



SKA SWG Update

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20 September 2022



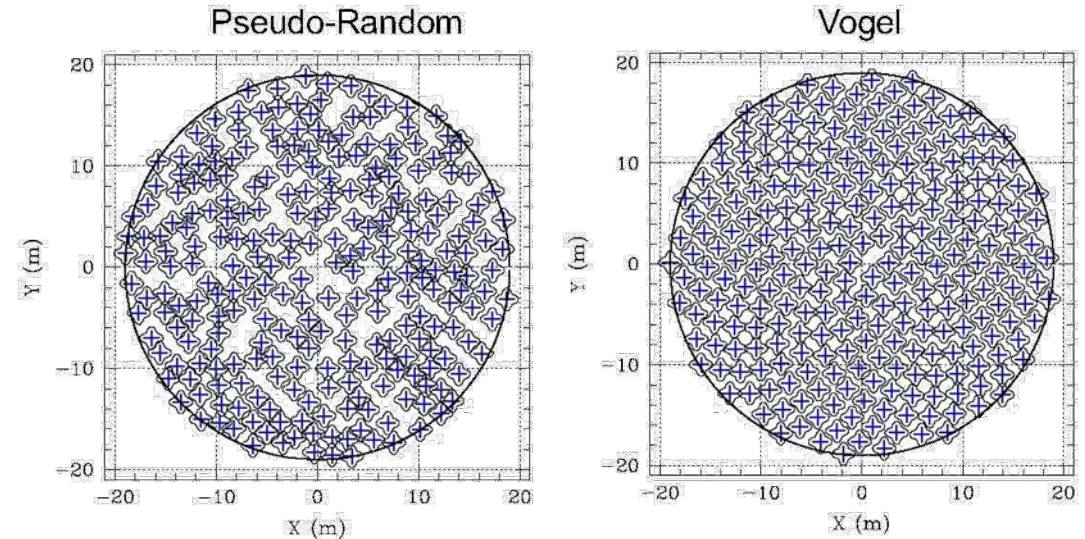
SKA Science Update

- SKA-Low Layouts and Antenna Orientation
- Data Challenges Update
- Science Meetings
- AOB

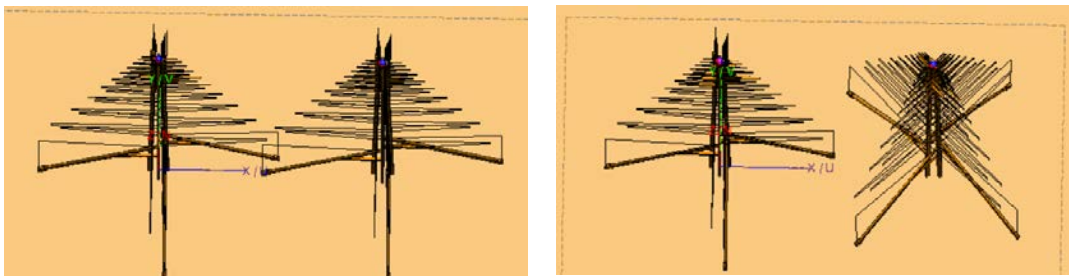


SKA-Low Station Layouts and Antenna Orientation

- Recall issue of bandpass resonances and EEP variability of AAVS station layout
- Have begun exploring alternate “Vogel” layout with larger minimum antenna separations (2m rather than 1.5 – 2m)
- Now also exploring antenna orientation diversity

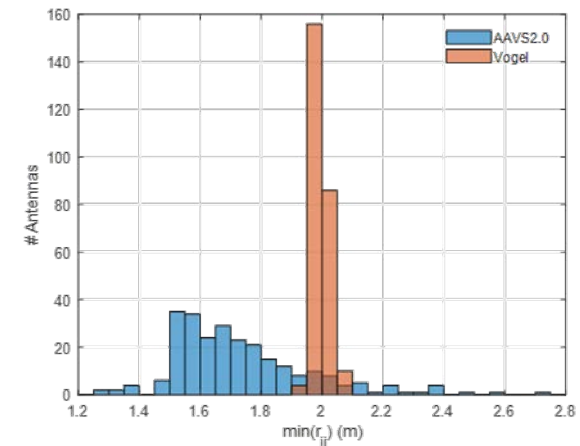


SKA-Low Station Layouts Revisited, SKAO-TEL-0001829

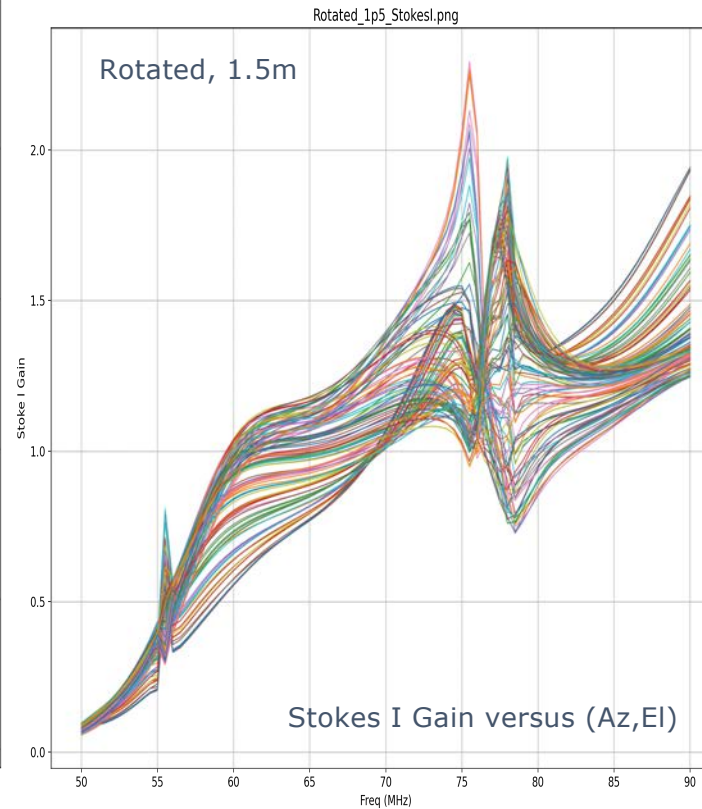
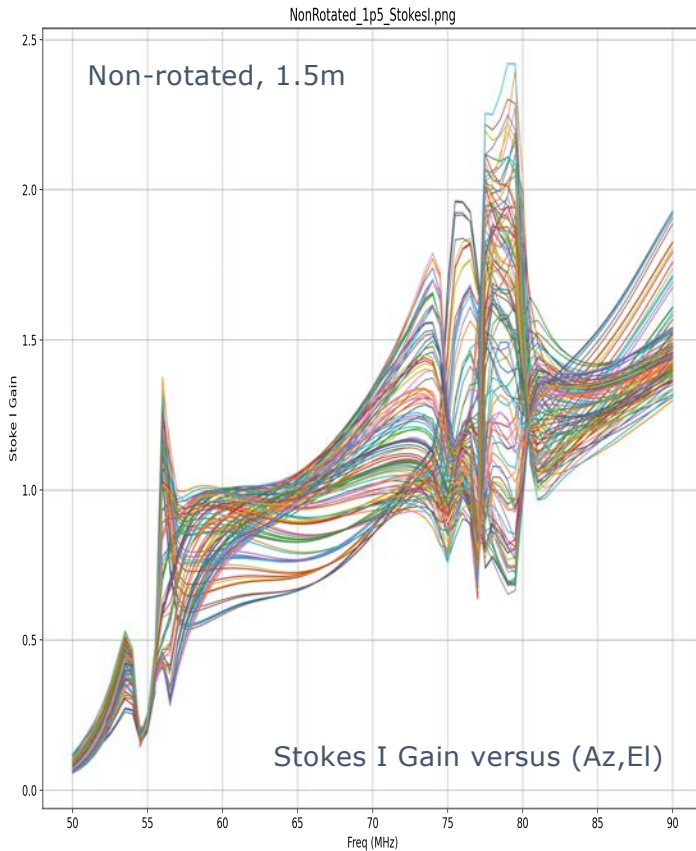


Non-rotated

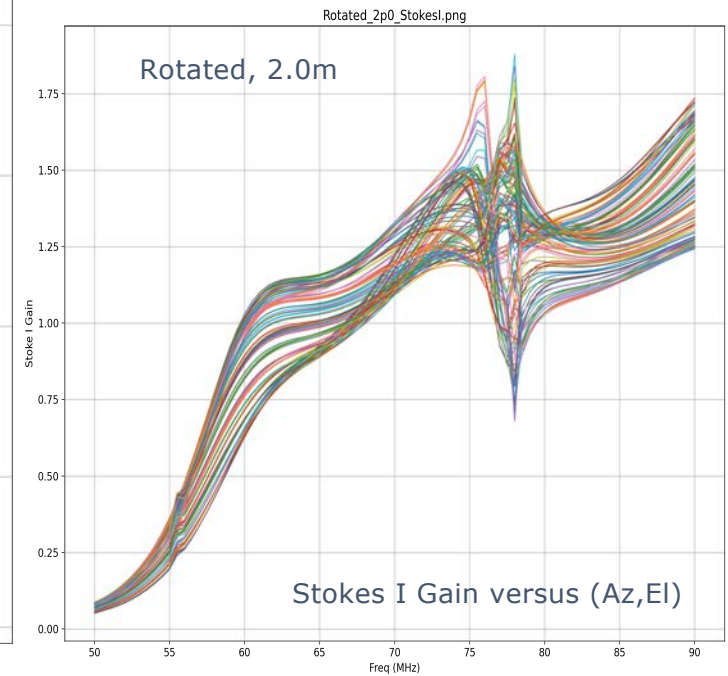
Rotated



SKA-Low Station Layouts and Antenna Orientation



*2 Antenna EM Simulations: Pietro Bolli
Gain versus (Az, El): Ravi Subrahmanyam*

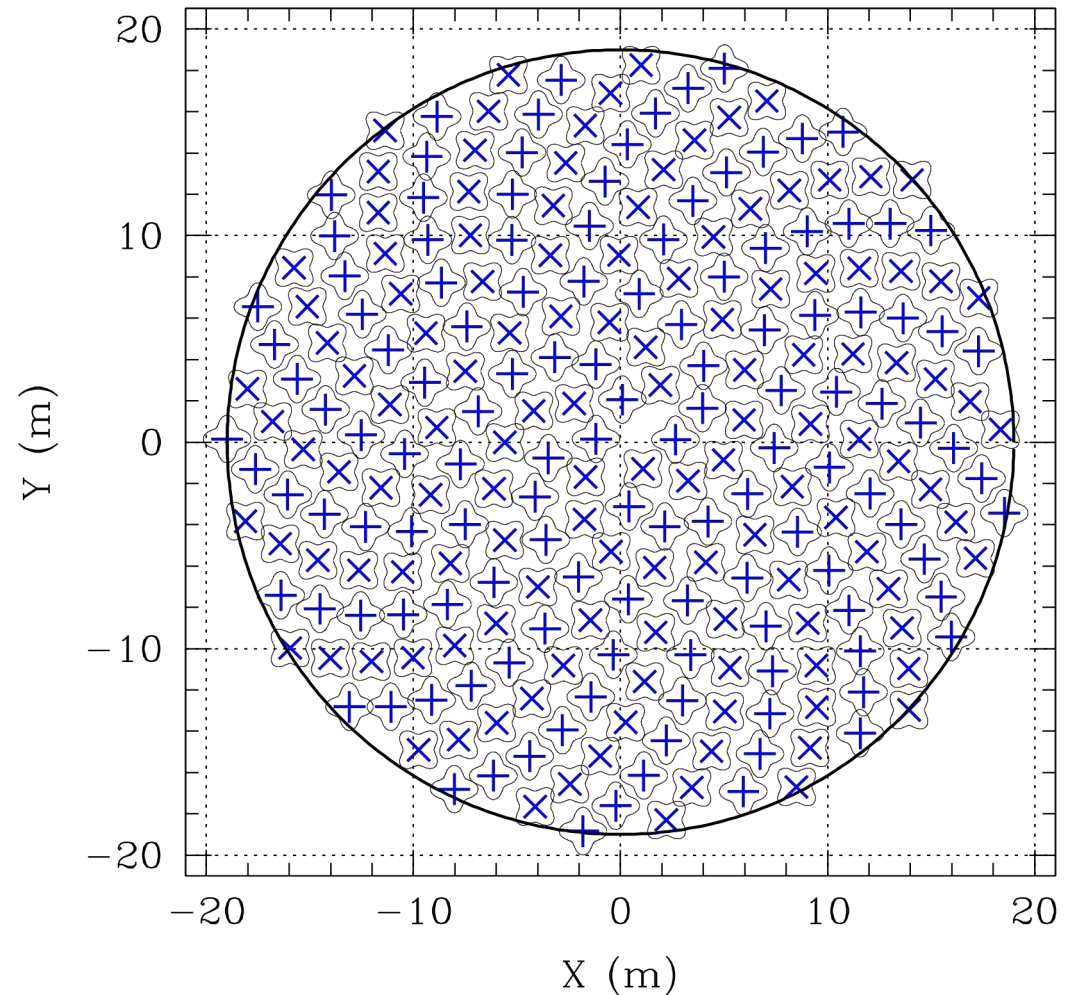


- Both antenna orientation diversity and increased nearest neighbour distance contribute to major improvement of bandpass smoothness and azimuthal polarisation symmetry



SKA-Low Station Layouts and Antenna Orientation

- Simulations now underway to fully test dual antenna orientation Vogel layout
- Given computational expense, starting with 64 antennas
 - Resonance (72 – 81, @1MHz)
 - Overview (50 – 350, @100MHz)
- Also 256 antennas at 350 MHz



SKAO Data Challenges

- Three different categories of SKA Data Challenges:
 1. SDP for calibration, imaging and pipeline development leading to science-ready data products,
 2. SRC for data visualisation, data product distribution and advanced data product development, and
 3. Science for science extraction from SKA-like data products (fully calibrated image cubes, pulsar or transient time domain candidates and in rare cases calibrated time averaged visibilities).



SKAO Data Challenges

- Exploring use of actual SKA Precursor and Pathfinder data in SKA Data Challenges
 - Request made to LOFAR, ASKAP and MeerKAT for general archive status (degree of science readiness) plus suitable specific data sets well-matched to one or more of the Data Challenge categories
 - Several suggestions received from LOFAR
 - Still awaiting suggestions from ASKAP and MeerKAT
 - Will collate suggestions and channel to SDP and SRC where relevant
 - Science suggestions will be taken to SWGs for prioritisation



SDC3 CD/EoR Data Challenge

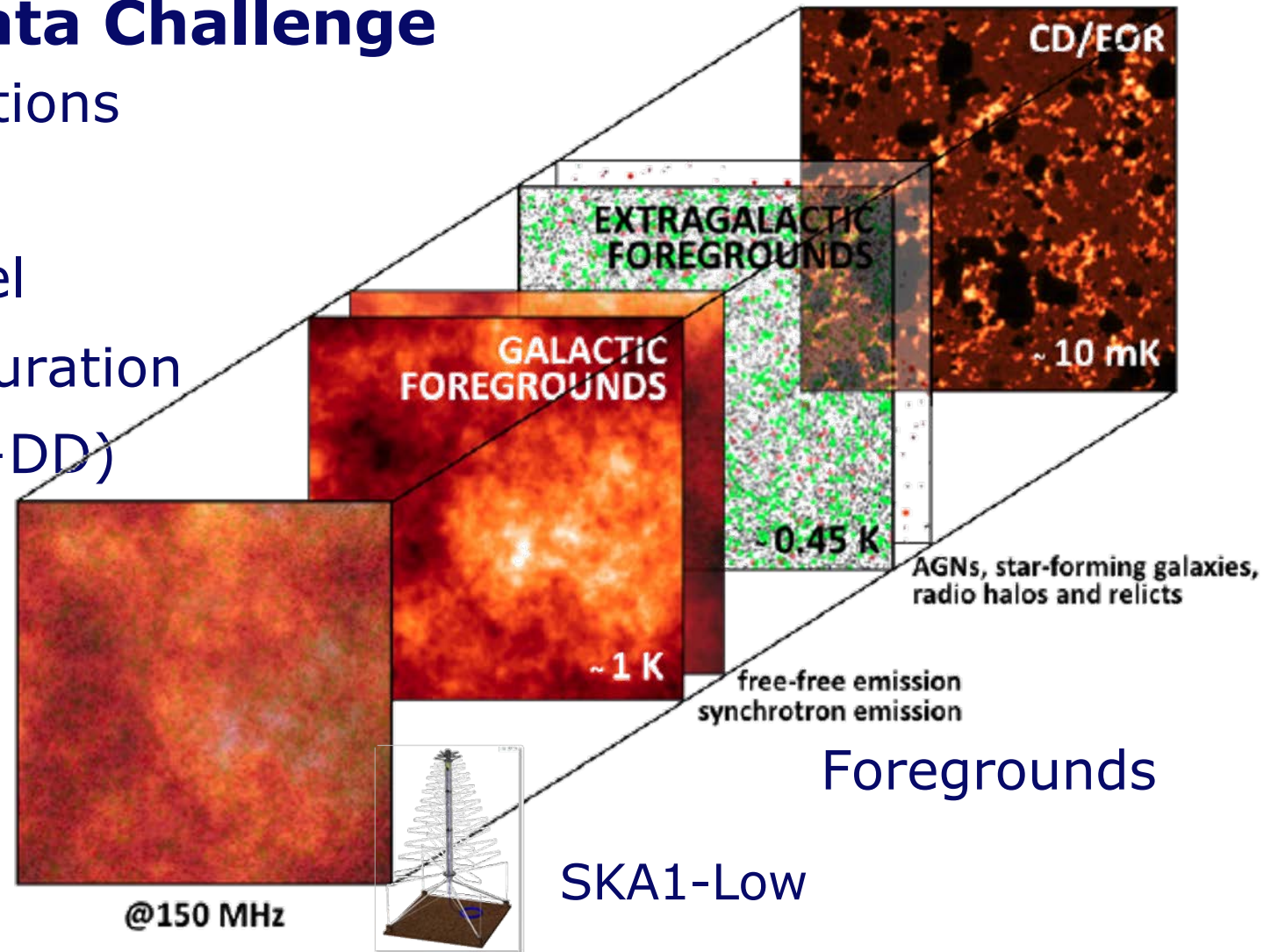
- SDC3 **EoR Foregrounds**: Foreground Subtraction + 21cm Power Spectrum Extraction (SWG contacts: Trott & Jelic)
 - Target Participants: SWGs like CD/EoR, Cosmology, Continuum, etc.
 - Input Data: (Imperfectly) Calibrated Visibilities and Image Cube
 - Challenge will be based on:
 - a) Ability to remove the compact source + diffuse foregrounds from the data-set
 - b) Ability to extract the spherical and cylindrical power spectrum
 - Verification of the results from participants
 - a) dN/dS plot of identified compact sources
 - b) Power spectrum of the diffuse foreground emission
 - c) Power spectra of the EoR**



SDC3 CD/EoR Data Challenge

- Synthetic Observations
 - Signal Cube
 - Foreground model
 - Telescope Configuration
 - Gain Errors (DI + DD)

Synthetic
Data Cubes



SDC3 CD/EoR Data Challenge

- Data Product simulation update
 - Had hoped to use 2D approximation for diffuse and faint signals, full 3D only for bright sky (both in-beam and all-sky)
 - Artefact levels found too severe, several arcmin “banana” distortions off-axis due to w-term effects
 - Have moved to full 3D simulation but are at limit of in-house resources, 2 week wall times (using 2 GPUs and 256 CPUs) for each complete trial run
 - Still aiming for SDC3 release in (late) autumn 2022 but is challenging



Science Meetings

- Joint ESO/SKAO Conference and Workshop was planned for week of 14 November 2022 “Coordinated Surveys of the Southern Sky”, in Garching
 - Organisational difficulties, postponed to week of 27 February 2023
- Joint SKAO/ngVLA Science Conference week of 30 April 2023, in Vancouver
 - Web site in development, SOC formed
- EAS 2023, SKAO Lunch Session (1.5 hour) proposed
- IAU GA 2024 in Cape Town, several Letters of Intent for SKAO related Symposia have been submitted, including in EoR and HI areas



Any Other Business

- News from SWG Chairs?
- ...



*We recognise and acknowledge the
Indigenous peoples and cultures that have
traditionally lived on the lands on which
our facilities are located.*

SKAO

www.skao.int