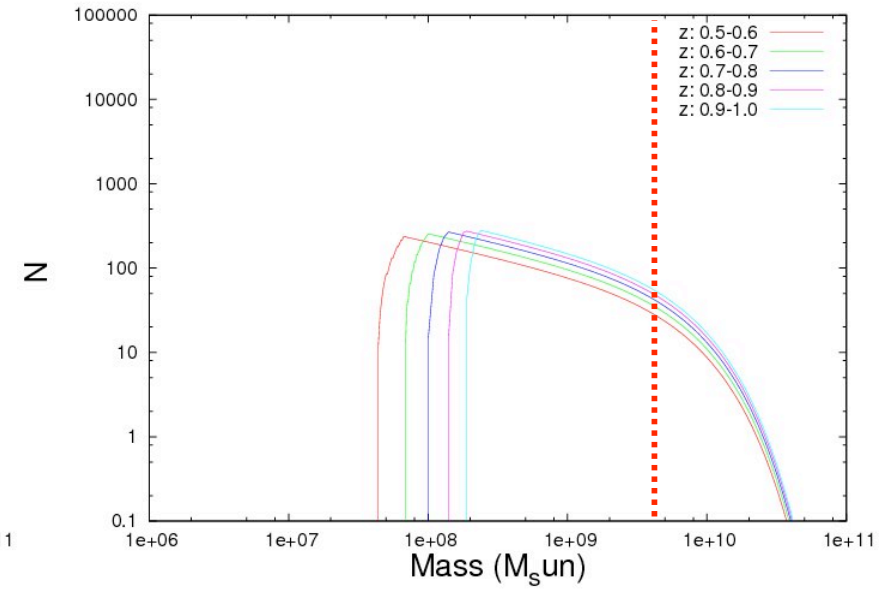
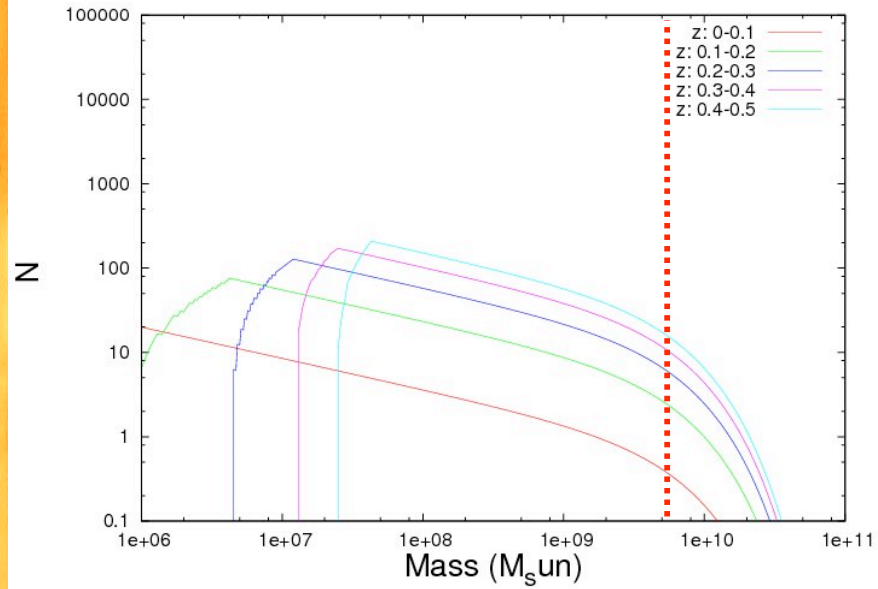
30 deg², 12m, 5 σ (peak flux)



0.8 deg², 12m, 5 σ (peak flux)

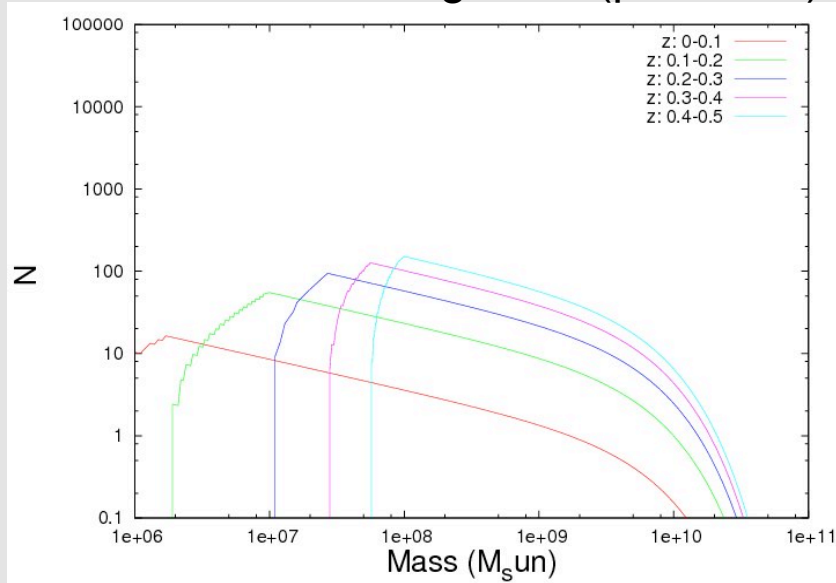


$t=12m, 5 \sigma$ (int flux), FOV=0.8deg²

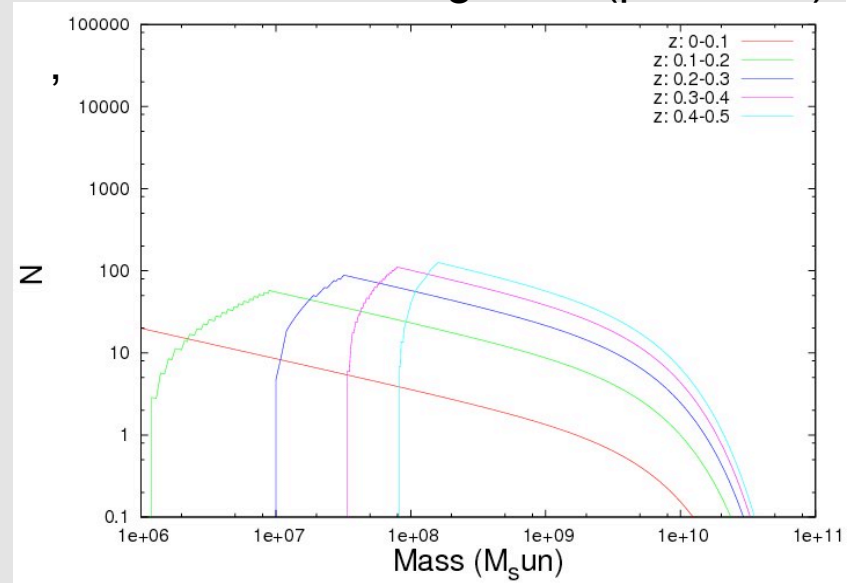


Survey Counts

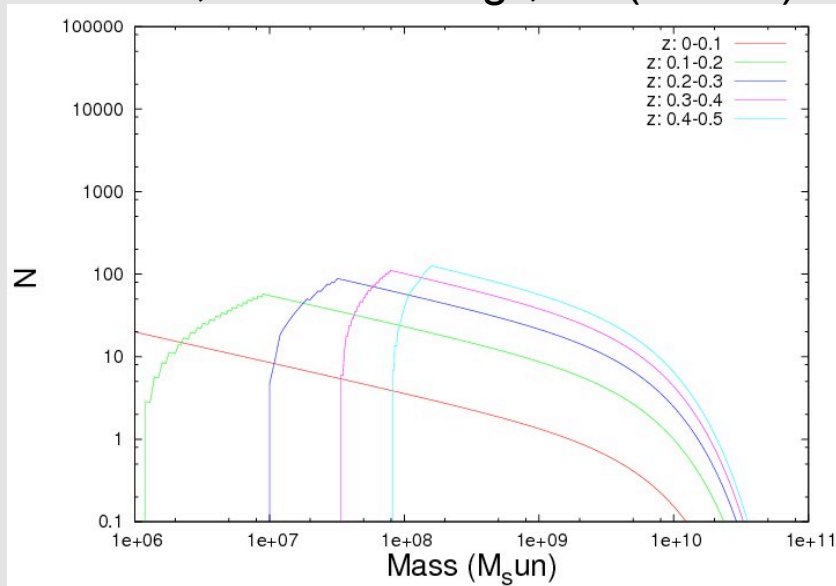
t=3m, FOV=0.8 deg², 5 σ (peak flux)



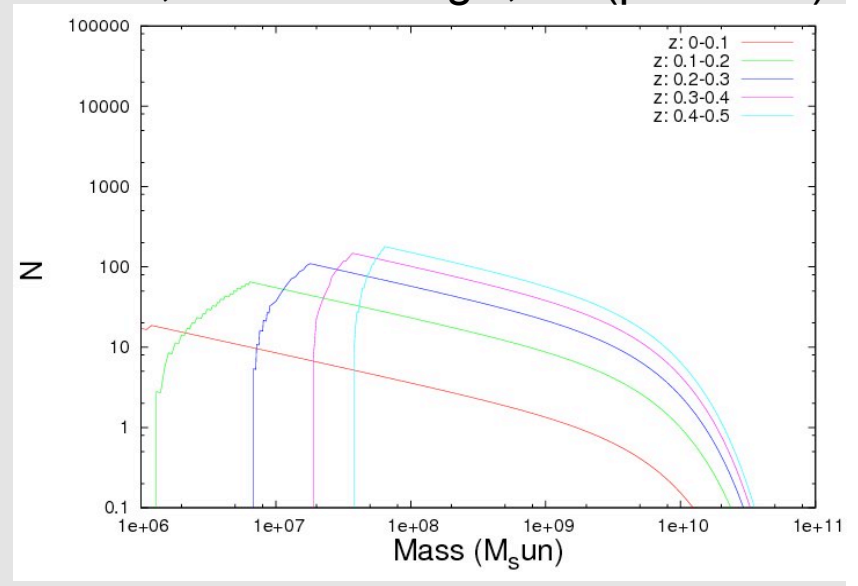
t=6m, FOV=0.8 deg², 5 σ (peak flux)



t=3m, FOV=0.8 deg², 5 σ (int flux)



t=6m, FOV=0.8 deg², 5 σ (int flux)



Optimal Survey Parameters?

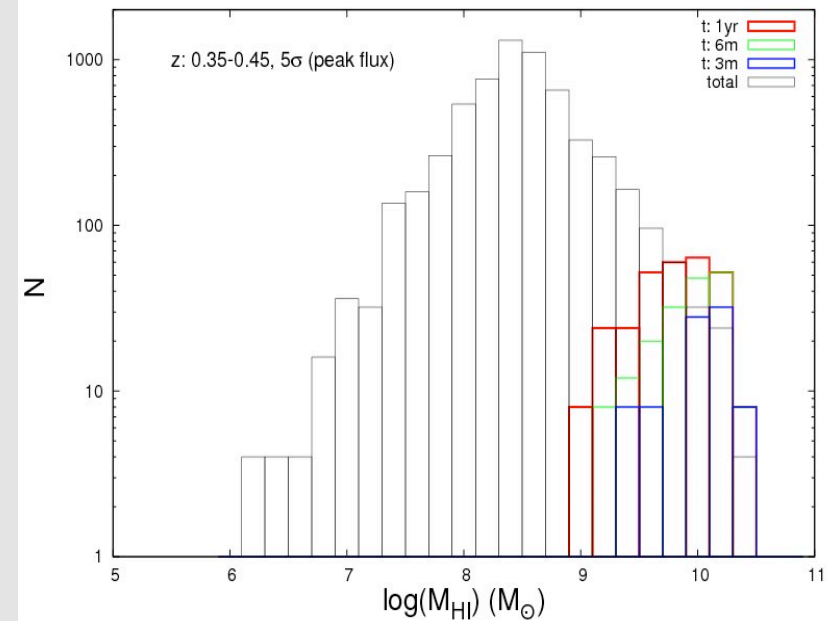
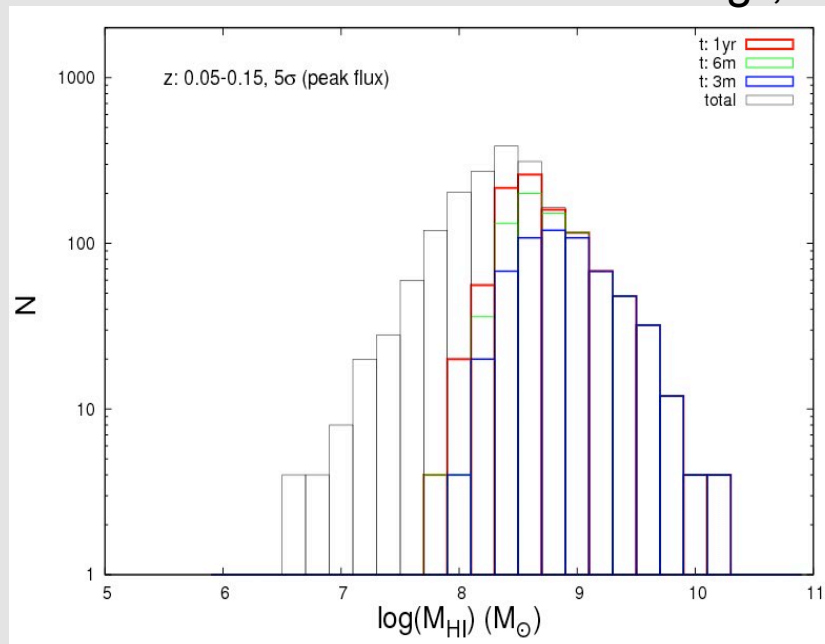
<u>Survey time</u>	<u>Area</u>	<u>Good Redshift range</u>
(months)	(deg ²)	
3	20 000	<0.1
	2 000	<0.1
	30	0.1-0.2
	0.8	0.2-0.3
6	20 000	<0.1
	2 000	<0.1
	30	0.1-0.2
	0.8	0.2-0.3~0.4
12	20 000	<0.1
	2 000	~0.1-0.2
	30	0.2-0.3
	0.8	0.4-0.5

Where to from here?

Obreschkow virtual sky

- $4.1 \times 4.1 \text{ deg}^2$
 - 6×10^7 galaxies
 - $Z=0-9.7$
- With thanks to Danail Obreschkow*

$0.8 \text{ deg}^2, 5\sigma$ (peak flux)



Thanks

Suggestions most welcome!

