

# **HBA test plan**

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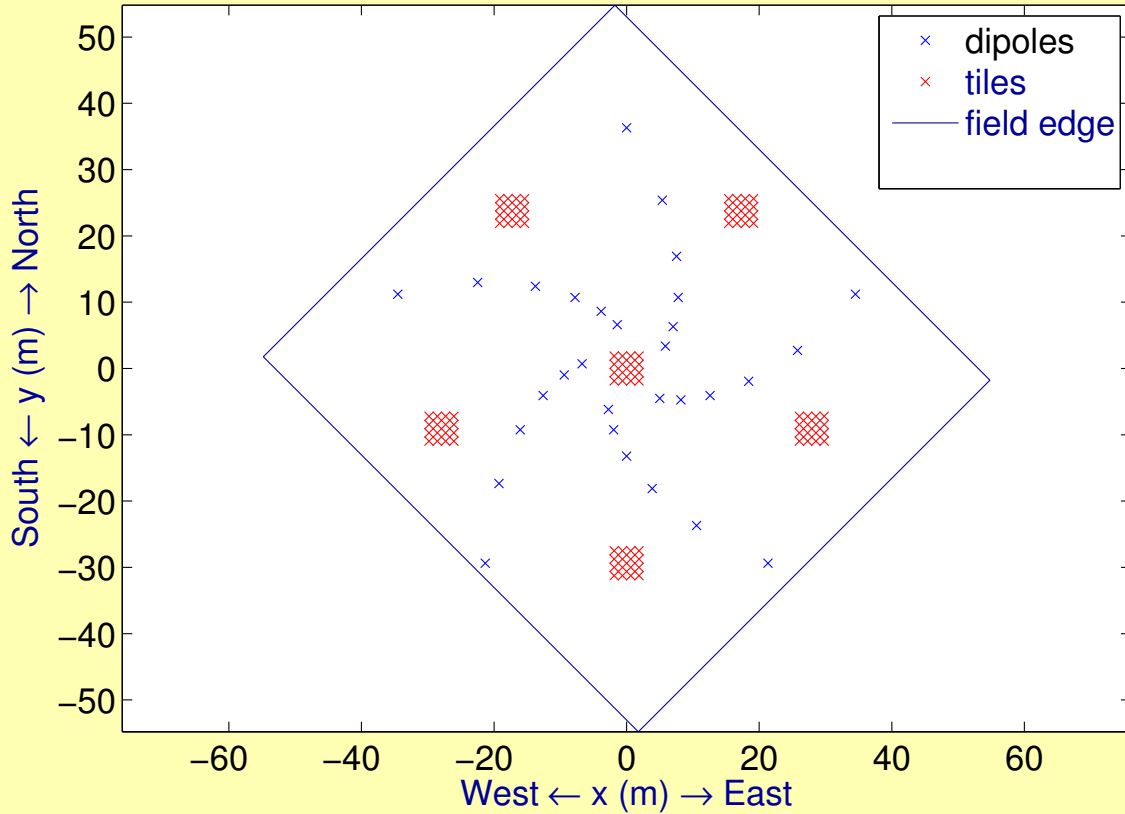
# Outline

- Objectives
- Configuration
- Experiments: single dipoles
- Experiments: tiles

# Objectives

- Validate tile **beam models** (in full **polarization**) as function of
  - Pointing position
  - Frequency
  - Time
- Determine extent of **crosstalk** between **tiles**
- Assess **stability** of tile parameters
- Find as many **tile defects** as possible
- Assess magnitude of **differences** between tiles
- Determine effect of tile **rotation**
- Test beam tracking

# Configuration



# Configuration

Properties of setup:

- No clock distribution problems
- CEP can correlate up to 32 (48) subbands with 256 channels each for 4 dipoles
- STATCOR can correlate all baselines for up to 48 antennae/tiles for one subband of one channel
- One can validate existing beam models, not measure actual beamshape
- CEP and STATCOR experiments can run simultaneously
- no beamforming or delaycompensation when using STATCOR

# Experiments: single dipoles

- Scan all subbands in order to find cleanest subbands (done last night, 195 kHz resolution, STATCOR)
- Scan smaller selection of bands at high spectral resolution (763 Hz, CEP)
- Validate single dipole beam models (CEP+STATCOR)
- 3× a single 48 hour synthesis in small selection of subbands (STATCOR)

# Experiments: single dipoles

Beam validation:

- Beam models:
  - EM simulation + low order analytic expansion fit to those models (expansion by Johan Hamaker)
  - Attempt at analytical model analogous to LBA model (Sarod Yatawatta)
- Predict CasA + CygA visibilities on intermediate baselines ( $20 - 150\lambda$ ) using beam models
- Correct visibilities for receiver Jones matrix with constant amps on diagonal, constant complex off-diagonal terms, and time variable diagonal phases
- Compare model prediction to observed cross correlations. ( $3 \times 4 \times 8$ h, 8 subbands, 60s integration, STATCOR)

# Experiments: tiles

## Beamshape

- **Cross-talk** between dipoles important: use **EM models** of complete tiles
- **STATCOR** Procedure during each of  $3 \times 4$  nights of 8 h per night:
  - form cross correlations between **all dipoles** and **tiles**
  - cycle through 4 pointing positions
  - dwell for 2 minutes on each position, one minute per subband
- **CEP** procedure during each of  $3 \times 6$  nights of 8 h each:
  - form cross-correlations between **1 tile** and **3 dipoles** in 32 (48) subbands
  - cycle through 8 pointing positions at 30 s integration
- $3 \times$  a single 48 h run in a small selection of subbands (STATCOR)
- Tracking experiment: use four tiles to track Cas A for 48 h (CEP).
- Repeat with tiles in closely packed config



# Experiments: tiles

Rotation of tiles STATCOR:

- Rotate tiles in steps of  $30^\circ$
- observe in highest freq range
- Cycle through 8 pointing positions at  $30^\circ$  elevation (60 s per position, 30 s per sub band, one night of 8 h)
- Form all cross-correlations between antennas and tiles
- Observe for 48 hours in two sub bands

# Required observing time

- $49 \times 8$  hours at night
- $11 \times 48$  hours
- total of 69 days needed. Oops...