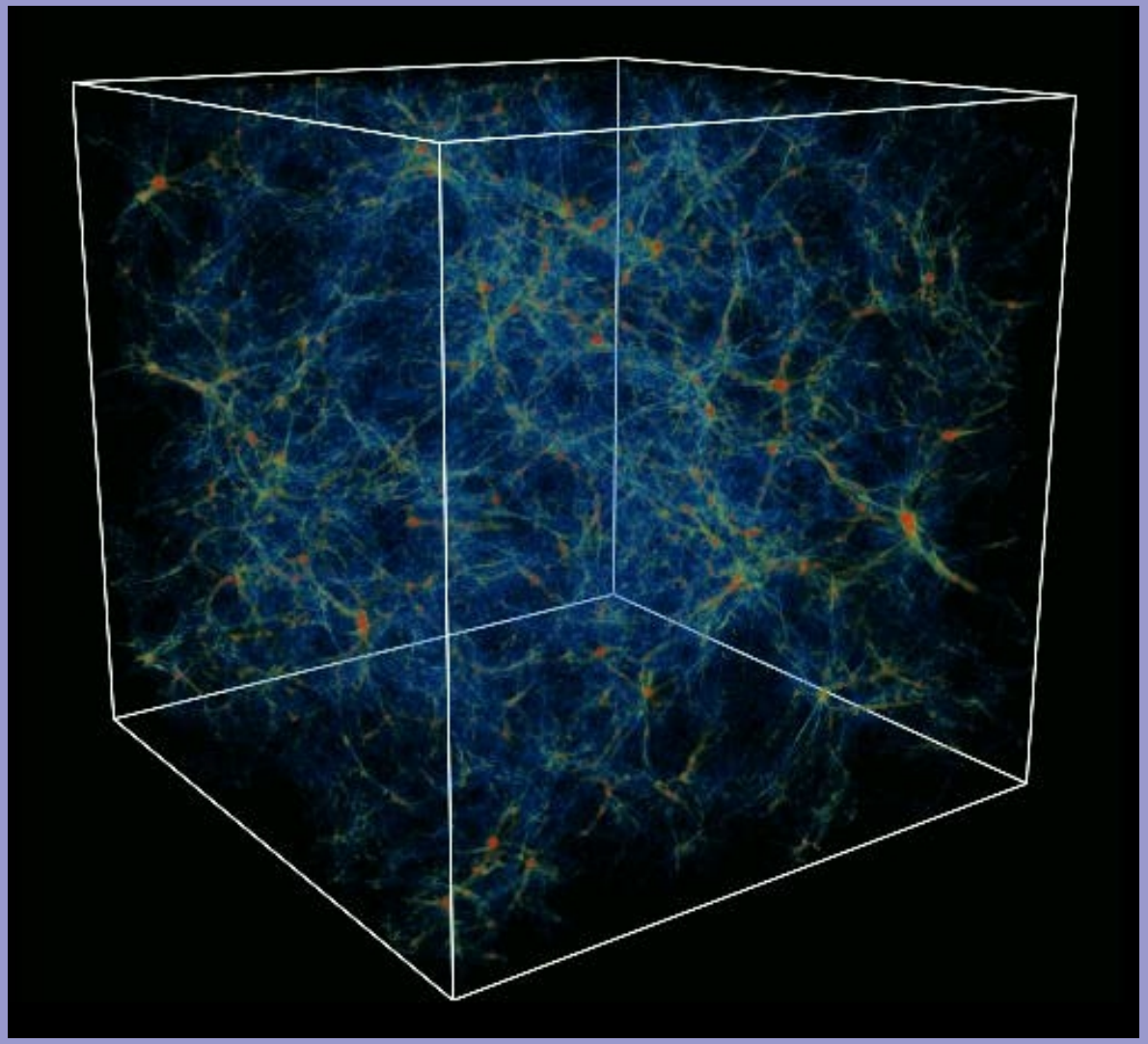
Studying the Ly-α Absorber/Galaxy Connection at 21cm

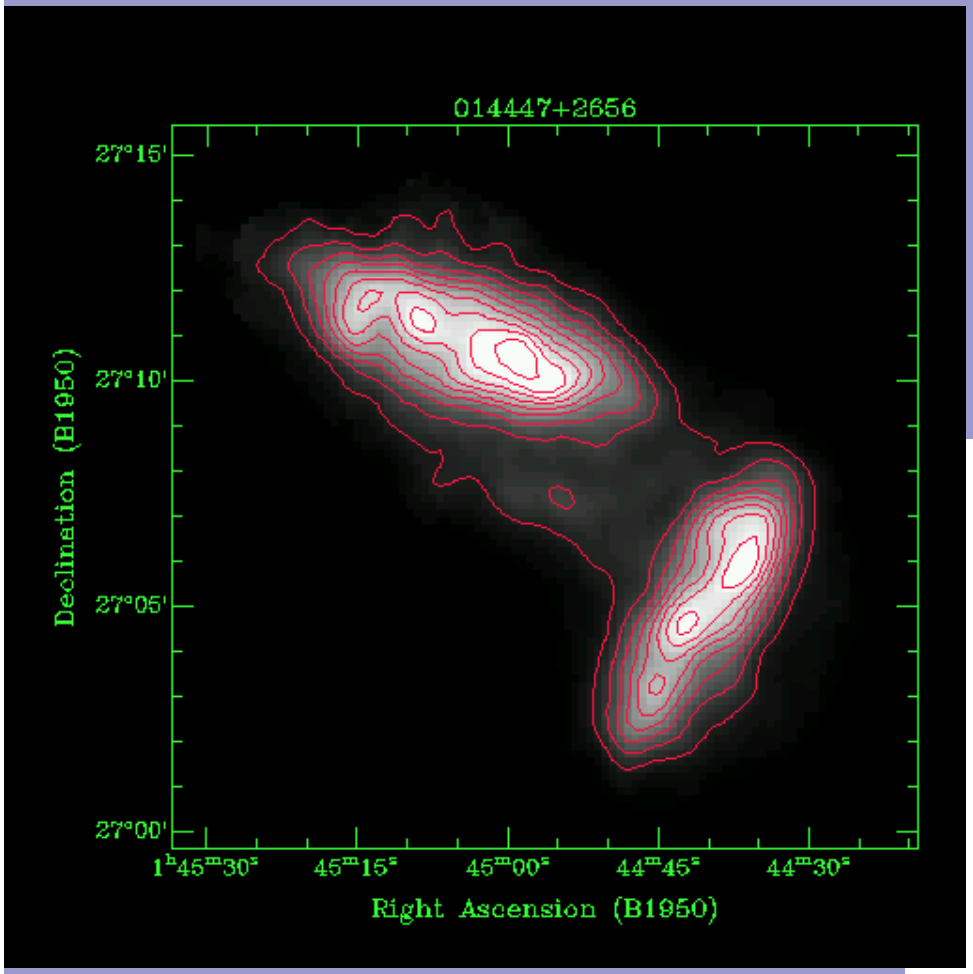
Jessica L. Rosenberg

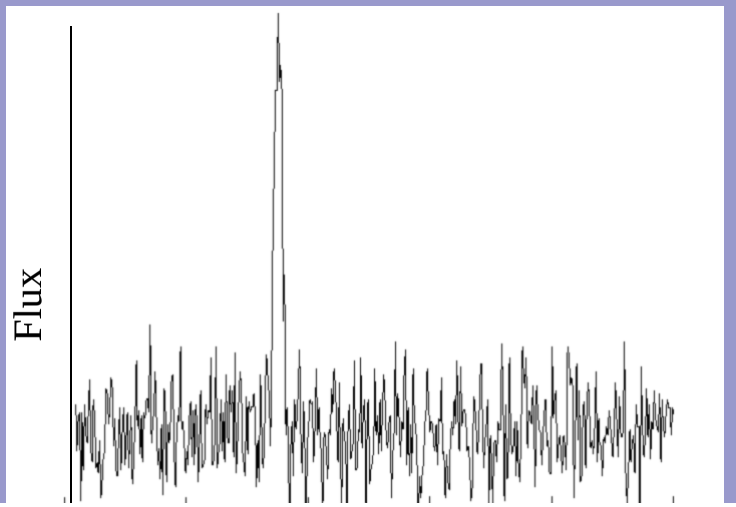
Theorists View of Gas in the Low-z Universe

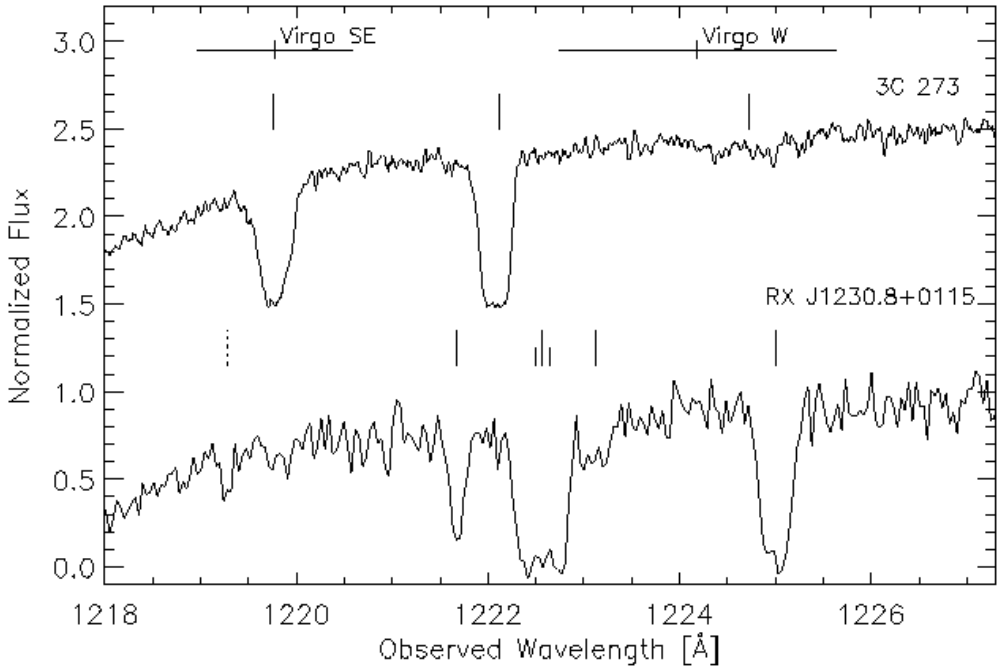


G. L. Bryan & M. L. Norman

Observers View of Gas in the Low-z Universe







Observers View of Gas in the Low-z Universe

Damped absorbers ($N_{HI} > 2x10^{20}$) can be observed at 21cm and are associated with galaxy disks

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Lyman- limit systems ($2x10^{20} > N_{HI} > 10^{17}$) are associated with galaxy halos

↓

High column density forest absorbers ($W>0.3A, N_{HI} \gtrsim 10^{13.5}$) may also be associated with galaxy halos

↙ ↘

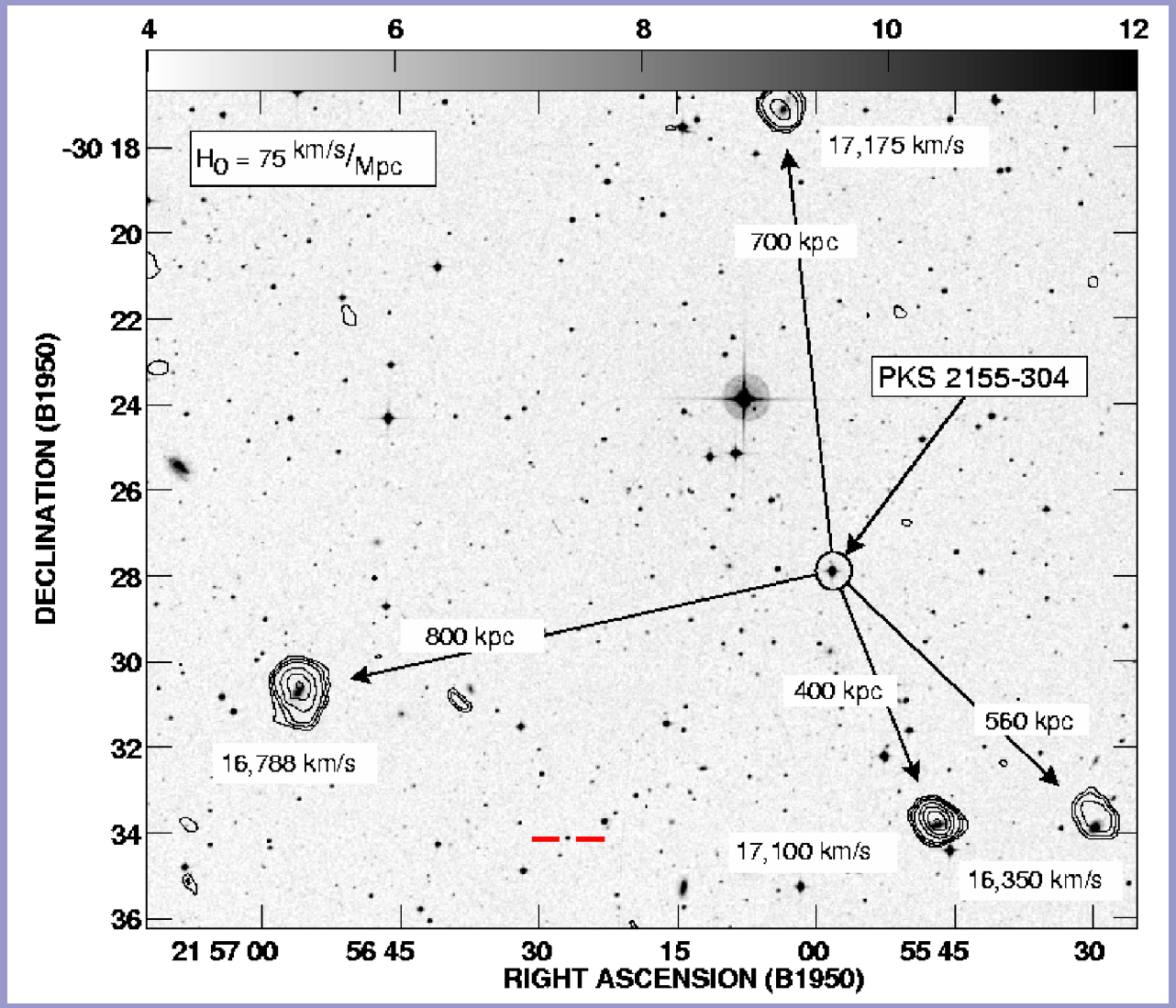
Lower column density forest is associated with galaxy halos

Lower column density forest is associated with large scale filaments

Why ask about the Relationship between Galaxies and Low-N_{HI} Absorbers?

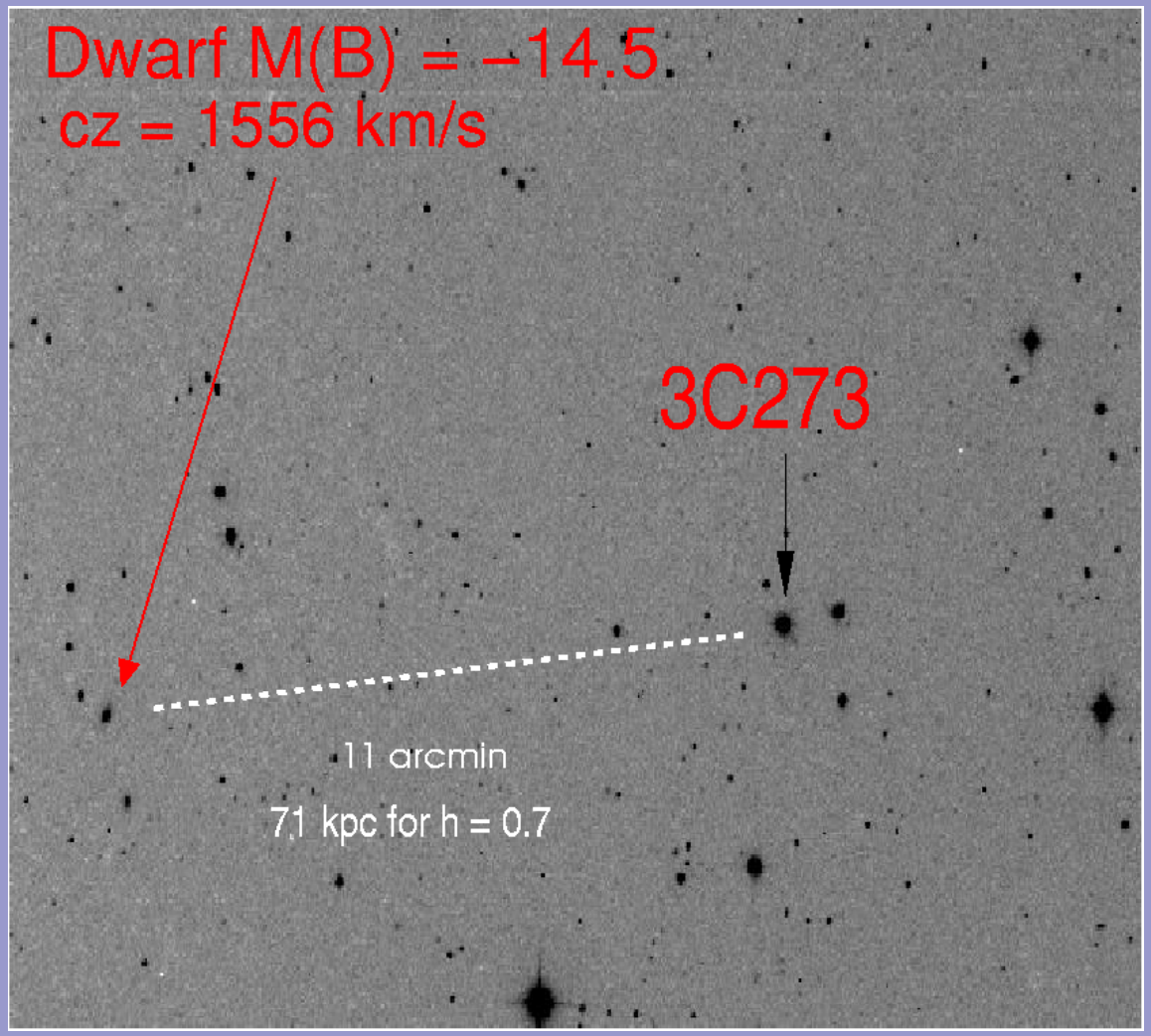
- Test and interpret theoretical models
- Constraint on formation and evolution of galaxies
- How large are galaxy halos?
- How large are absorbing structures?
- Are absorbers probing galaxy halos or filaments?

Absorption in a Galaxy Group



van Gorkom et al. 1996, AJ 112, 1397

Absorption from Galaxy Outflow?



McLin et al.

Arecibo Studies

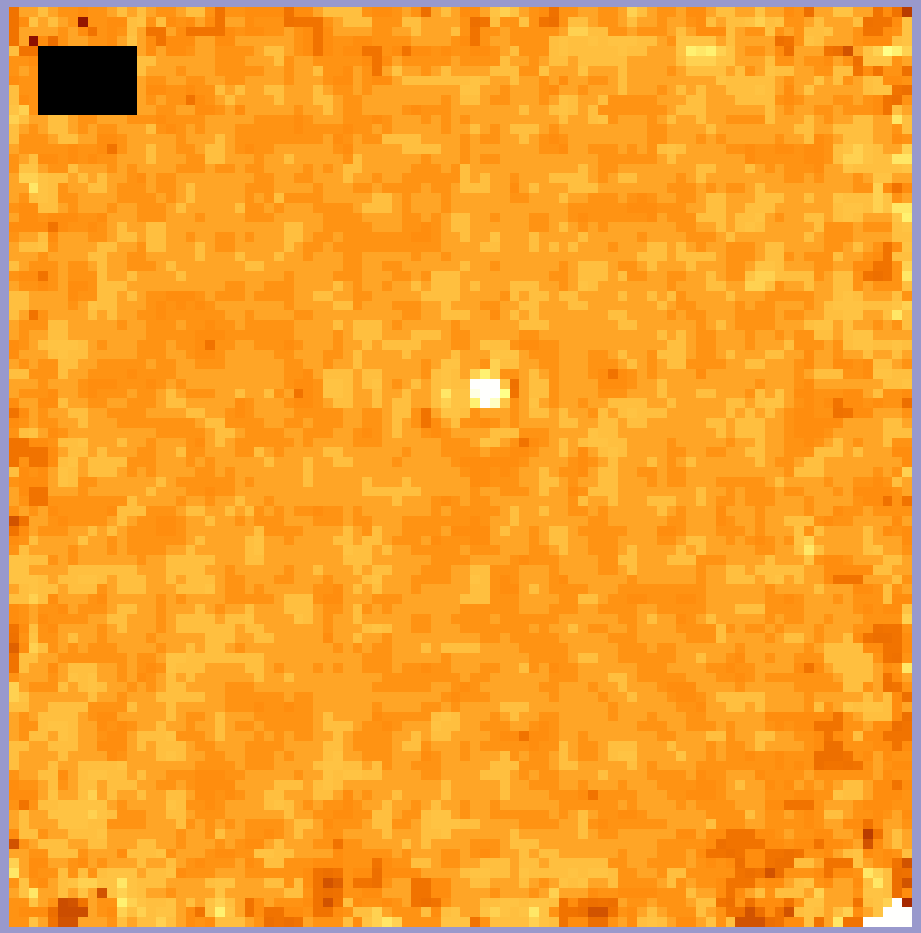
- Work in progress - results are yet to come

- Have used Arecibo to map 0.5^{o} x 0.5^{o} regions around 21 low column density absorbers in 4 AGN sight lines

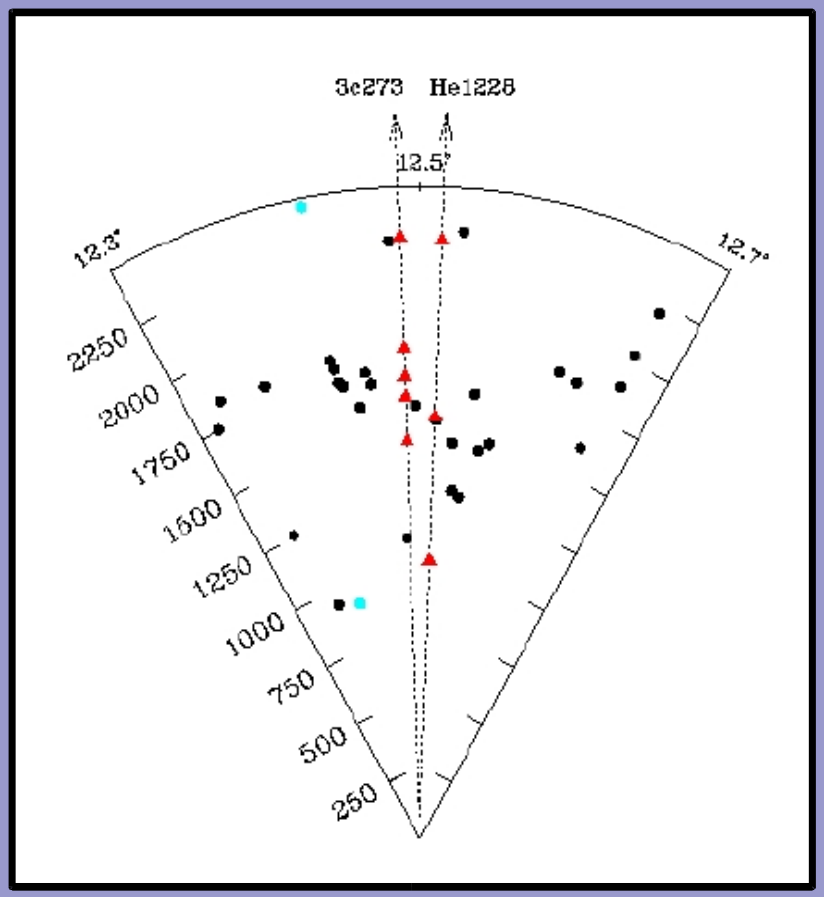
- Mass sensitivities of $2x10^{6}$ - $5x10^{8}$ M for the nearby absorbers choosen for study

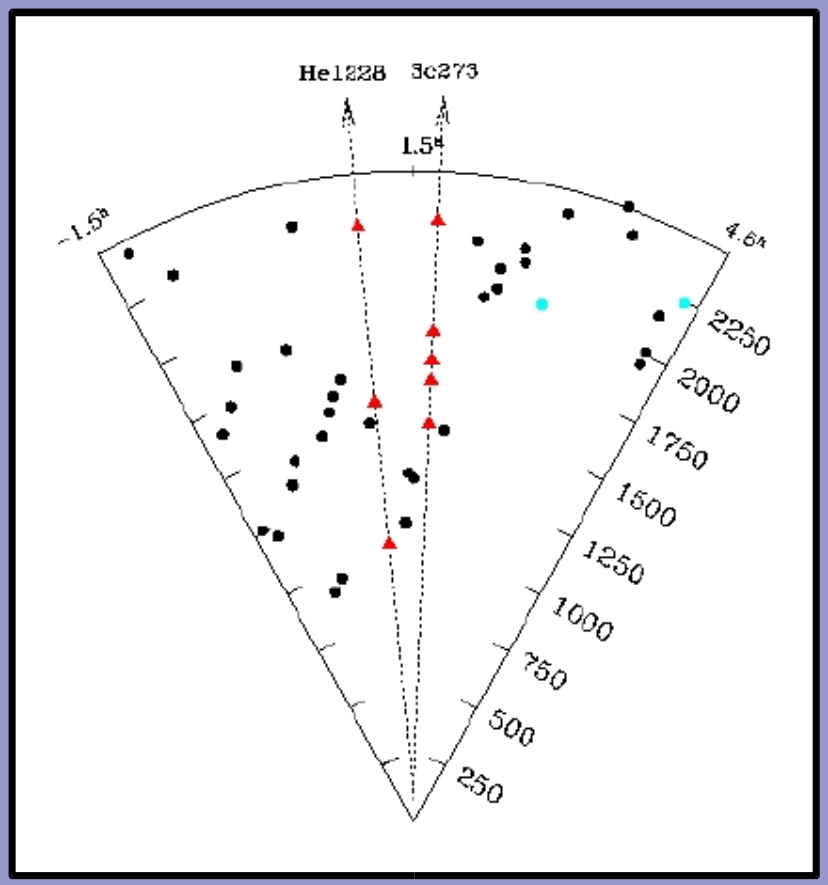
- Area surveyed is 140 kpc - 1 Mpc around these nearby absorbers

Parkes HI data cube using the Multibeam Receiver



3C 273 and He1228 Field





What will the Arecibo Multibeam Contribute?

- Examine large scale structure as defined by gas- rich galaxies around absorbers
  - Deep large area surveys will provide better understanding of the large scale environment
- Search for gas- rich LSBs near sightlines
  - Provide a complement to optical searches to remove bias towards stellar- dominated galaxies

The Future

COS, the next UV spectrograph on HST is scheduled to be launched in late 2004

COS will have 10-30 times the throughput of present instruments

A much larger sample of low-z absorbers will be available for statistical study

There will be AGN probes of galaxy halos

We must tie our understanding of low column density gas in the local universe to the distribution of higher column density gas in galaxies