



# SKA SWG Update

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# SKA Science Update

- Welcome to new SWG Co-Chairs
- Science Data Challenge 3 progress (Anna)
- SWG Updates (All)
- AOB



# New SWG Co-Chairs

- Cradle of Life:
  - Welcome to John Ilee (University of Leeds)
  - Thanks to Josep Miquel!
- Magnetism:
  - Welcome to Tessa Vernstrom (University of Western Australia)
  - Thanks to George Heald!



# SDC3 CD/EoR 2-tier Data Challenge

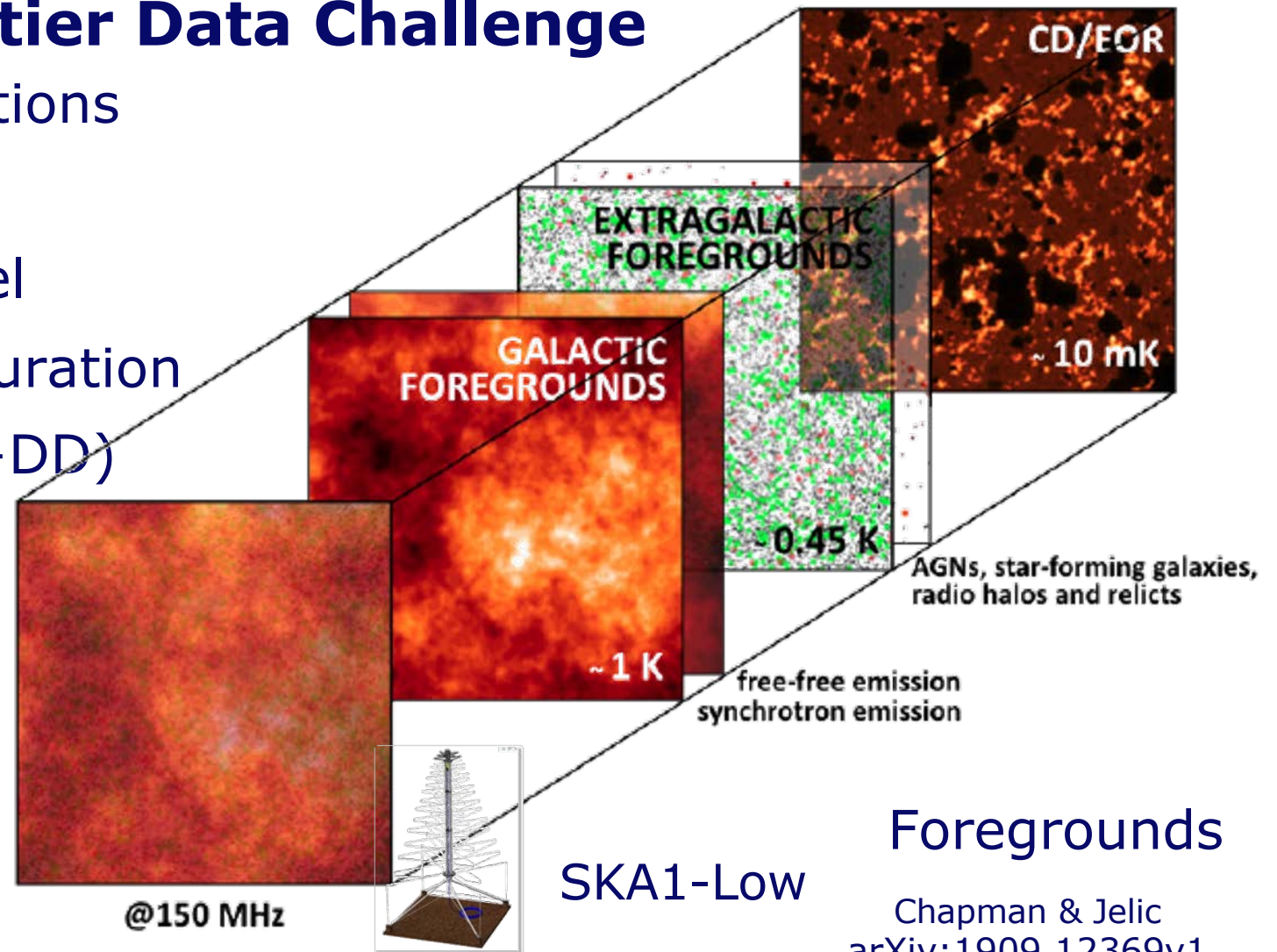
- SDC3 EoR Foregrounds: Foreground Subtraction + 21cm Power Spectrum Extraction (SWG contacts: Trott & Jelic)
  - Target Participants: SWGs like CD/EoR, Cosmology, Continuum, etc.
  - Input Data: Calibrated Visibilities and High Fidelity Image
  - Challenge will be based on:
    - a) Ability to remove the point source + diffuse foregrounds from the data-set
    - b) Ability to extract the spherical and cylindrical power spectrum
  - Verification of the results from participants
    - a) Can be verified by the  $dN/dS$  plot of the fitted point sources with the input
    - b) Can be verified by the power spectrum of the diffuse emission with the input
    - c) Comparison with the original input signal PS – most straightforward/relevant



# SDC3 CD/EoR 2-tier Data Challenge

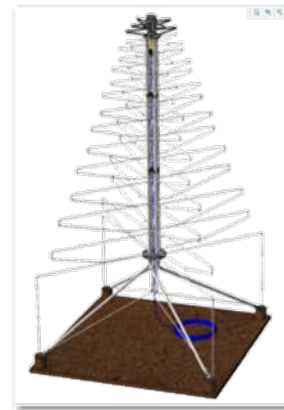
- Synthetic Observations
  - Signal Cube
  - Foreground model
  - Telescope Configuration
  - Gain Errors (DI + DD)

Synthetic  
Data Cubes

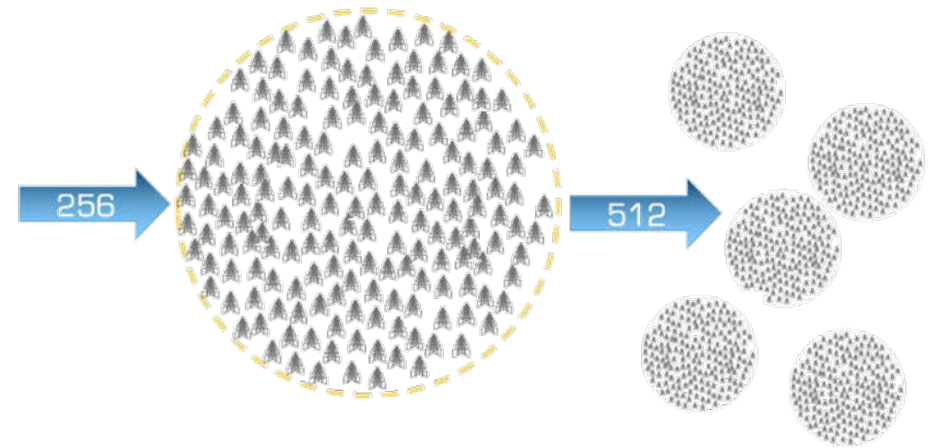


# SDC3 CD/EoR 2-tier Data Challenge

- SKA1-Low
- Baselines: 130816
- Total BW: 40 MHz
- Channel Resolution: 100 kHz
- Time Resolution: 8 sec
- Observation depth: 1000 hours
- Polarisations: 2
- Synthesis: 4.5 hour observation
- Data Volume: 1 Tb



SKA1-Low  
Antenna/Receptor  
Antenna Beam



SKA1-Low  
"Station"  
Station Beam

SKA1-Low  
"Array"  
Correlation and  
Tied-array Beams



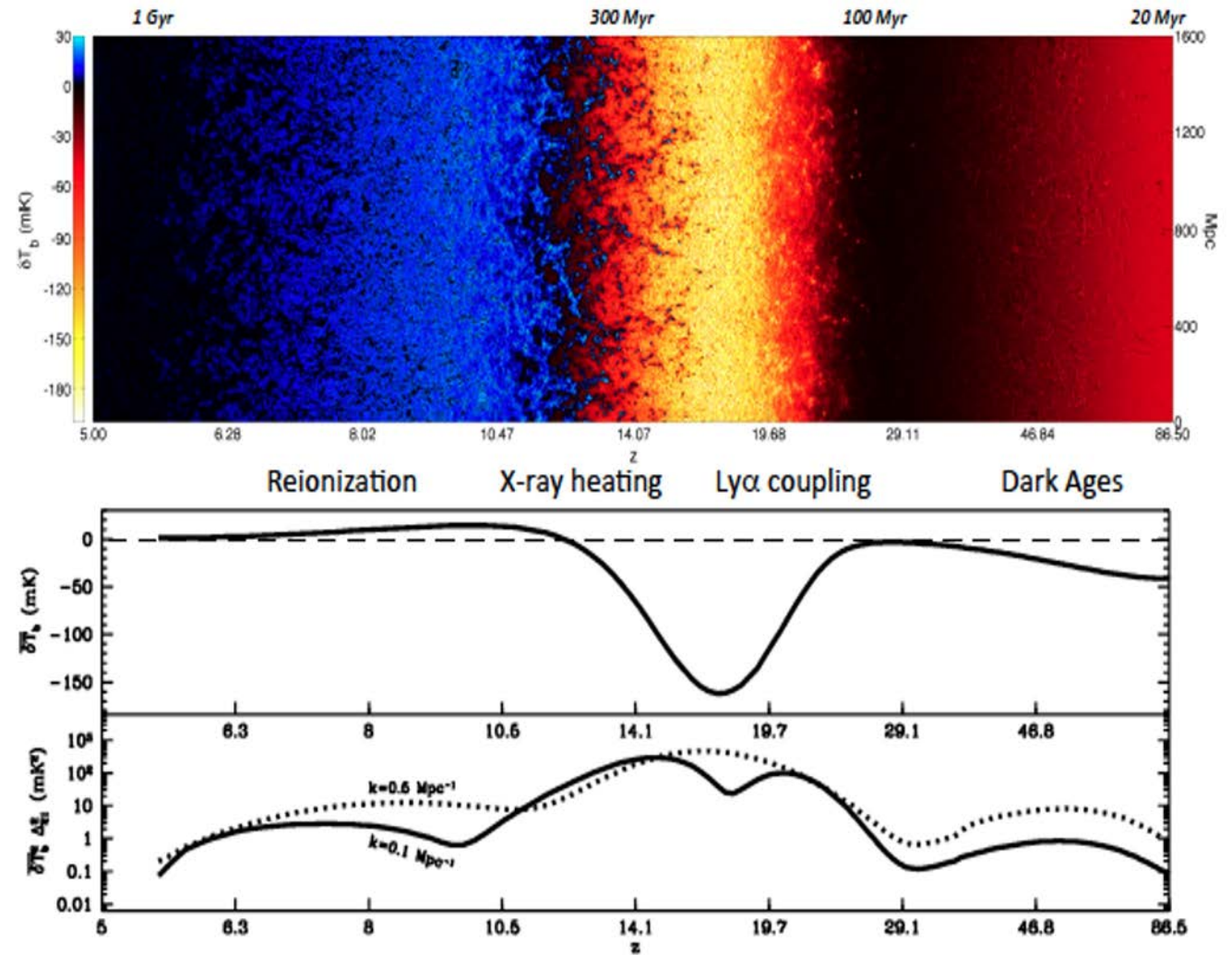
# SDC3 CD/EoR 2-tier Data Challenge

- SDC3 EoR Inference: Extraction of reionization parameters (coordinators Mesinger, Melema, Bonaldi, led by Eunseong Lee. support from Greig, Giri)
  - Target Participants: SWGs like CD/EoR.
  - Input Data: EoR PS + noise and residual foreground contamination
- Challenge will be based on:
  - a) ability to extract the IGM and source properties
- Verification of the results from participants
- Comparison with the input EoR history (ionisation fraction)



# SDC3 CD/EoR 2-tier Data Challenge

- CD/EoR Signal





# SDC3 CD/EoR 2-tier Data Challenge

- Timeline (preliminary)
  - SDC3 foregrounds: autumn 2022, 6 months duration
  - SDC3 inference: early 2023, 6 months duration
- Resources (preliminary)
  - EoR Foregrounds - 250 core h per power spectrum
    - Dataset size around 1TB
  - EoR Inference - Dataset size minimal
    - Disk space per team 100 GB
    - If performing “forward modelling” inference (or emulator + training):
      - Around 256 cores having 2GB (preferably 4) GB RAM each (with some flexibility)
      - Quota few 100K core h per team
    - If using analytical models / emulators:
      - 8-32 cores
      - Quota few K cores h



# Any Other Business

- Upcoming meetings
  - 3rd URSI Atlantic Radio Science Meeting, 29 May – 3 June  
(<https://www.atrasc.com/>)
  - Timing and Imaging of compact sources with SKA pathfinders, 6 – 12 June  
(<https://www.atnf.csiro.au/research/conferences/2022/Kerastari2022/>)
  - EAS2022 “S7: Building bridges: The lifecycle of dust and gas in the Milky Way with ALMA and SKA”, 27 June – 1 July  
([https://eas.unige.ch/EAS\\_meeting/session.jsp?id=S7](https://eas.unige.ch/EAS_meeting/session.jsp?id=S7))
  - EAS2022 “SS23: Towards the SKA Observatory: Artificial Intelligence in radio astronomy”, 27 June – 1 July,  
([https://eas.unige.ch/EAS\\_meeting/session.jsp?id=SS23](https://eas.unige.ch/EAS_meeting/session.jsp?id=SS23))
  - 
-  SWG News (all)



*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](http://www.skao.int)