21cm absorbers at intermediate redshifts

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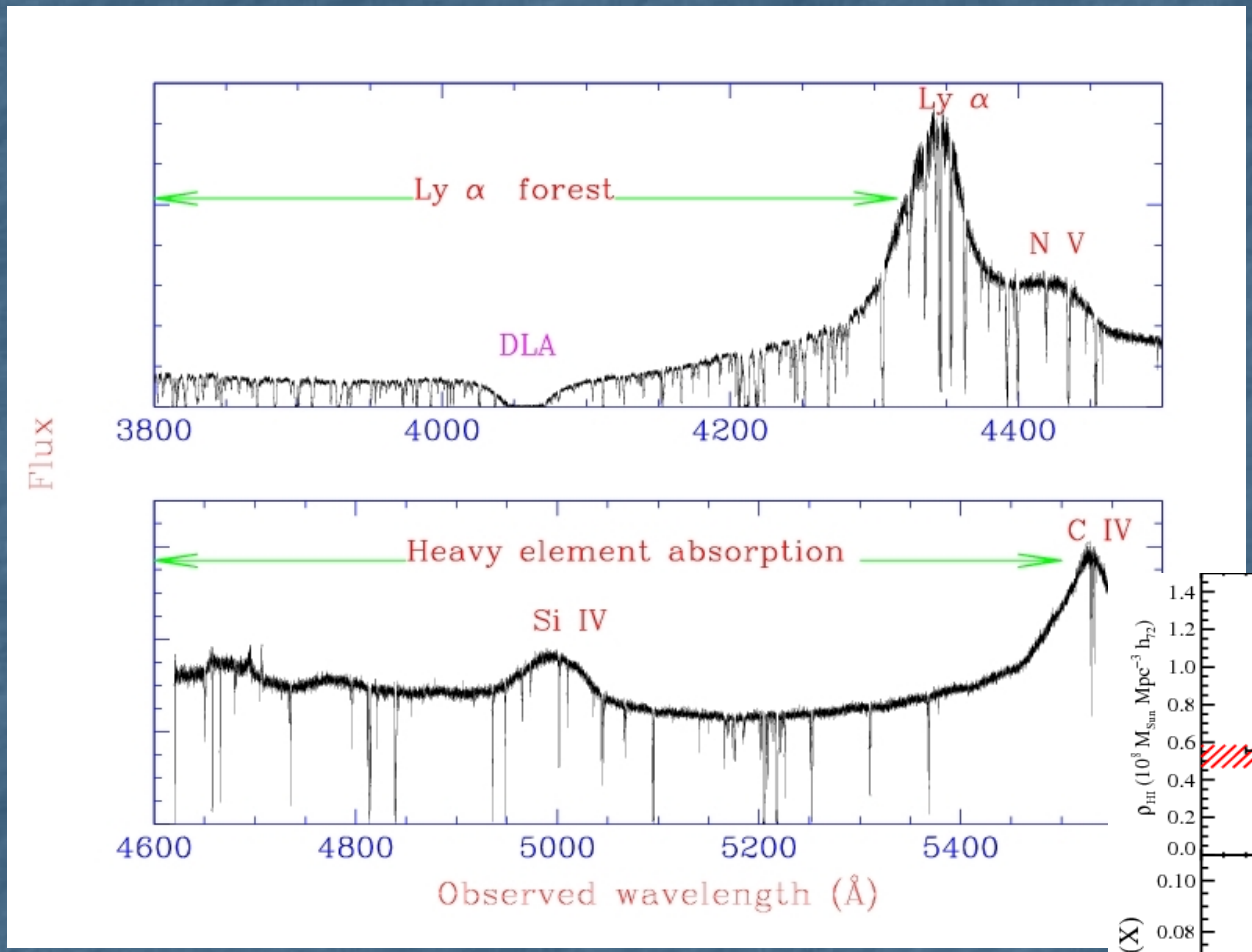
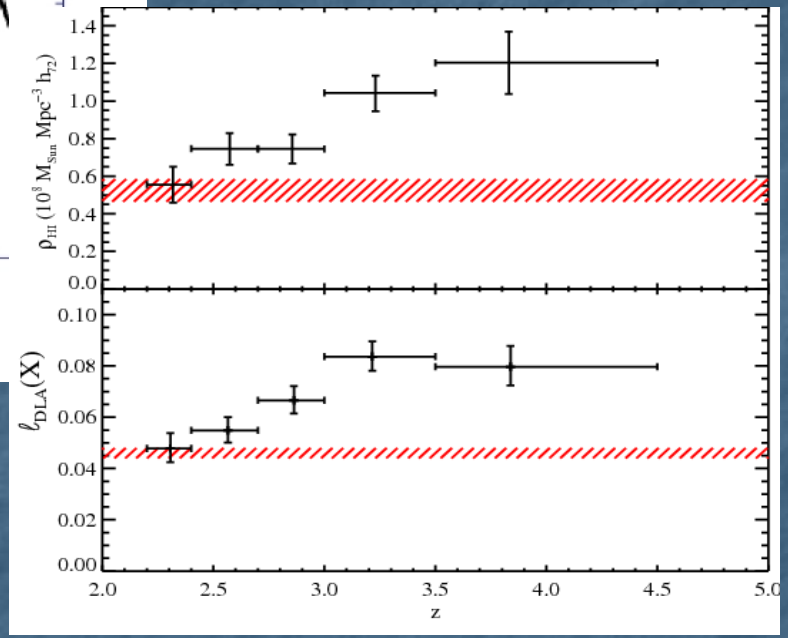
Damped Lyman- Absorbers (DLAs)



log N(HI)>20.3



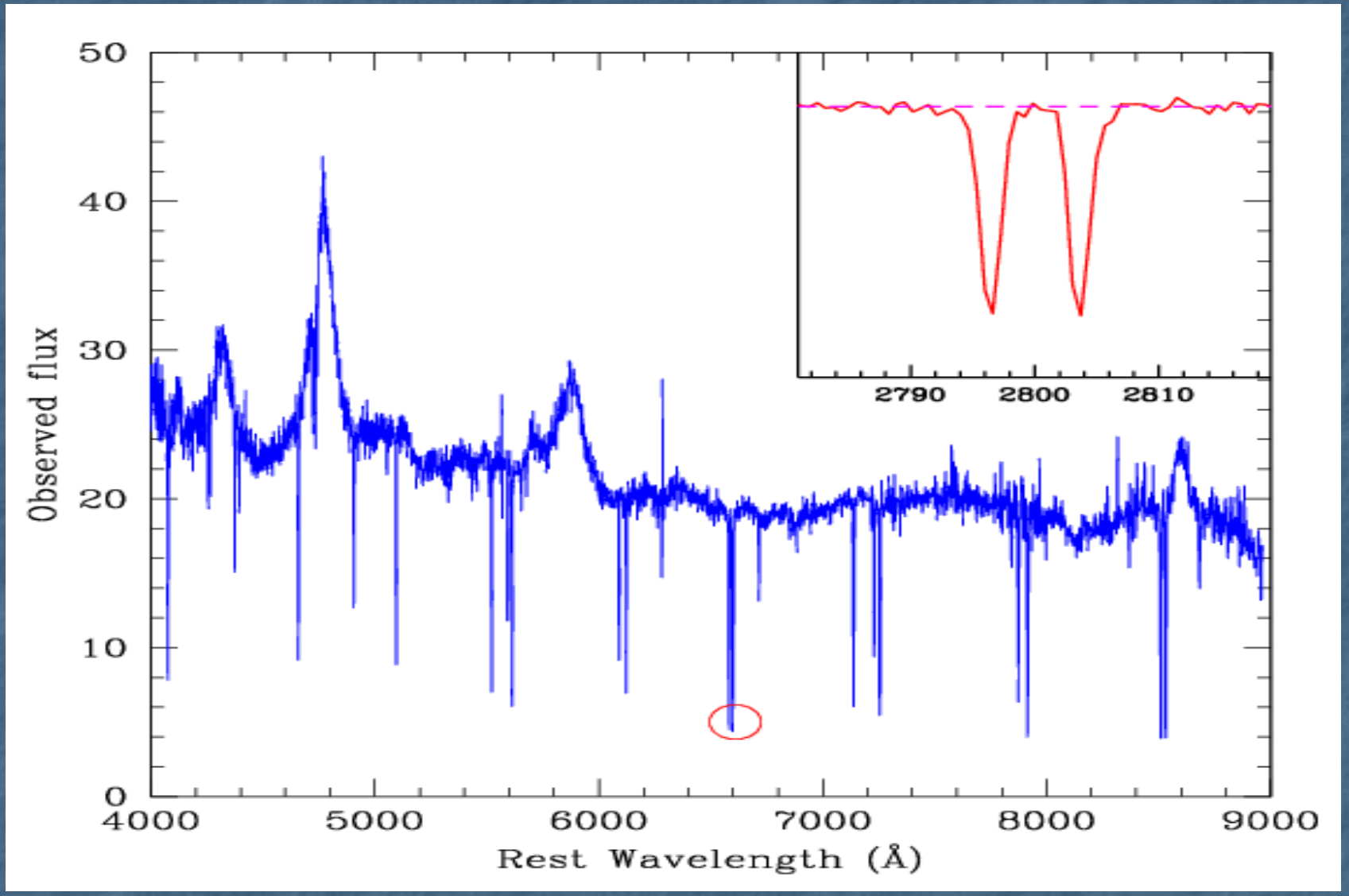
(Rao et al. 2006; Prochaska et al. 2008; Noterdaeme et al. 2009)

DLA-like absorbers at $z<2$

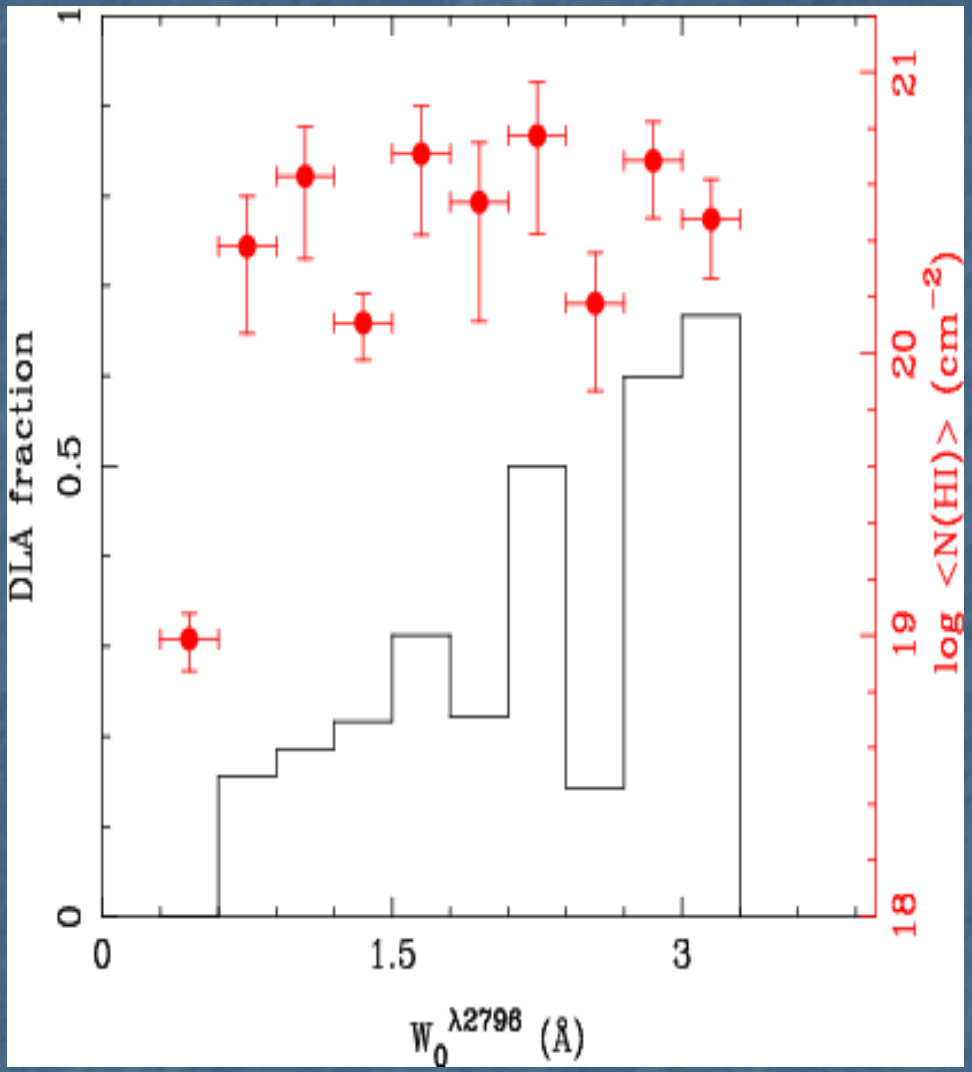
21-cm absorption surveys provide an unique method to probe the physical state of the DLA-like absorbers.

- **Blind surveys**
- **Targeted searches**

MgII systems



DLAs at z<2

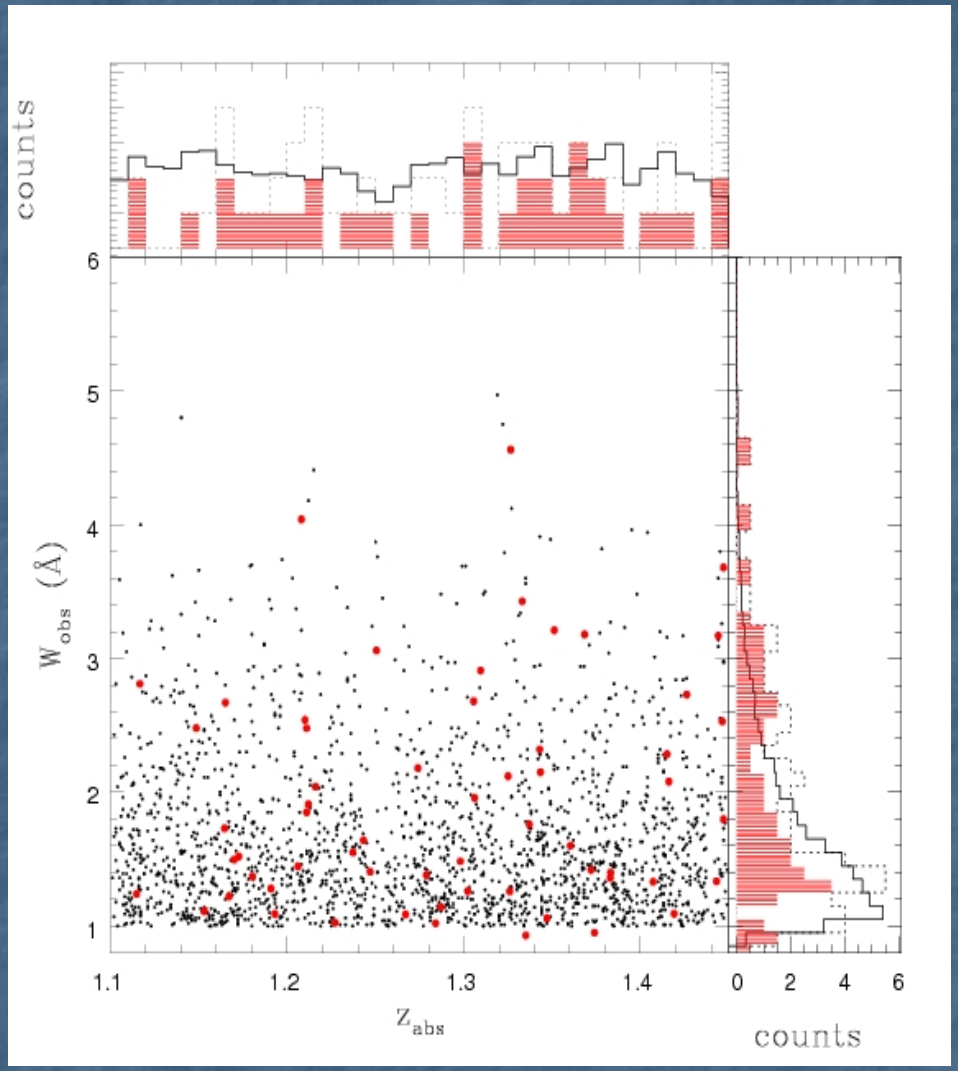


Most comprehensive HST survey of DLAs at z<2 based on the MgII systems

- **41 DLAs detected from 197 MgII systems i.e. 36% detection rate.**
- **DLA fraction increasing with W(MgII)**

(Rao et al. 2006)

Our sample of Strong MgII absorbers (W>1Å)

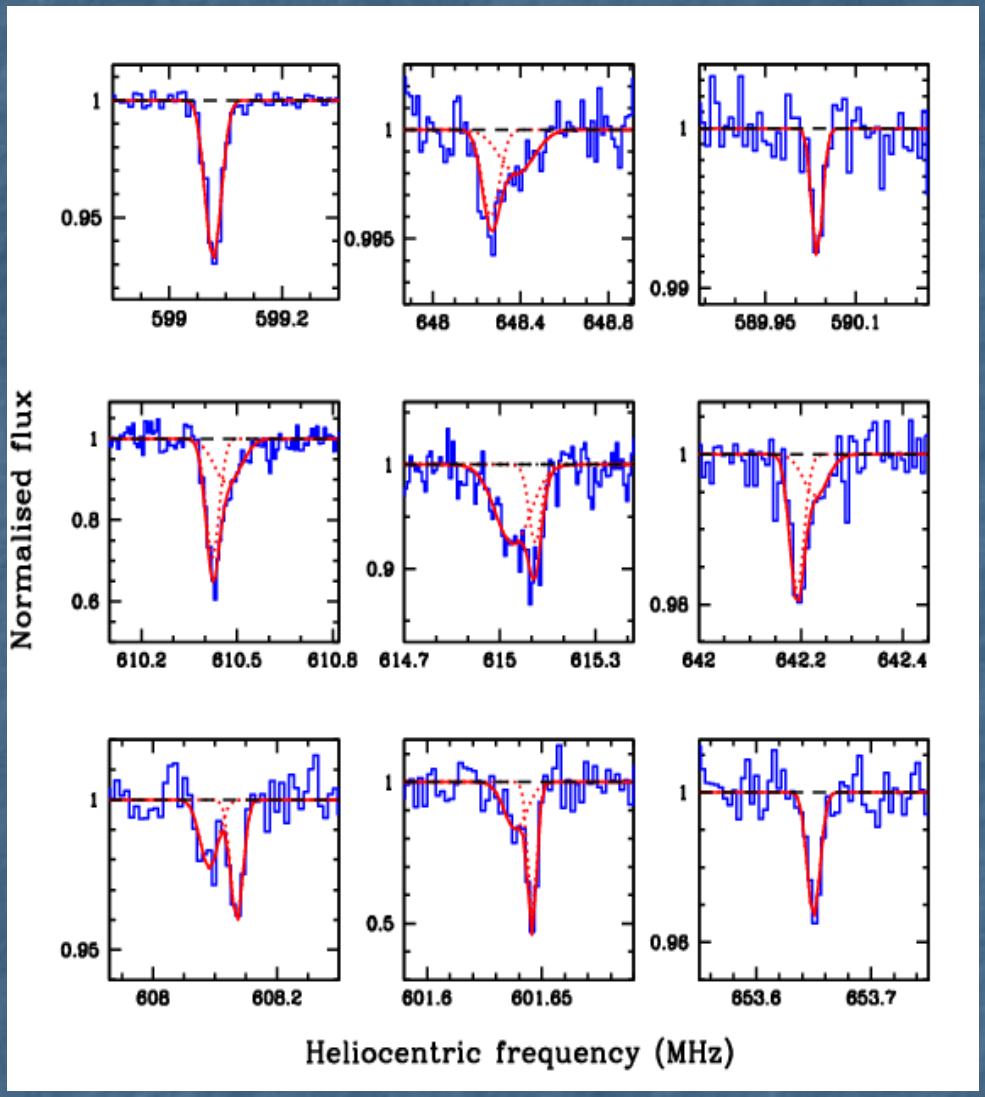


Drawn from the 3501 W>1Å MgII systems in SDSS DR5.

- **Statistically GMRT sample is indistinguishable from the parent sample.**

(Gupta et al. 2009)

Results from GMRT survey



400hrs of GMRT observations in 610-MHz band in last 2 years

- -Typically each system is observed for about 8hrs with a velocity. resolution of 3.7km/s i.e. 1MHz BB BW split into 128 channels.
- -9 new 21cm absorption detections
- -velocity widths range from 5-70km/s

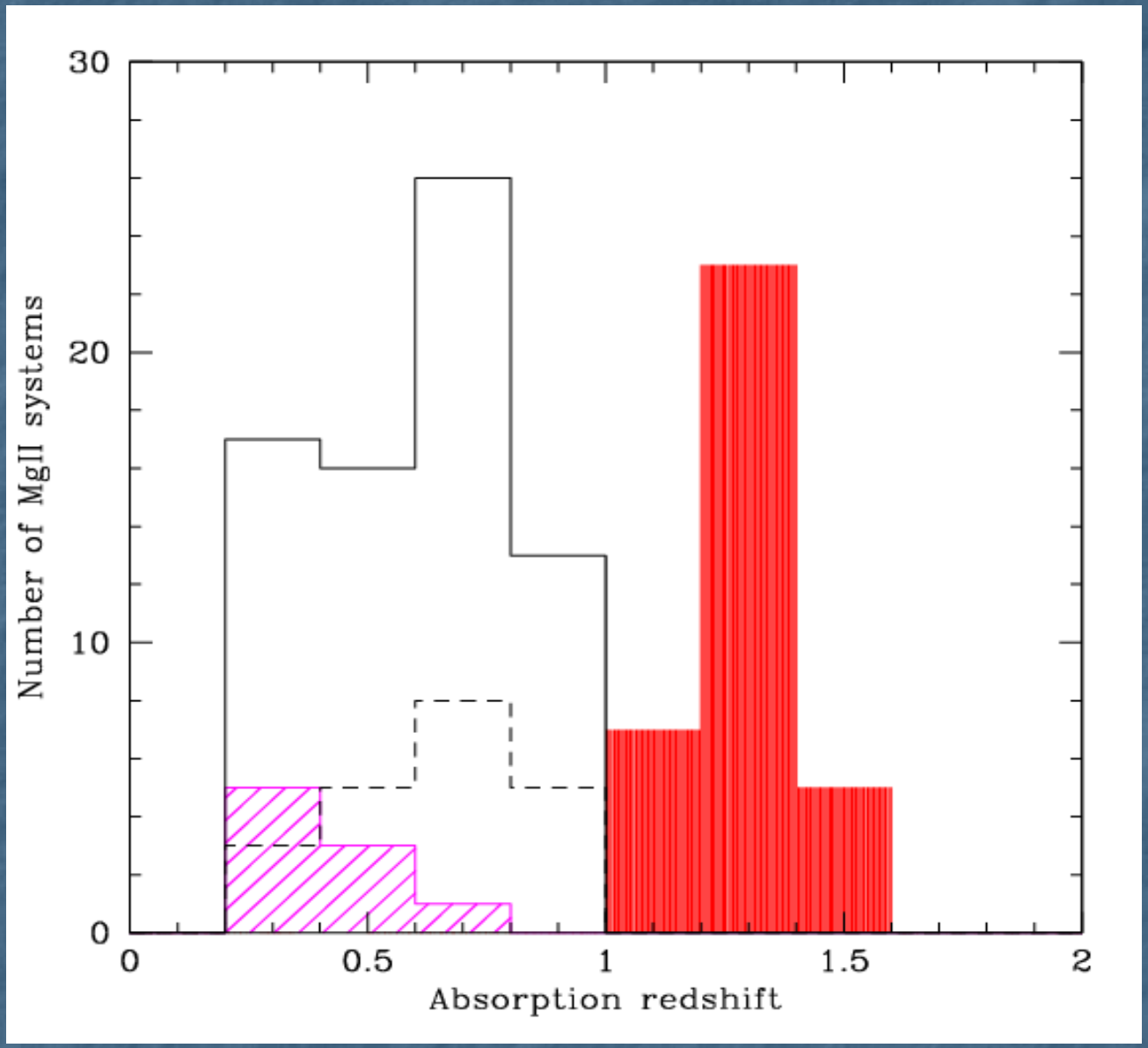
(Gupta et al. 2007, 2009; Srianand et al. 2008)

Estimating n21(z)

$$n_{21}(\tau_{21} \geq \tau_o, W_r \geq W_o, z) = C(z) * n_{MgII}(W_r \geq W_o, z)$$

$$n_{MgII}(W_r \geq W_o, z) = n_o * (1+z)^{\gamma}$$

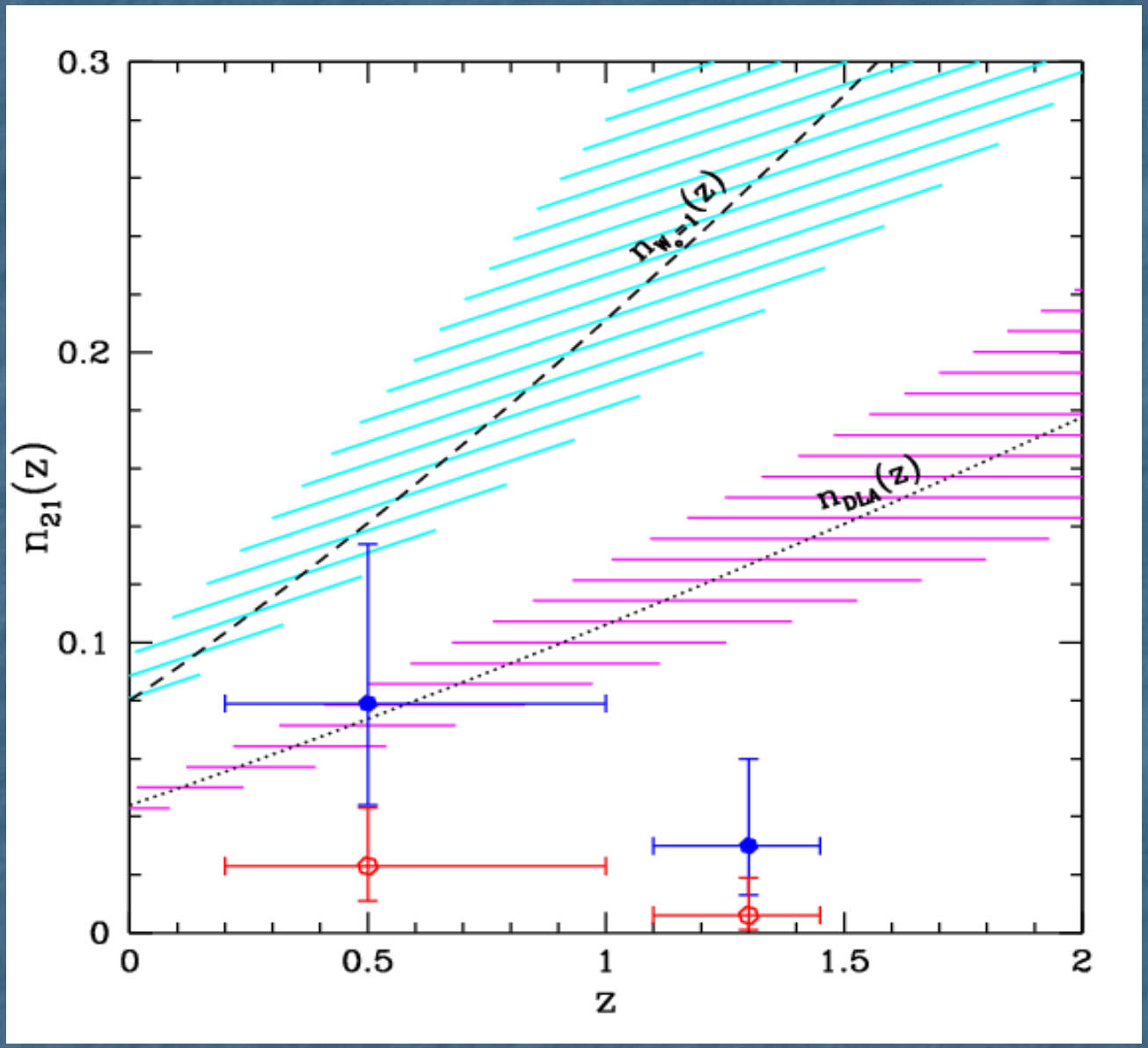
Survey design



Distribution of MgII systems searched for 21cm absorption.

(Lane 2000; Gupta et al. 2009)

Estimating $n_{21}(z)$



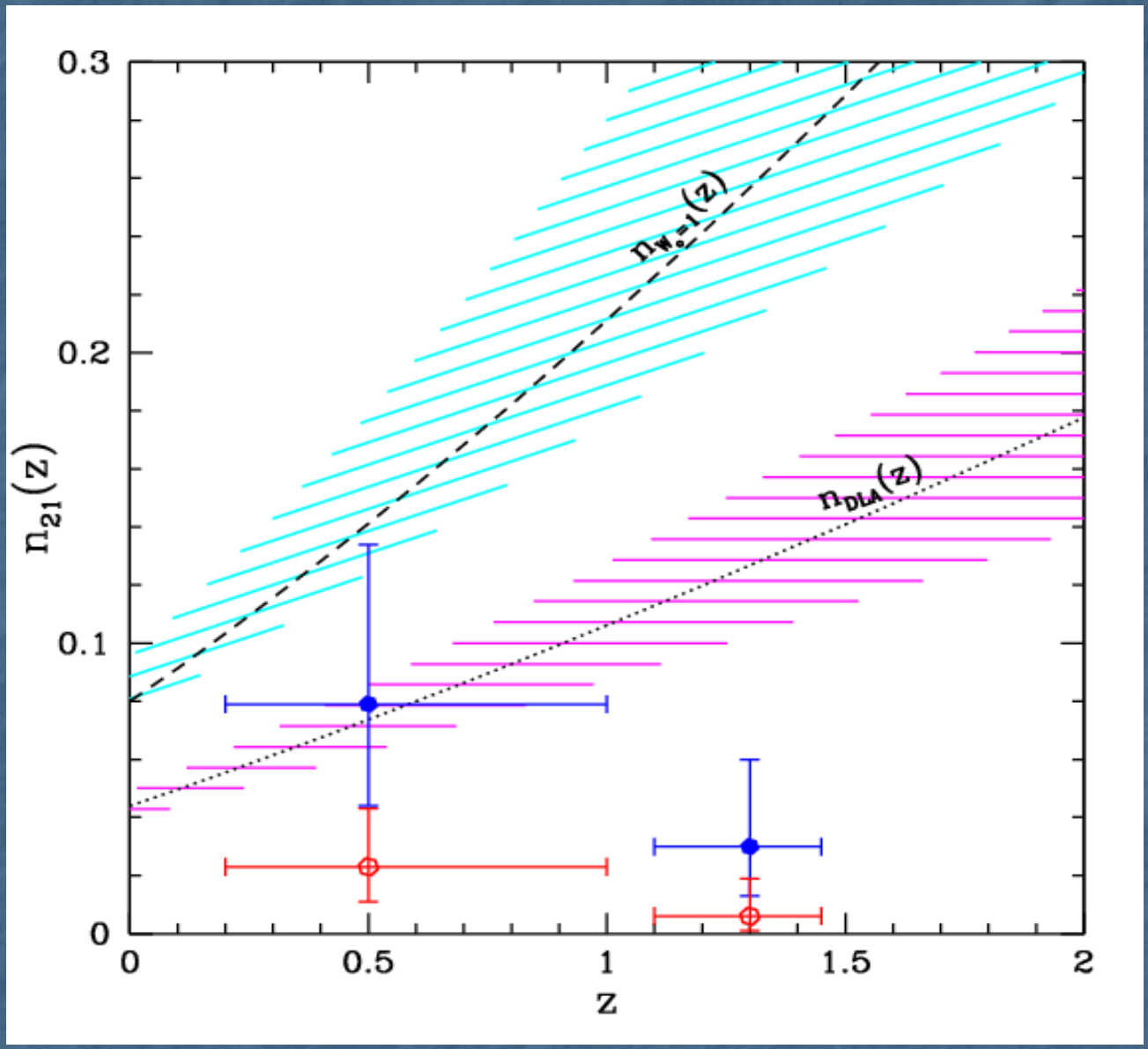
Number of 21cm absorbers per unit redshift.

(Gupta et al. 2009)

Estimating n21(z)

$$N(HI) = 1.835 * 10^{18} (T_S / f_c) \int \tau(v)\, dv$$

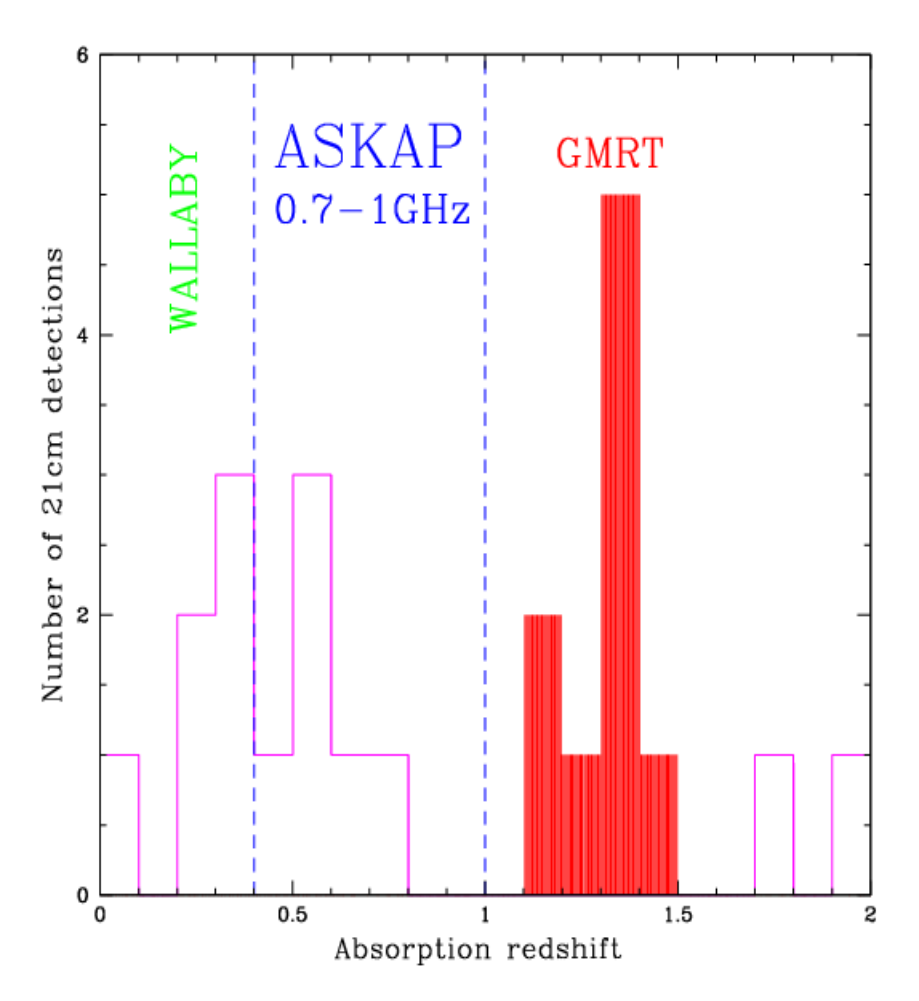
Estimating $n_{21}(z)$



Decrease most likely due to the decrease in the CNM covering factor.

(Gupta et al. 2009)

ASKAP blind 21cm absorption survey



ASKAP survey with 150 pointings of 20hrs each (3000hrs) i.e. Covering 0.5π sr of the sky will be sensitive to detect CNM in 700 absorbers.

Instataneous BW of 300MHz and FOV of 30deg^2 .

Survey goals

- Constrain the atomic gas cross-section
- Constrain the molecular gas cross-section
- Time variation of fundamental constants
- Associated absorbers