

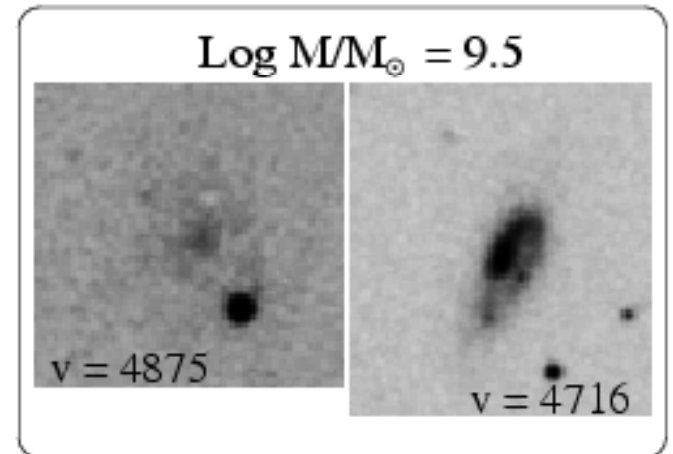
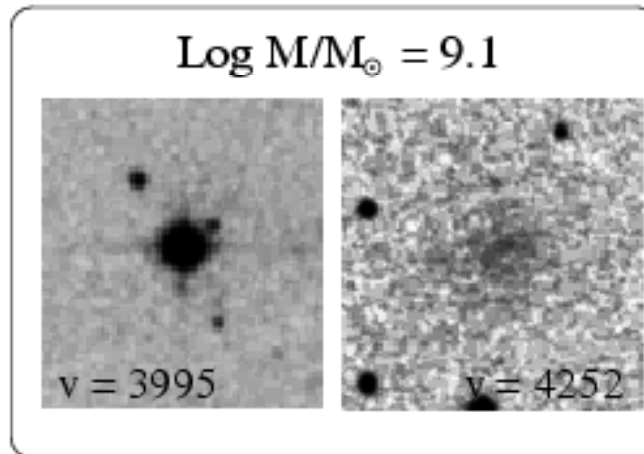
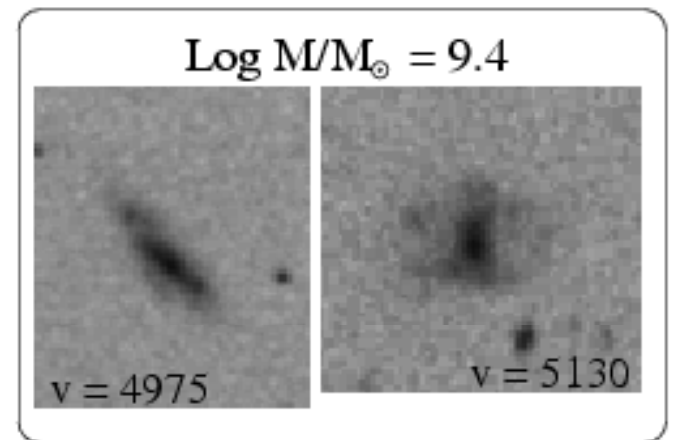
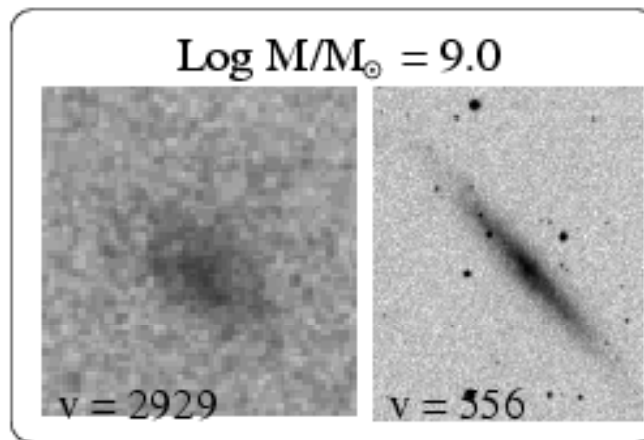
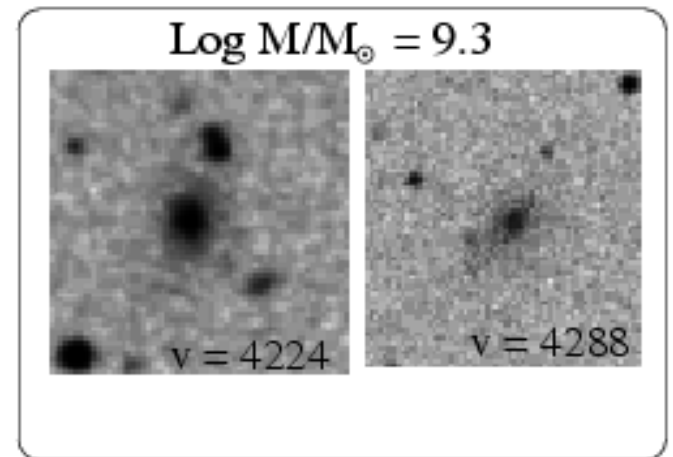
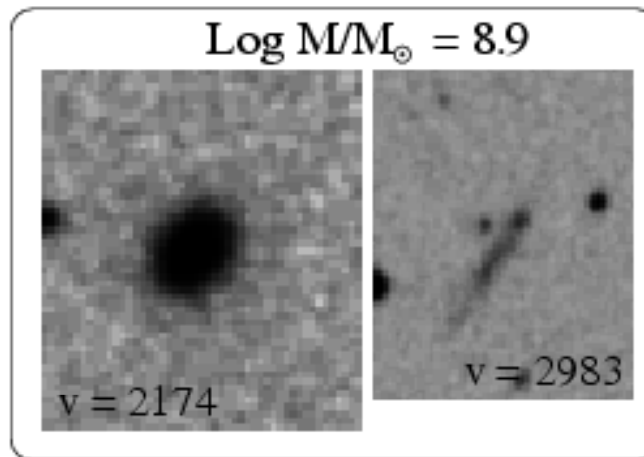


Variance in the HI Mass Function

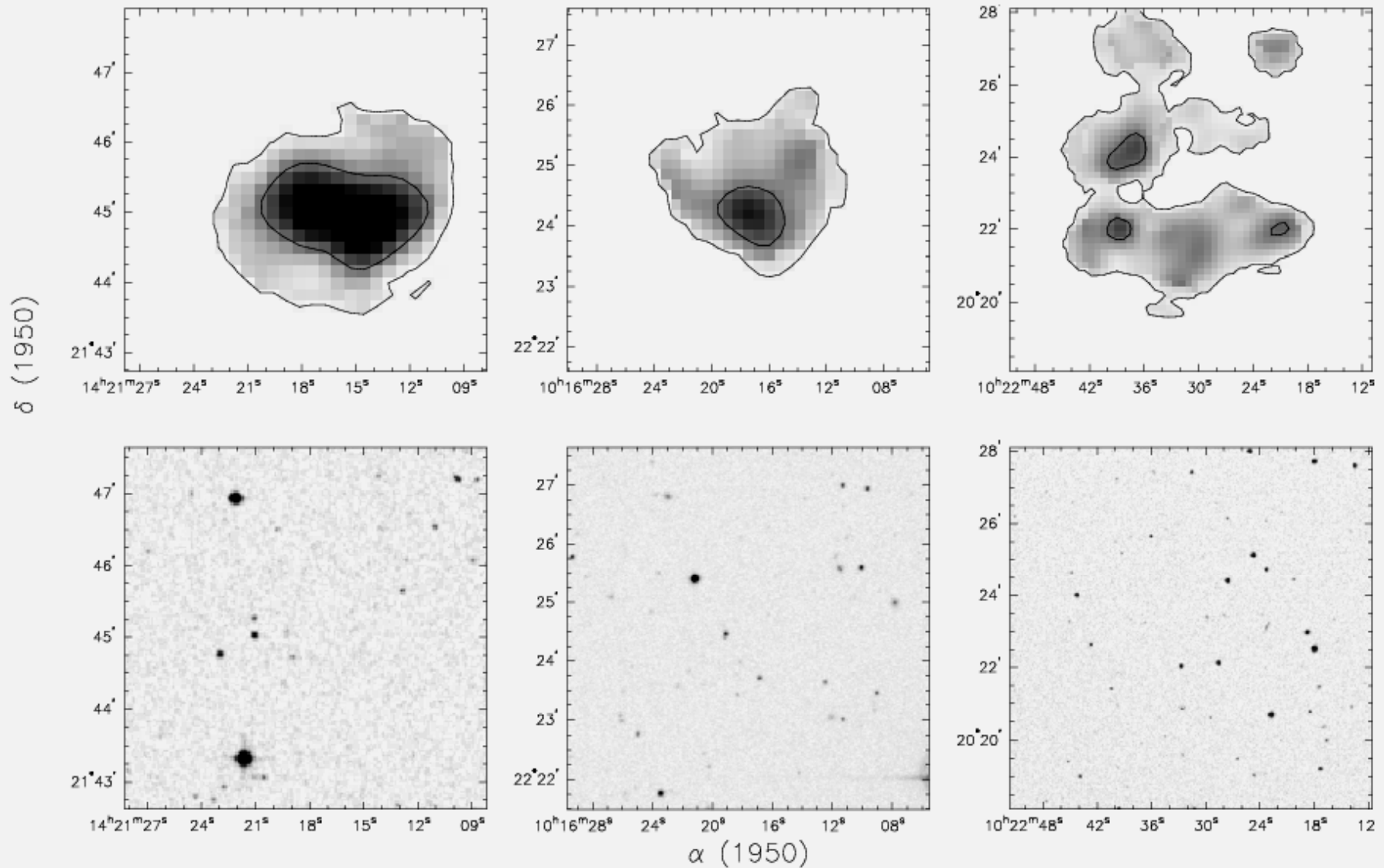
Stephen Schneider
University of Massachusetts

Spineto, 12 June 2007

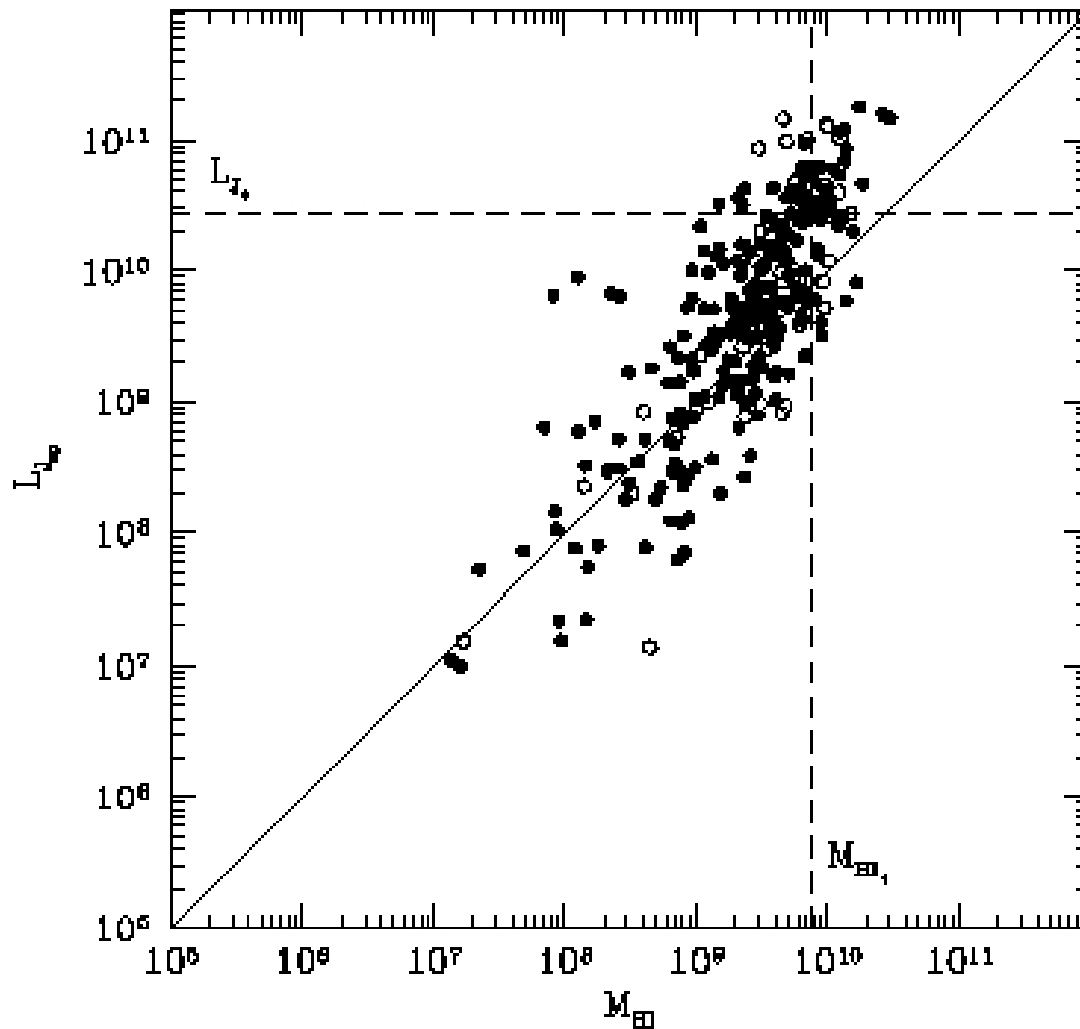
Pairs of Galaxies with equal HI Masses



VLA Images of HI Sources without Obvious Optical Counterparts

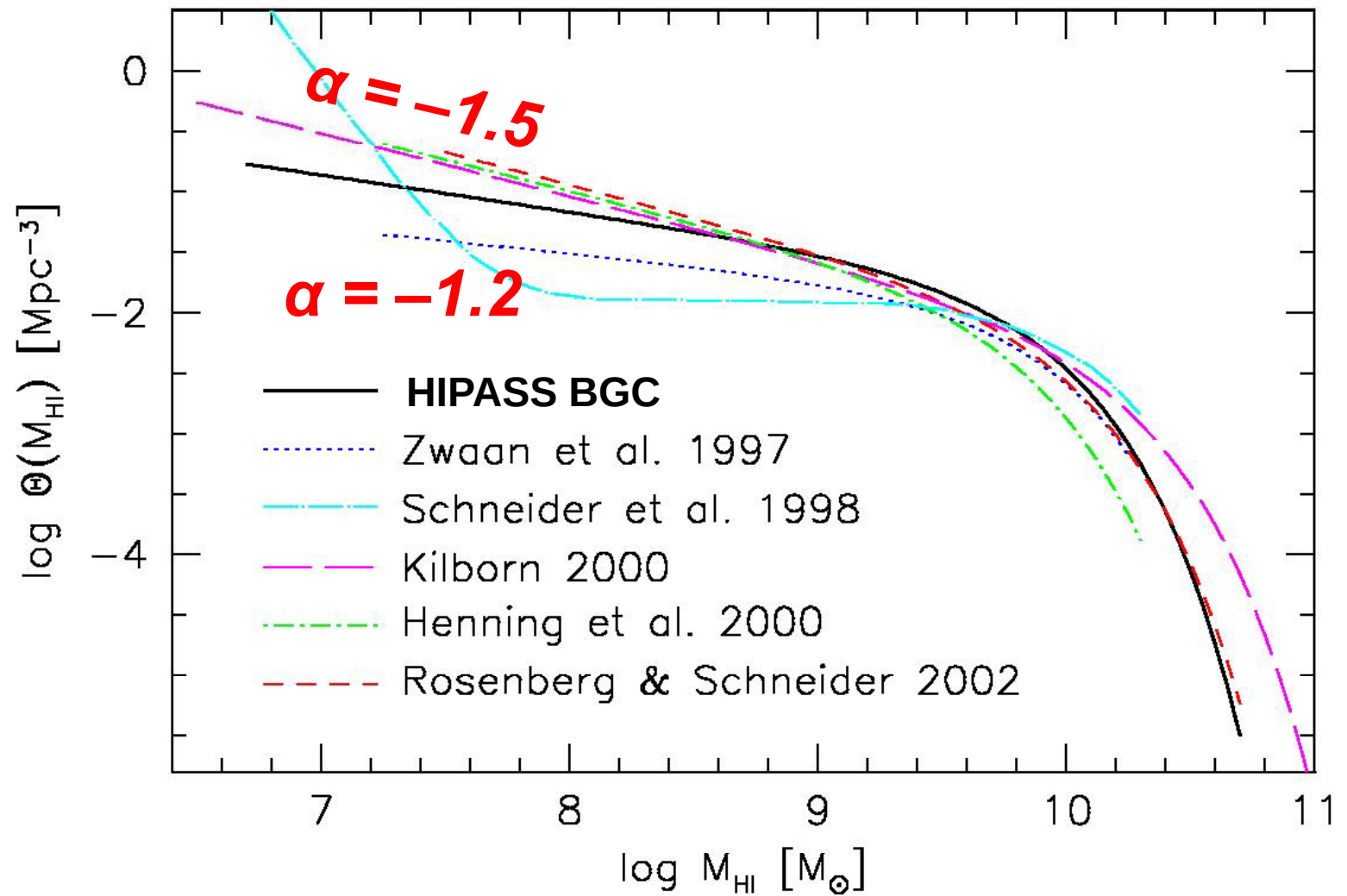


Gas versus Stellar Content

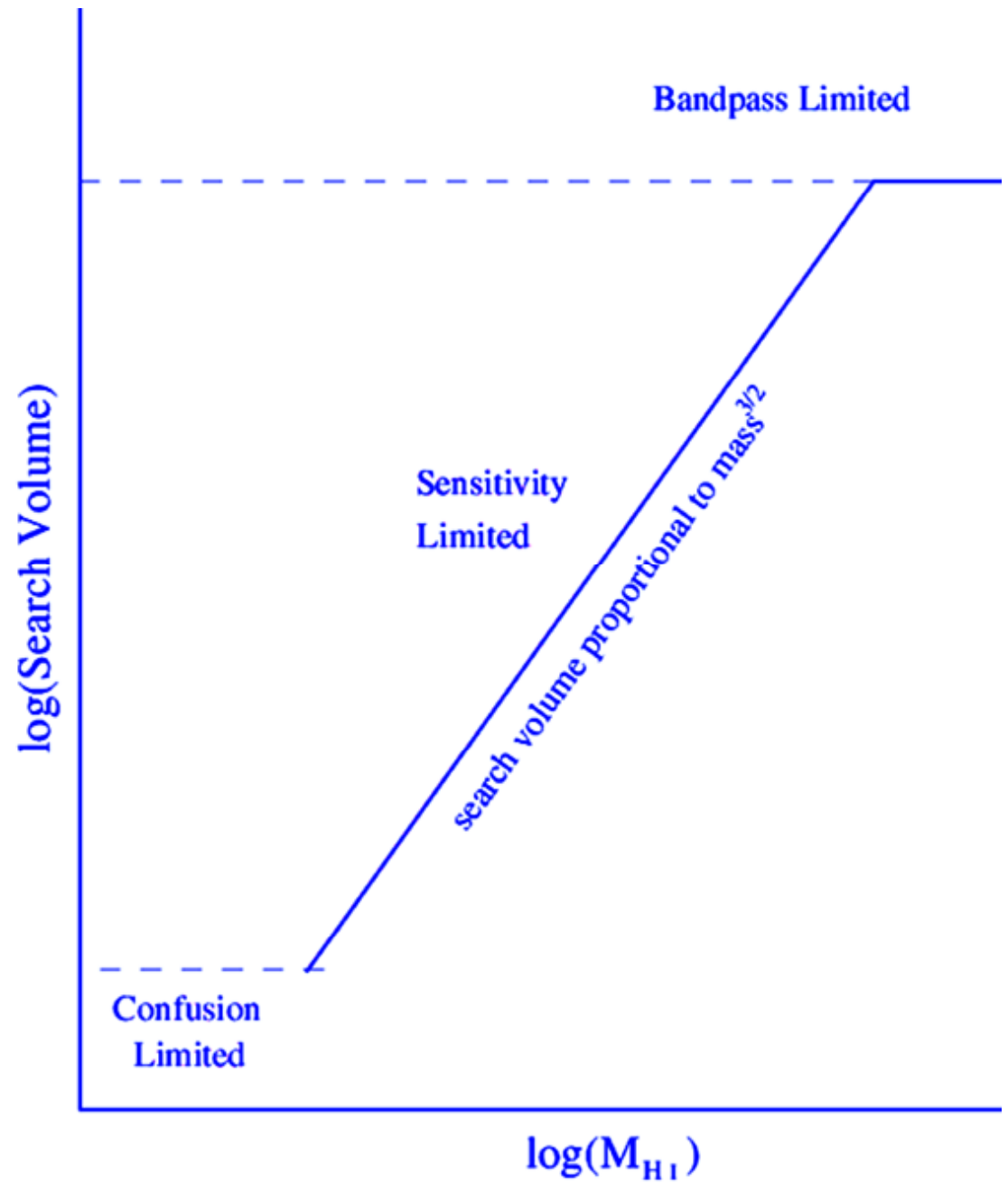
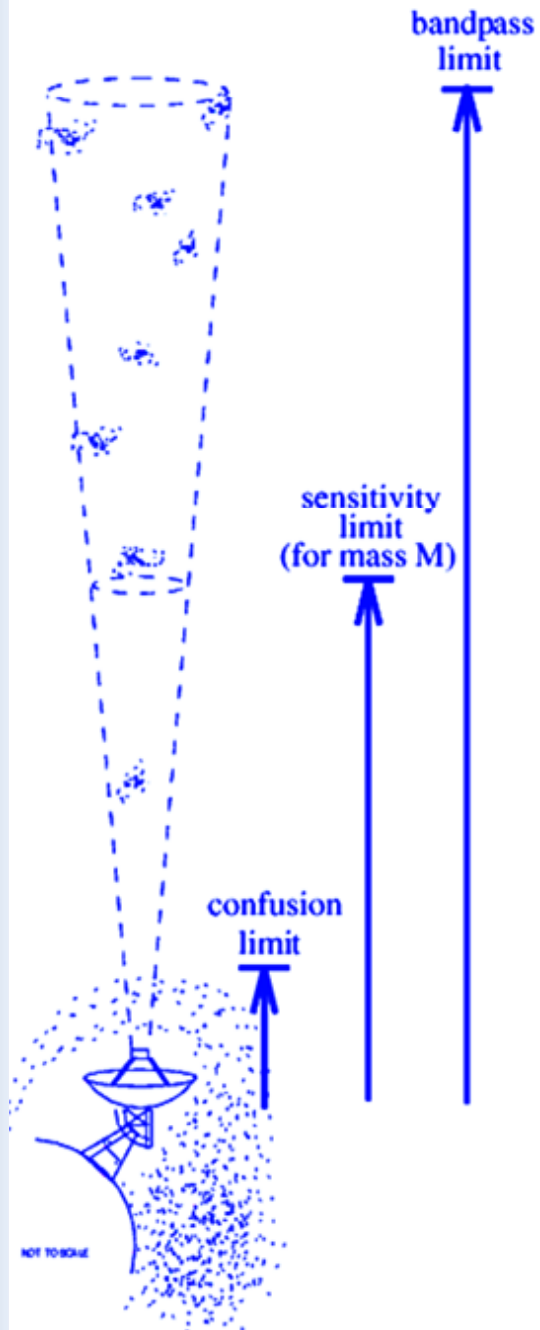


- J-band luminosity as measure of total stellar content
- HI mass as measure of total gas content
- For a given gas mass, there is a wide range of stellar masses

HI Mass Functions



Searching for HI

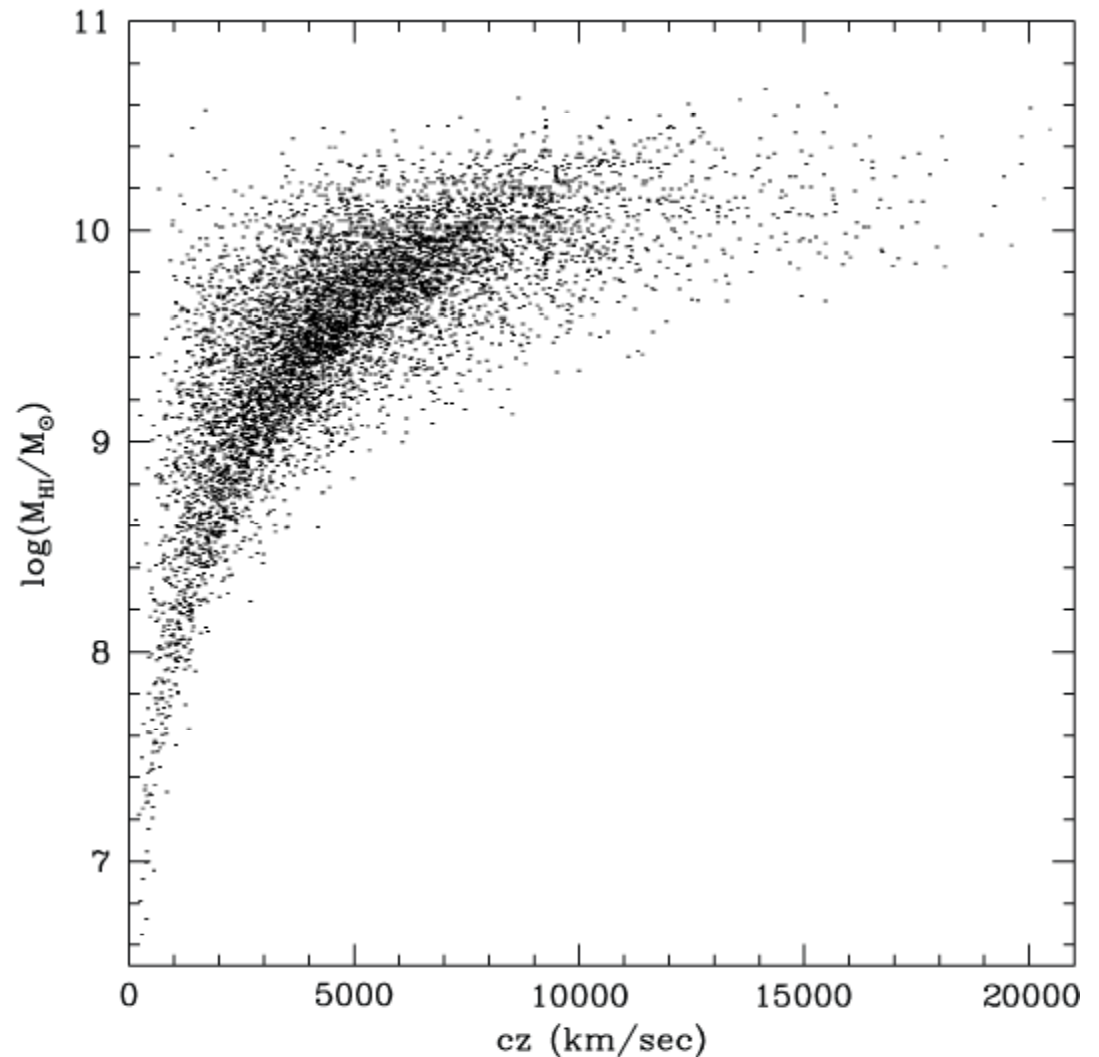


Detections: simulations

Simulation of mass vs. distance for expected detections

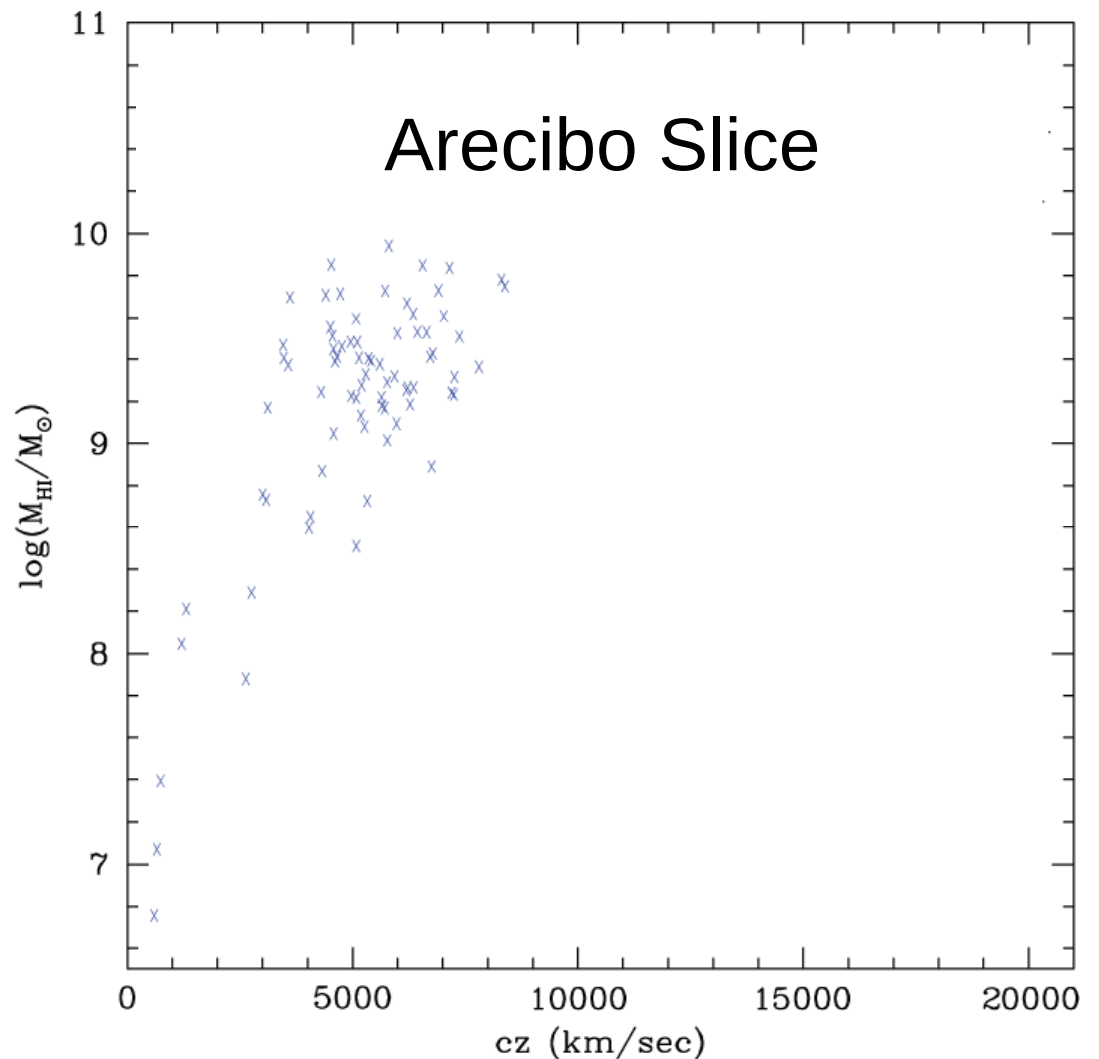
Note:

- roll-off in completeness
- low-mass sources are detected only nearby.



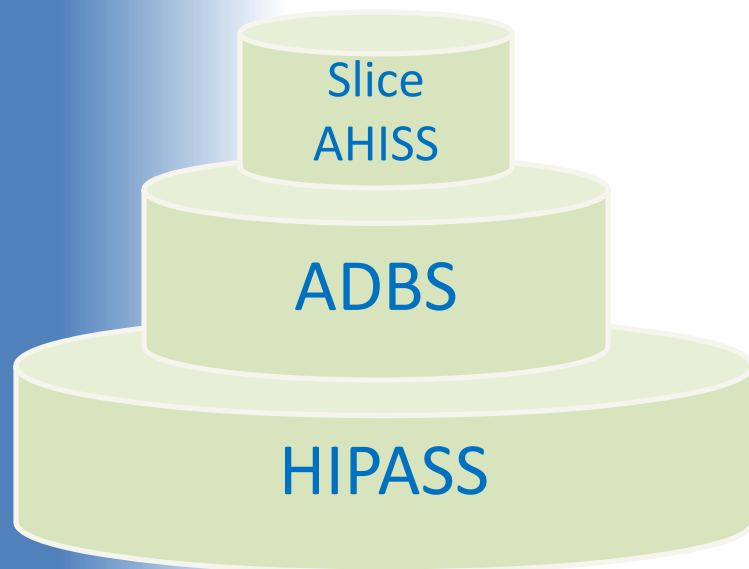
Detections: the reality

- The first surveys were severely restricted by small number statistics and small bandwidths.
- There may actually be a clue here about cosmic variance...

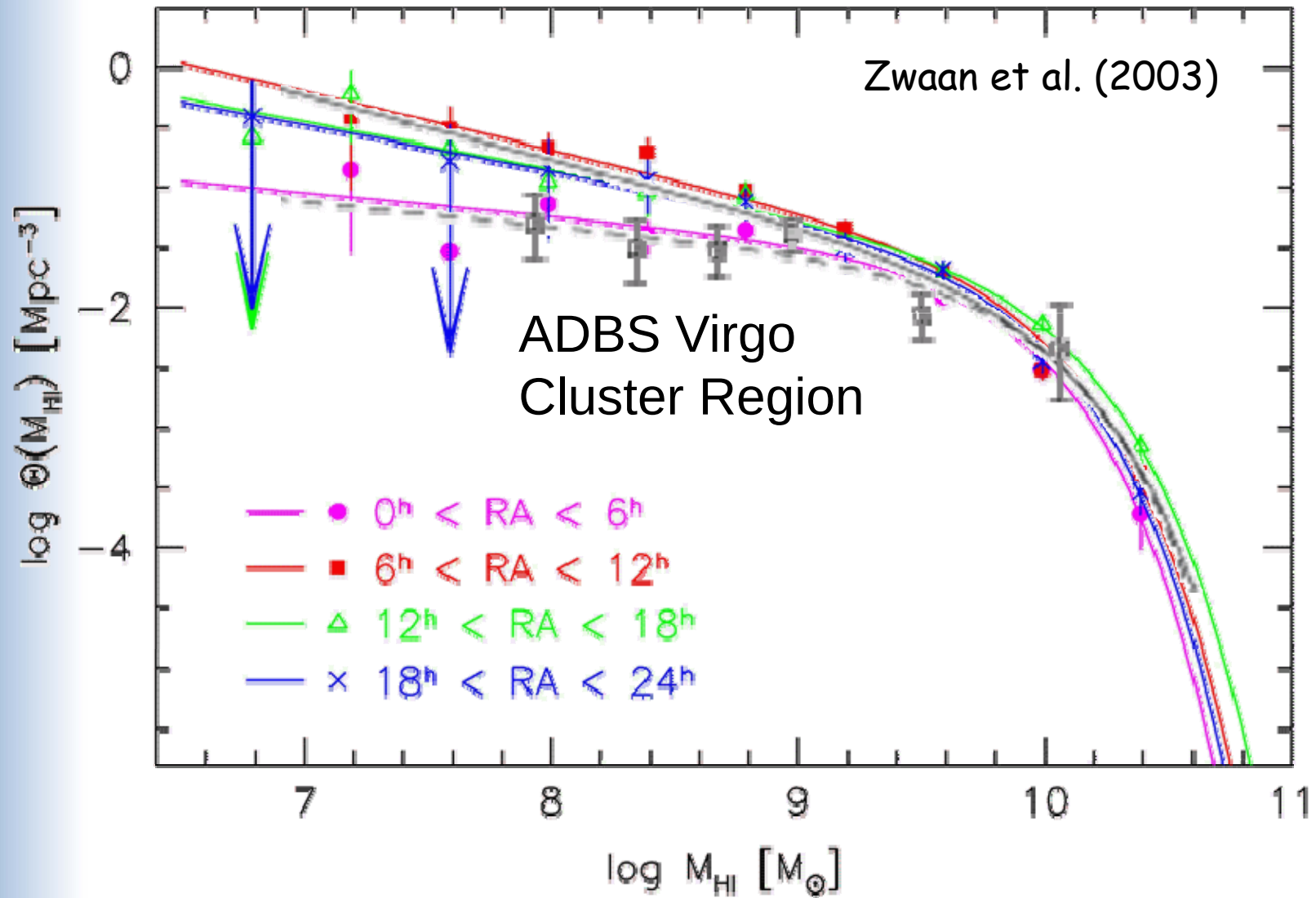


The HI Surveys

- The Arecibo Slice and AHISS (Sorar, Zwaan Briggs) detected dozens of galaxies.
- The Arecibo Dual Beam Survey (Rosenberg) detected hundreds
- HIPASS (Staveley-Smith, Kilborn, Zwaan, et al.) detected thousands

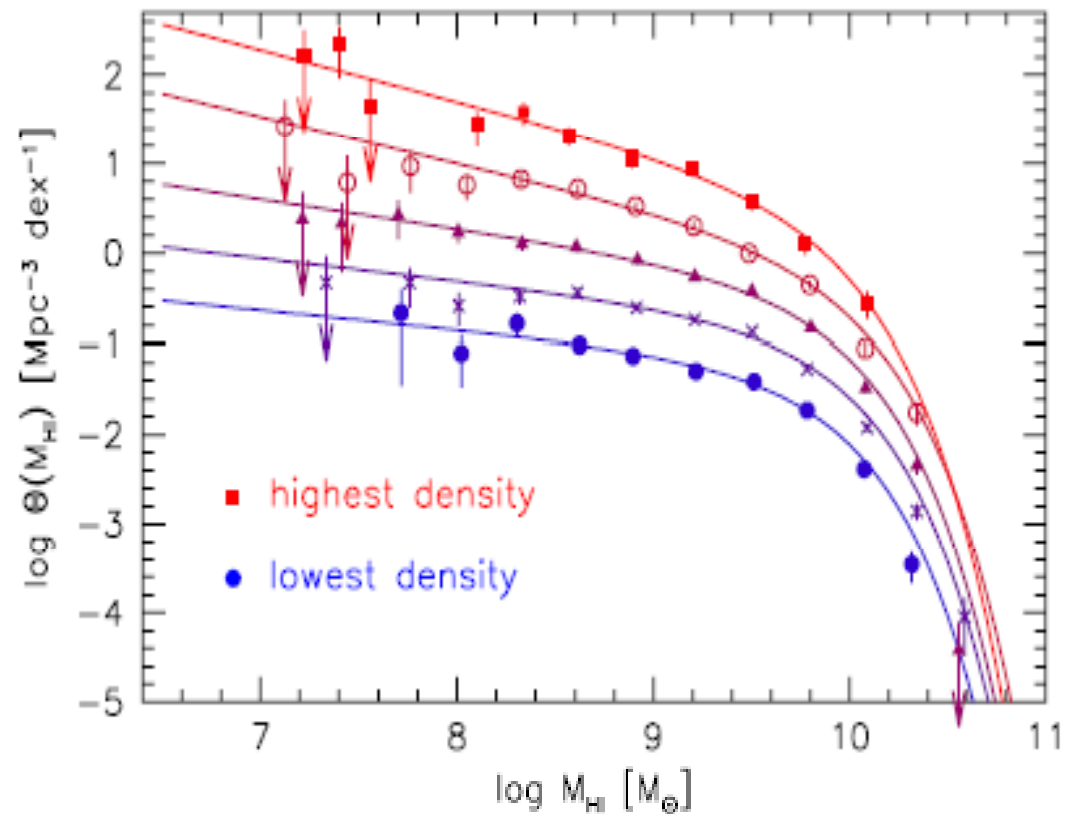


Cosmic Variance in HIPASS BGC



- Zwaan et al. 2005 argue against variance based on nearest neighbor among HIPASS galaxies.
- Basilakos et al. 2007, argue that massive HIPASS galaxies follow optical, while $<10^9$ are nearly uniform

HIPASS – Inverse or No Variance?

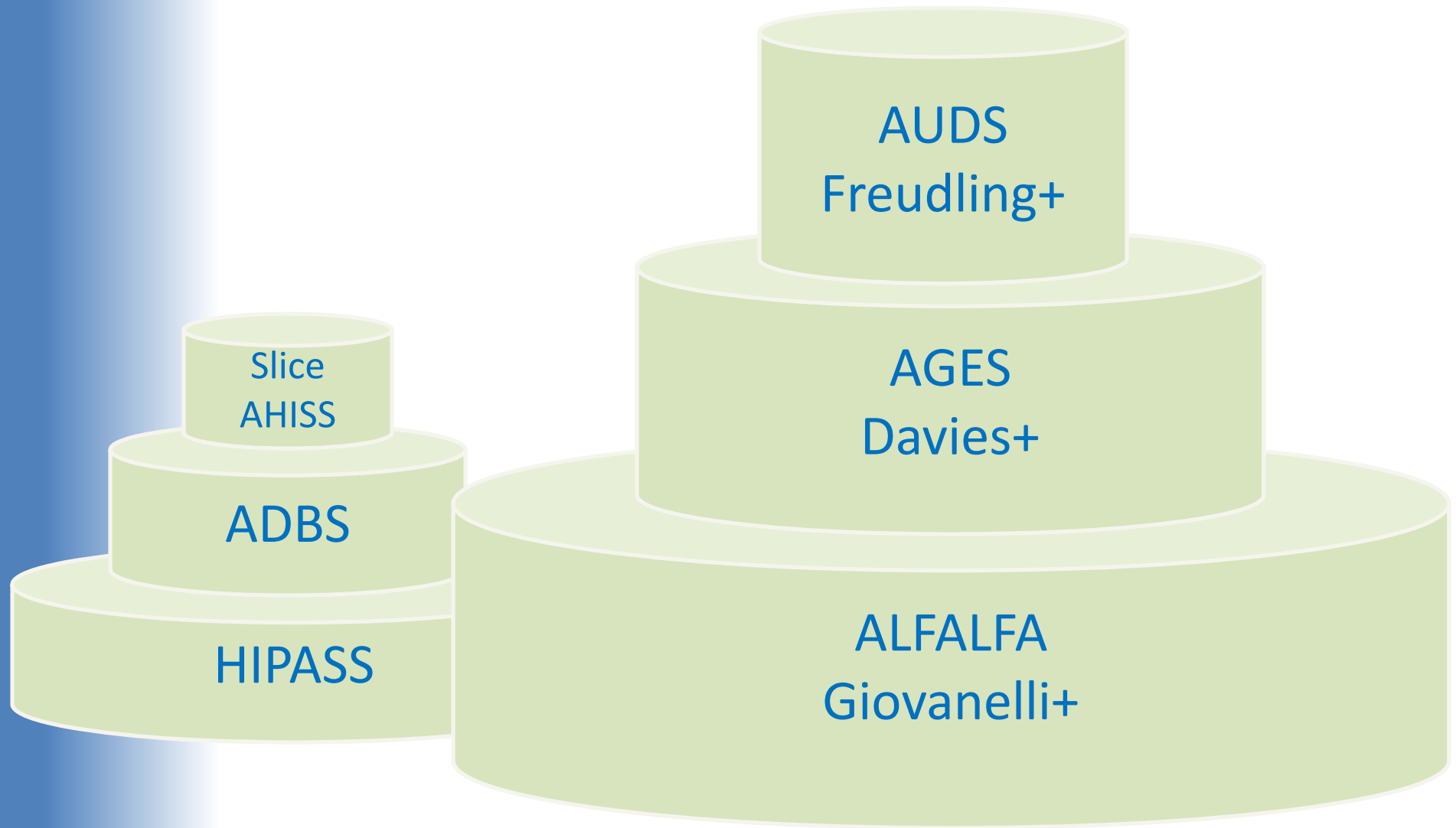




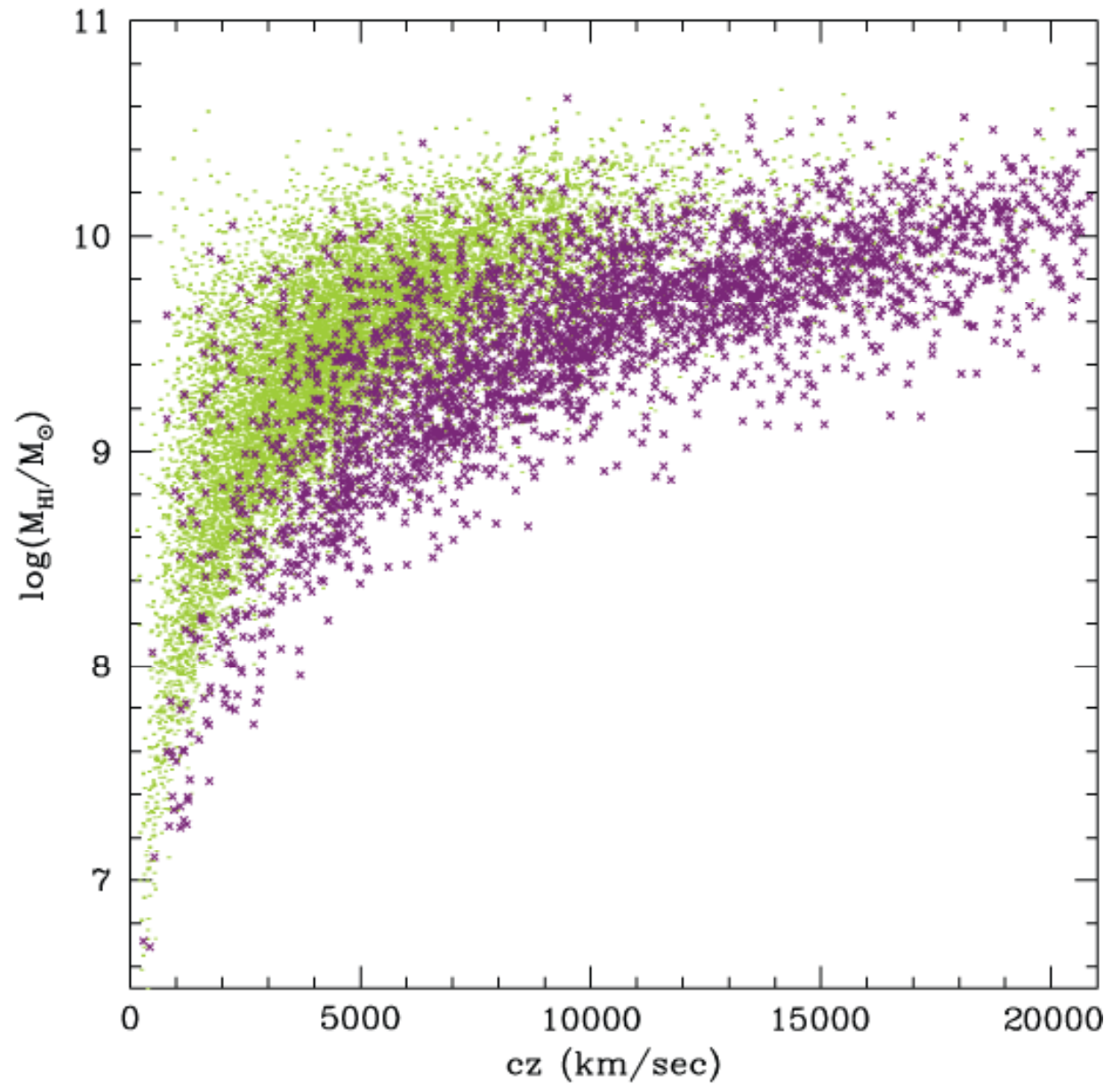
Arecibo Line Feed Array



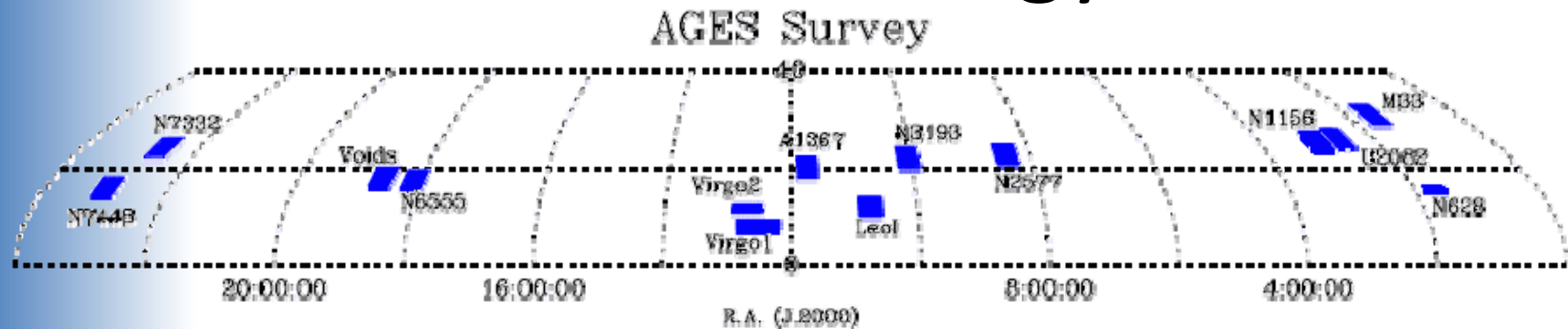
Next Generation HI Surveys



Mass
vs. cz
for
ALFALFA
and AGES



AGES Strategy



- The Arecibo Galaxy Environments Survey is targeting nearby galaxies with deep integrations.
- Full bandpass is used, allowing us also to search for background galaxies.
- First field expected 42 ± 6 based on Parkes HIMF
- Detected only 22 (Auld et al. 2006)

Summary

- Although there have been disagreements about the shape of the HIMF in the past, it appears that a significant portion of these disagreements are caused by cosmic variance.
- Narrow area fields show variations larger than suggested by small number statistics.
- Dense regions (as defined by optically-selected galaxies) appear to have a suppressed faint end of the mass function.
- New large surveys with ALFA will explore these variances in much greater detail.