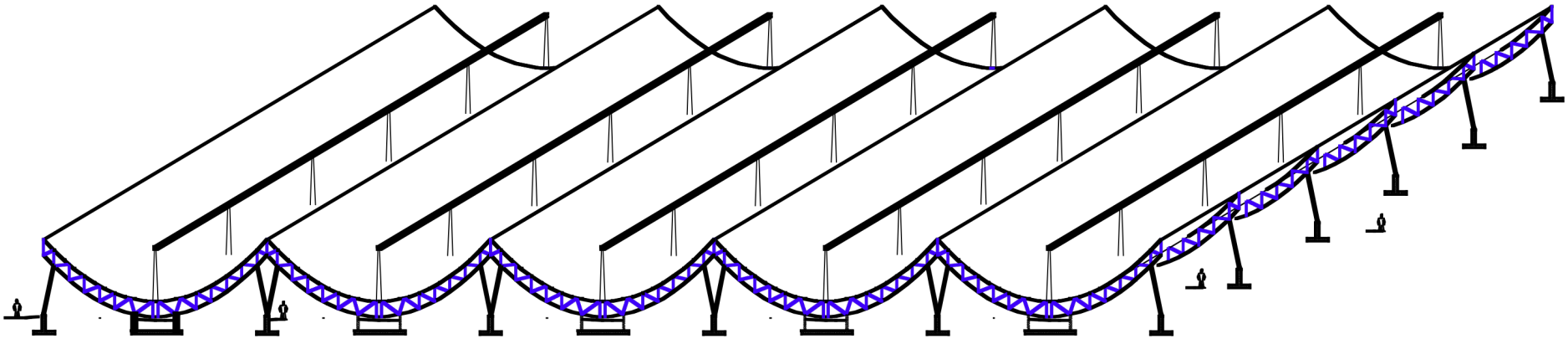
CHIME

Collaboration of UBC, McGill, Toronto
Maps 21cm from 0.8<z<2.5 for BAO
Funding officially announced by CFI Jan 15, 2013.
Pulsar calibration: holography, polarimetry
Active RFI cancellation (c.f. Parkes)



Nominal Design

Driven by 400 MHz (z=2.5): worst resolution, least sensitivity, smallest size structures.

@z=2.5: widest baseline=80m, l=700, k=0.16h/Mpc, 3rd BAO peak.

Cylinder minimum spacing: z=0.8, to see third BAO peak from intercylinder correlation: 20m, l=330, k=0.16. Short spacings include range of 10-30m, so k=0.1-0.3, well matched to 2nd and 3rd peaks

Telescope Parameters:

5x(20mx100m cylinders)

N^2/Hybrid/FFT/beamformer correlations

50K T_{sys}

Feeds spaced ~λ wavelength

Incommensurate receiver spacing

Call for pulsar interest

Software backend can provide baseband beams.

400 MHz BW, transit time> 10 min/cos(delta)

Daily DM/RM monitoring for all visible pulsars?

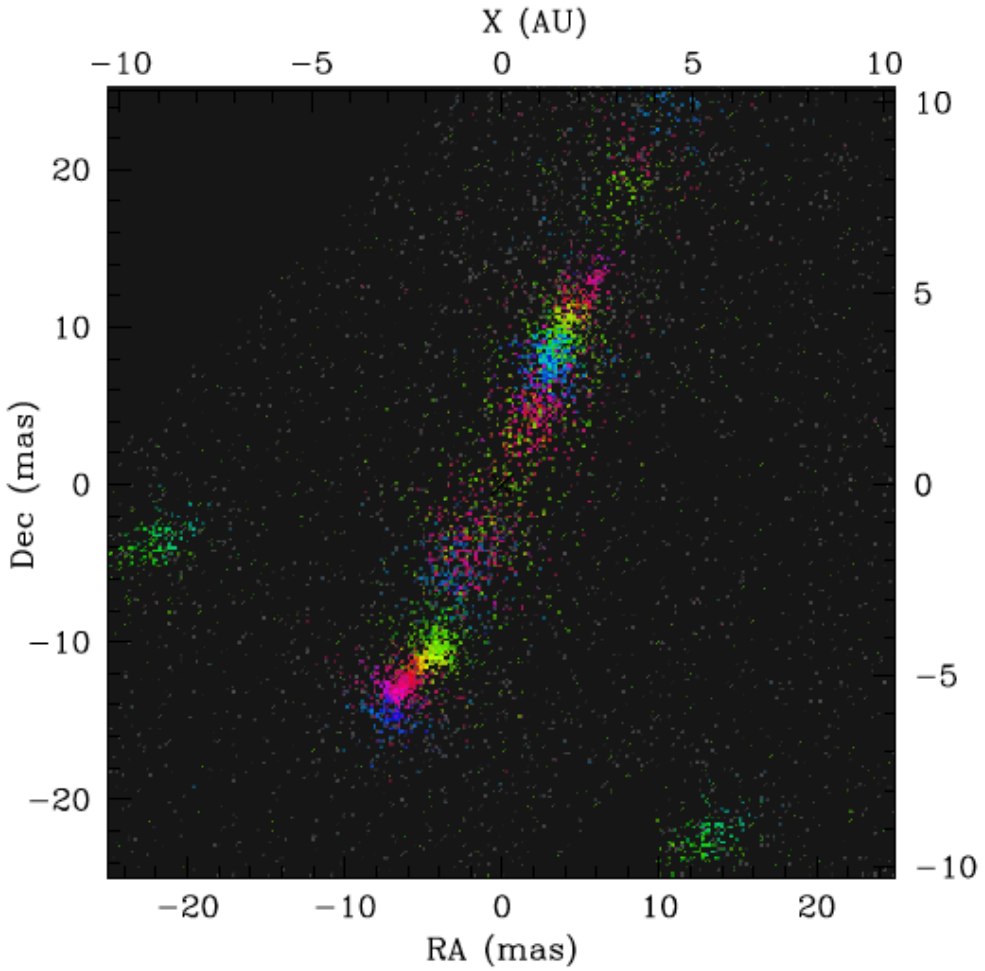
May achieve better than 50 μJy complete pulsar survey

Transients: RRATs, lorimer events, etc.

Needs interest and participation from community.

Pulsar ISM

Use ISM as telescope for precision parallax



Brisken et al 2010, Pen et al 2013

50 picoarcsecond astrometry

Potential for precision pulsar distances (King&Pen 2012). Doubles PTA sensitivity, high angular PTA resolution (Boyle&Pen 2012)

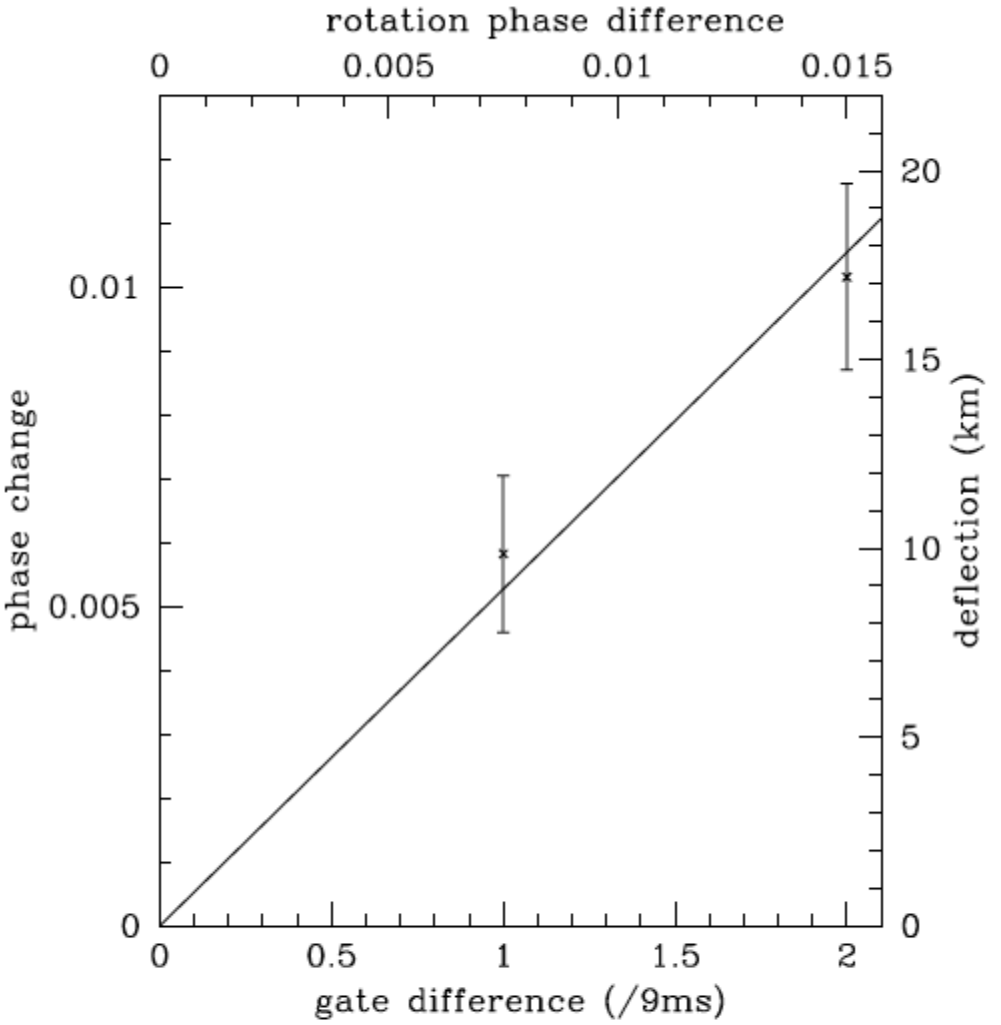


Figure 6. Pulsar motion projected along scattering axis. The horizontal axis is the time difference, the vertical axis is the apparent motion shift along the scattering axis, scaled to a doppler velocity of -15mHz. The changes are always small. The error is about 1/1000 of a radian, wich reflects the signal-to-noise of the measurement.

Future directions

Low frequency monitoring: precision measurement of DM

Low frequency VLBI: precision ISM parallax, potential for precision descattering

CHIME: pulsar participation invited. Talk to us!