

21 cm cosmology and the BINGO radio telescope



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ABSTRACT

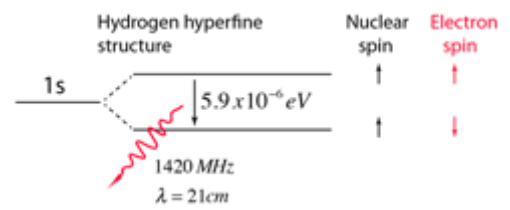


One of the most effective probes to investigate dark energy properties are the baryonic acoustic oscillations (BAO), detected for the first time in 2005. BAO are also being studied the radio band, through the emission of 21cm hyperfine transition of neutral hydrogen, directly relating observed frequency band to cosmological redshift space. The BINGO radio telescope is a new instrument designed to measure BAO in the radio band in the redshift band $0.13 < z < 0.45$, corresponding to a frequency band $980 < \nu < 1260$ MHz. We present here the basics of 21cm BAO cosmology, and the current development status of the BINGO radio telescope.



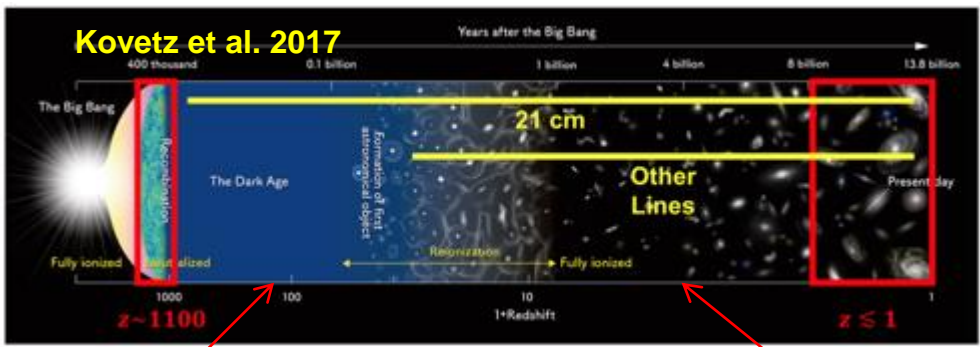
BINGO Science goals

- Measure BAO on top of the 21 cm HI spectrum
- HI intensity mapping can be used as mass tracer, probing distortions in redshift space and checking BAO anisotropy

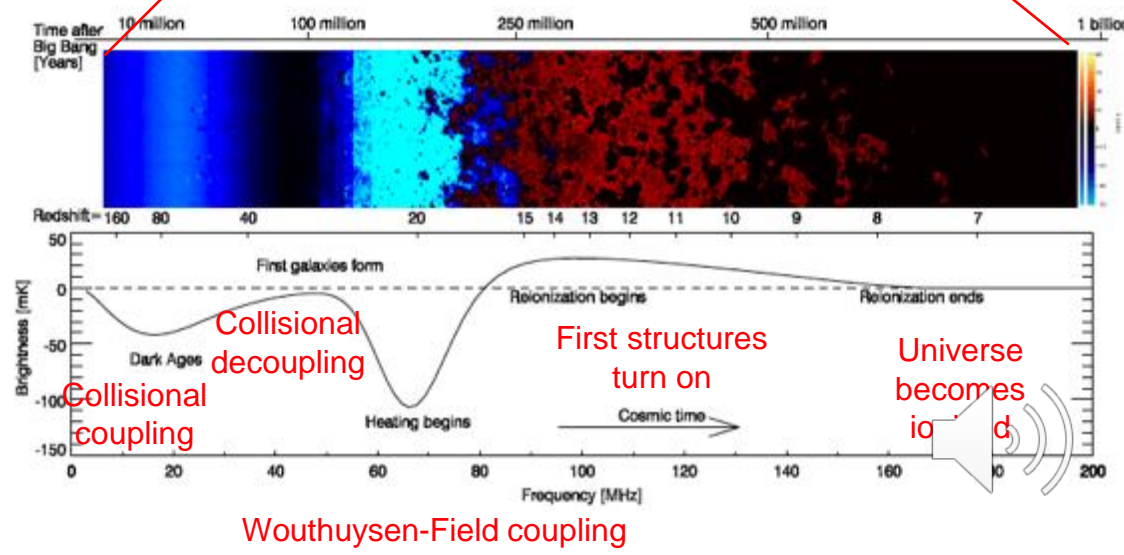
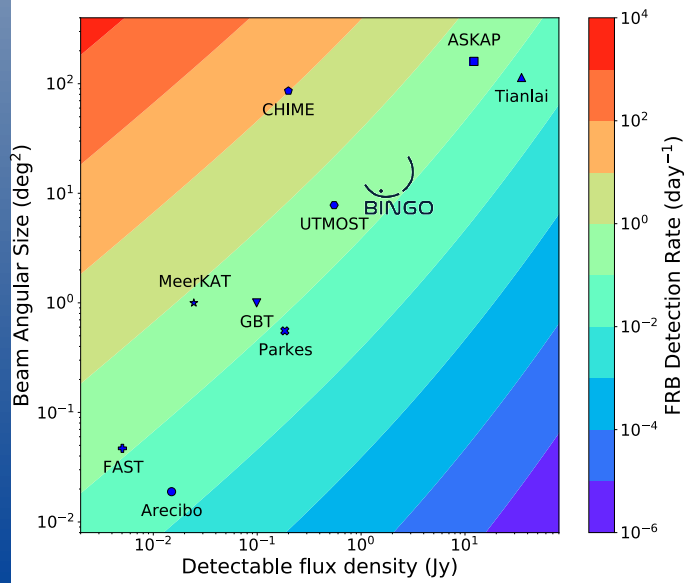


Additional science

- Life history of hydrogen
- Radio recombination lines
- Galactic continuum
- FRBs**, delivered for free due to the nature of BINGO observational strategy



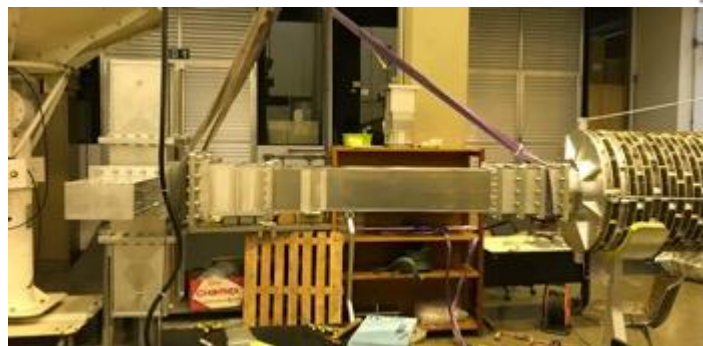
Pritchard & Loeb (Rep. Prog. Phys., 2012)



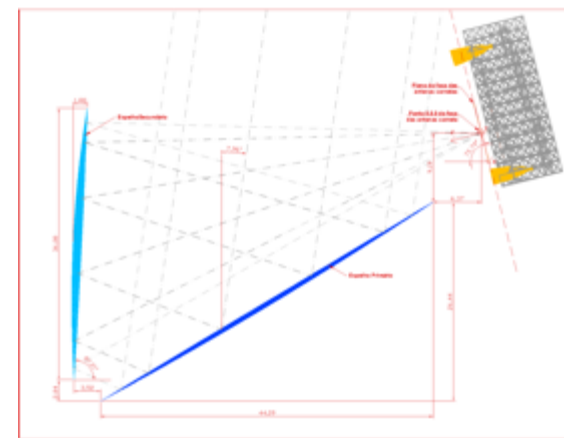
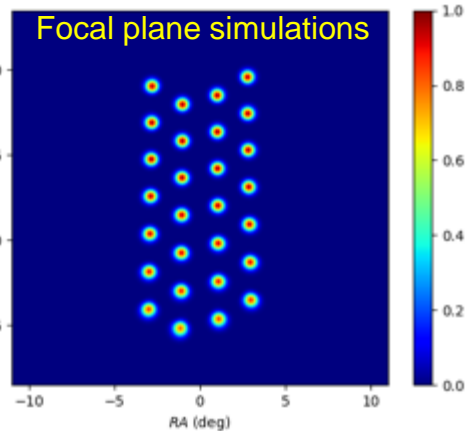
Optics - design completed, construction to start 2020



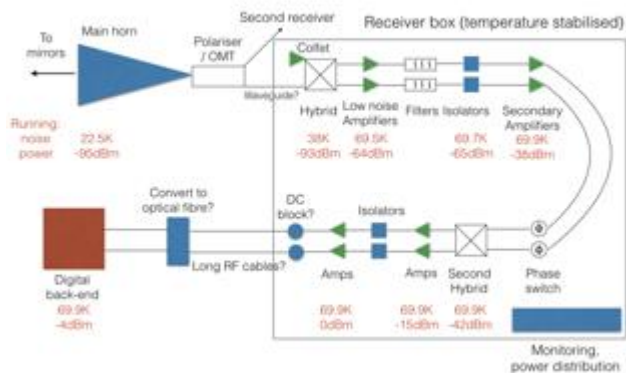
Horn - Testing completed



Front end Testing completed



| FIDUCIAL BINGO (Phase 1) | |
|----------------------------------|------------|
| T _{sys} (K) | 70 |
| Frequency band (MHz) | 980 – 1260 |
| Focal length (m) | 63.2 |
| Primary parabola diameter (m) | 40 |
| Secondary hyperbola diameter (m) | 34 |
| Optics FWHM (deg) | 0.67 |
| Horns | 28 |
| Sensitivity (μK, 1 yr) | 45,5 |
| Survey area (square deg) | 6000 |



Receiver - Testing ongoing

| Site coordinates (Aguar, PB) | |
|------------------------------|----------------|
| 7° 2' 27.6" S | 38° 16' 4.8" W |

