

# SKA-I: HI Absorption

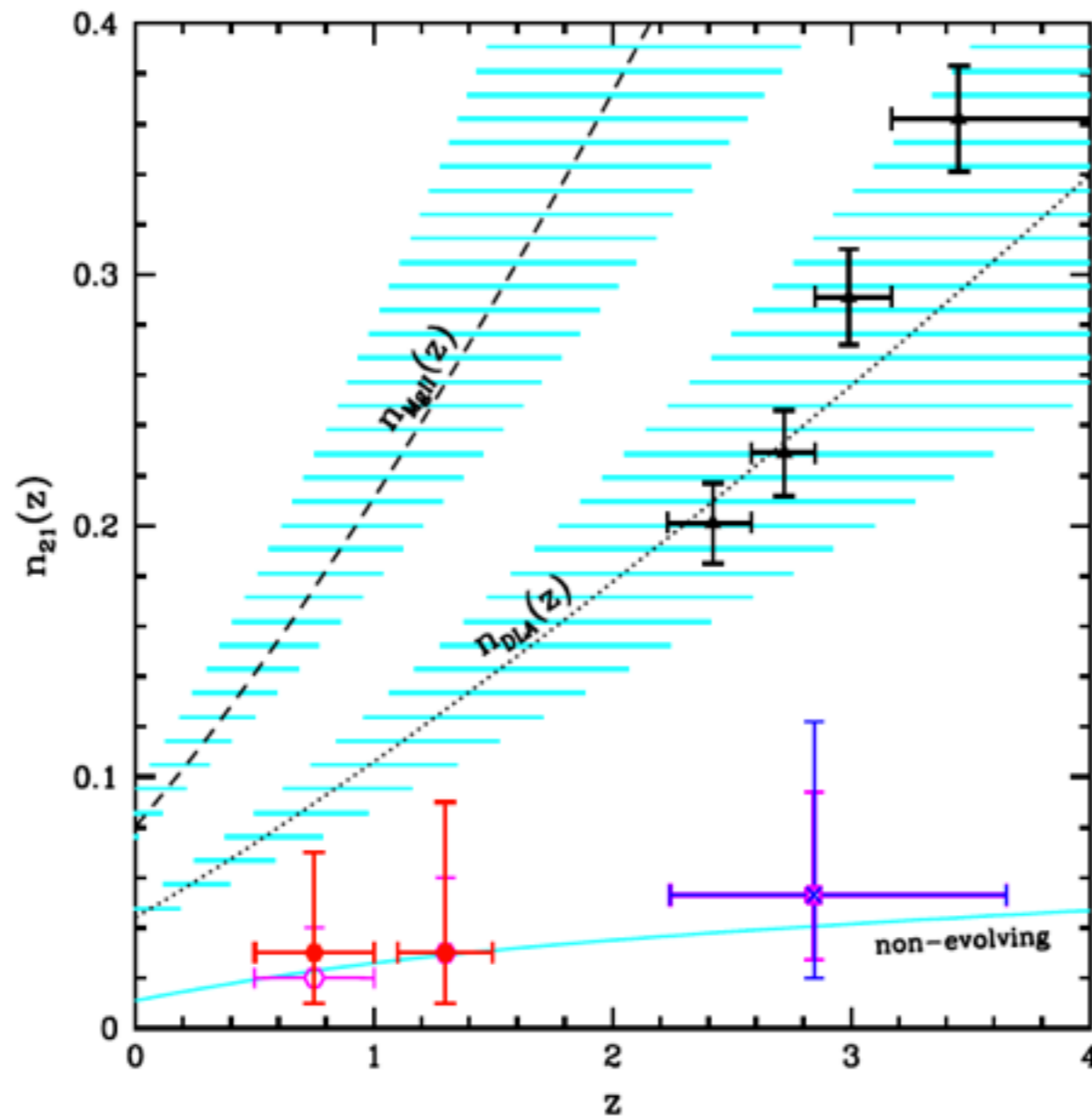
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SKA - 2013



# Number density of 21-cm absorbers



No significant evolution !  
Large errors !  
(Only ~50 absorbers)

Apertif, ASKAP, MeerKAT: ~1000 absorbers known.  
 $dn/dz$  constrained to ~10-20% accuracy at  $z < 2$ .



## SKA-I survey and mid

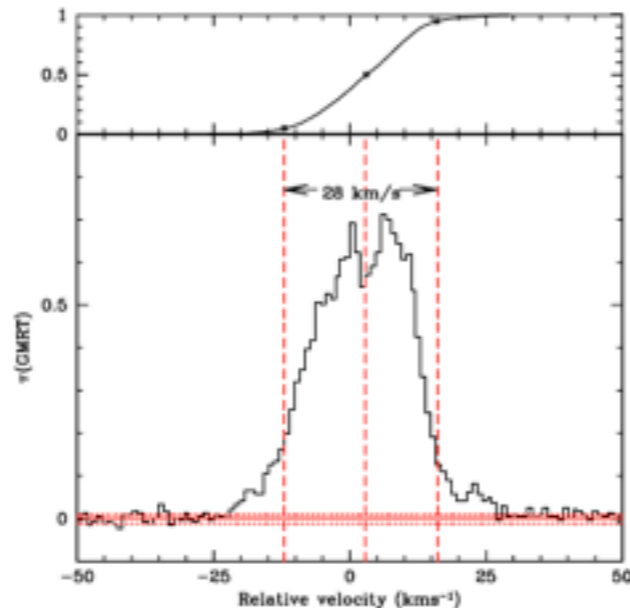
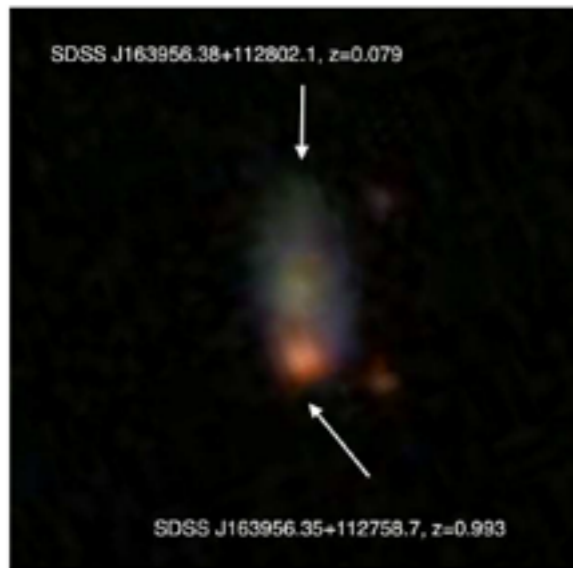
- ◆ Improved sensitivity: faster surveys, more detections.  
Useful and obvious; velocity resolution adequate (1km/s).

## SKA-I mid

- ◆ Frequency coverage: unexplored redshift range  $1.5 < z < 3$ .  
Complementarity with ELTs.
- ◆ Due to better sensitivity wrt MeerKAT/JVLA: MeerKAT absorption survey, for example, detects gas colder than 3000K for DLA  $\log N(\text{HI}) = 20.3$ . With the improved sensitivity WNM i.e. **entire HI along the sight line can be detected in 1-2 hrs** integration towards  $>300$  mJy sources.
- ◆ Factor 6 better sensitivity wrt JVLA: **Zeeman splitting!**



# SKA-I mid (cont.: Zeeman)

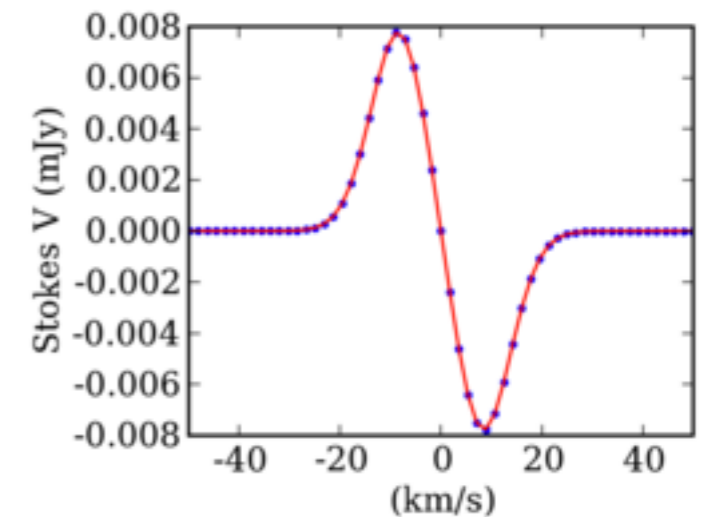
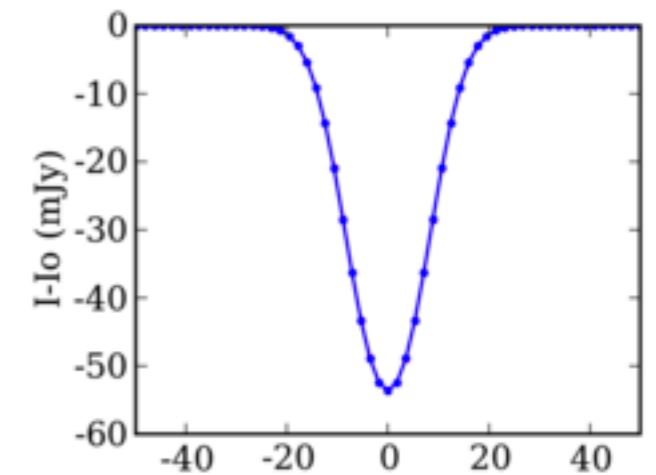


(Top)

Typical high-N(HI) absorber detected towards 100 mJy source(s) from upcoming surveys not affected by dust extinction.

**\*\*\*First detections of Zeeman in normal galaxies\*\*\***

**Detectable with SKA-I mid in tens of hrs.  
Ensure stokes-V polarization purity in the  
integrated MeerKAT and SKA-I system.**

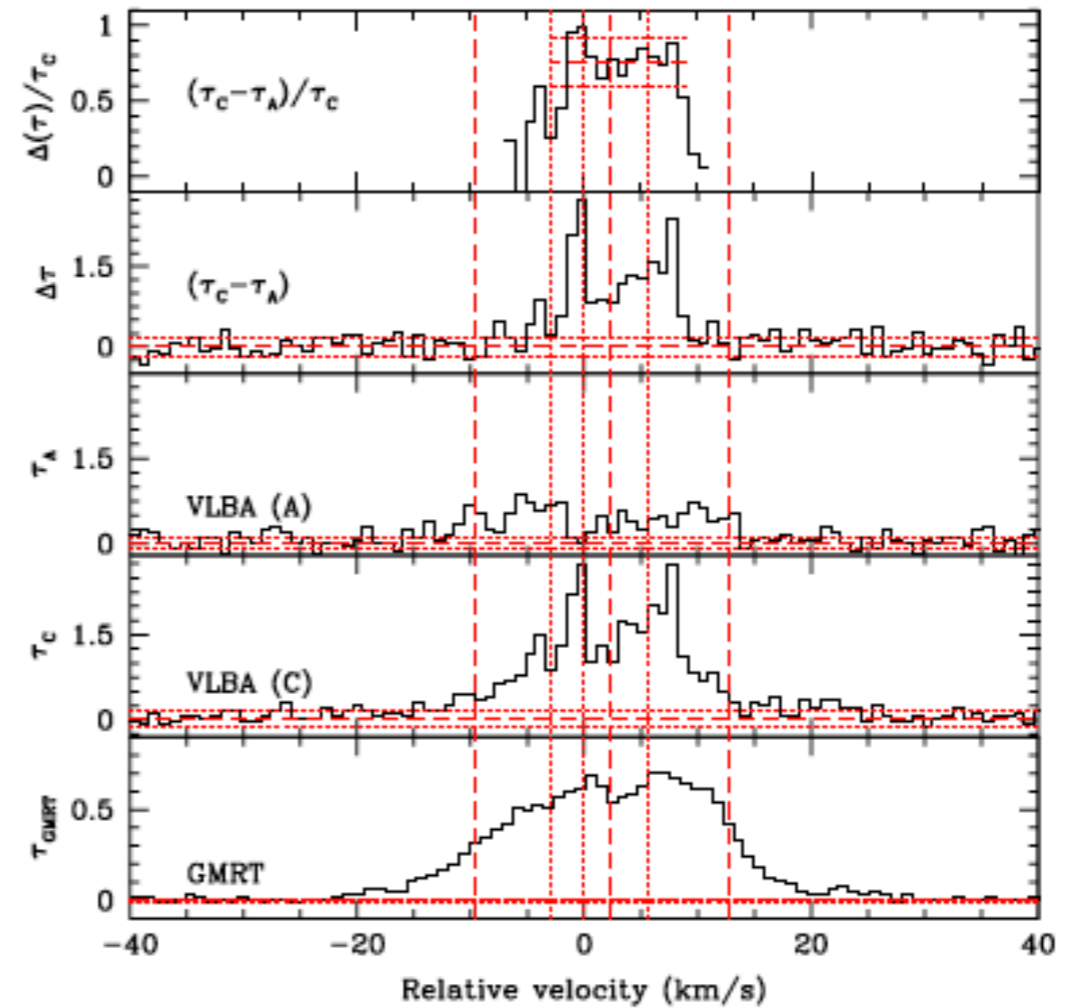
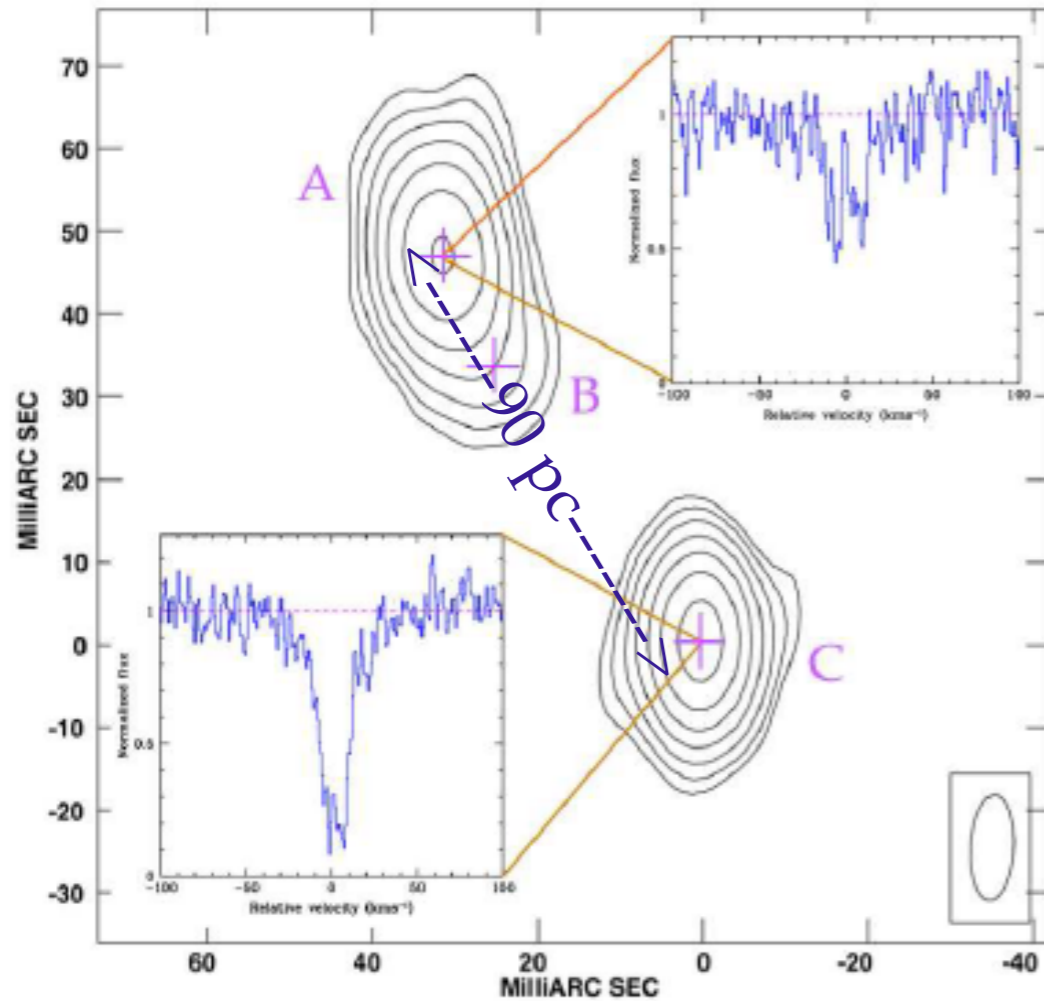


(Right)

Signal expected for 6 uG field.



# Not considered: pc scale structure in gas



Important but well beyond the scope of configurations offered. Lack of mas scale spectroscopy capability will limit the scope of some science that **can only be done** at radio wavelengths.

