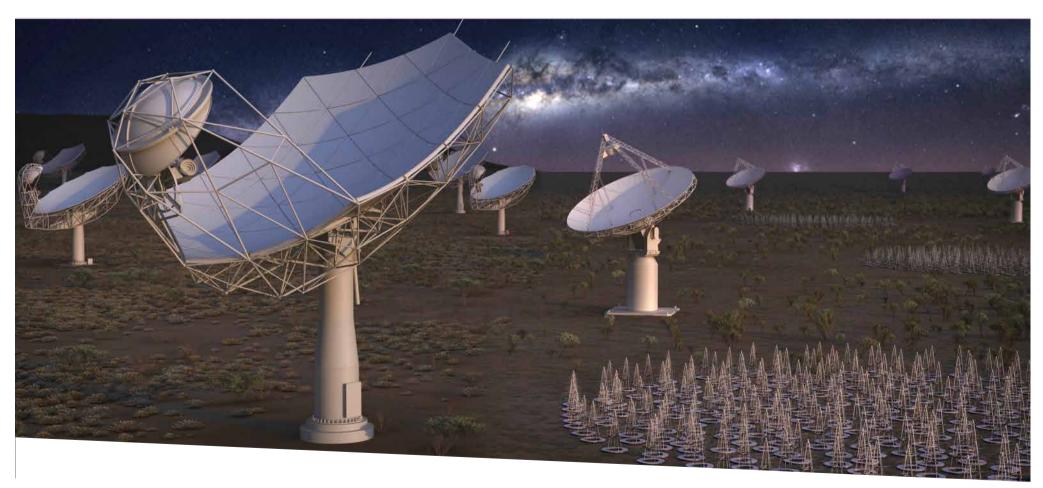
SKA SWG Update





SQUARE KILOMETRE ARRAY

Robert Braun, Science Director

Exploring the Universe with the world's largest radio telescope

11 September 2018



Agenda

- Progress report on SWG wiki investigation (Cristina)
- SWG Poster initiative (Tyler)
- Data Challenge update (Anna)
- SKA Science Meetings
- Community Updates



A wiki for the SKA SWGs

- A common platform for all SWGs to share news, group progress, activities (meetings minutes, discussions, workshops, publications, etc.)
 - With a common landing page for all the SWG groups (without password), with general information about the different groups, general news, etc. to attract interest and participation from other fields scientists.
 - With links to the different SWGs wikis, using the same platform, with user access required to upload or modify content, controlled by SWGs chairs.
 - With access from anywhere in the world.
 - Able to support ~ 500 users.
 - With SKA "brand" design.

SOUARE KILOMETRE ARRAY

A wiki for the SKA SWGs

 Performed a benchmark study between wiki engines and wiki hosting services (wiki farms): https://www.wikimatrix.org/index.php

- Wiki engines:

- **Pros:** server requirement not demanding, simple installation and administration, data resident locally, no storage size or users limit, no fee.
- Cons: burden for SKAO IT department for server and wiki maintenance (s/w upgrade, users administration, backup, security, etc.)
- Examples: JIVE (Dokuwiki), MPIfR (deki wiki and possibly xwiki), etc.

– Wiki farms:

- **Pros:** cloud server offering simple tools for creation and development of wikis, avoid physical server and administrative burden.
- Cons: some farms impose restriction in content, may contain adverts, storage size and users limits for free versions, annual or users fee for advanced versions, data resident "whoknowswhere", services shutdown schedule not controlled by us.
- Examples: Cosmology and Continuum SWGs (PBworks), Zoho wiki, etc.

Proposal: use a fee version of a wiki farm (preferably PBworks, \$2000/year)

SWG Posters

- Aim to have a poster for each SWG, similar to those put together by the Consortia (see next slide)
- First use would be AAS in January, then the April SKA meeting, ...
- Asking each SWG to produce a poster by mid-November
 - Suggest each SWG find someone from their core group to lead (can be co-chair)
- Size and template as shown on next slide (to be provided to SWGs)

Exploring the Universe with the world's largest radio telescope

The Square Kilometre Array and the Cradle of Life

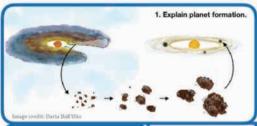


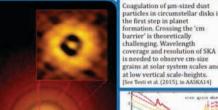
Matthiis H.D. van der Wiel¹, on behalf of the SKA 'cradle of life' science working

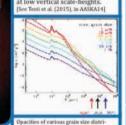




From planet formation to the distribution of life with the SKA







2. Detect and characterize large molecules in planet-forming regions

3. Detect existence and study properties of exoplanet magnetic fields The magnetic field of a planet probes its interior and its habitability, because (1) it can protect the atmosphere and surface from high-energy particles, and (2) it may

imit atmospheric escape. SKA1-low will be sufficiently sensitive to detect magnetospheric radio emissions revealing magnetic fields of gas giant planets, analogs of Jupiter, and potentially even the auroral emission of the host planet. Intended sample: 250 stars and hundreds of exoplanets with 10 pc of Earth



[See Zarka et al. (2015), in AASKA141

4. Search for ExtraTerrestrial Intelligence (SETI).

SKA1 will be capable of detecting emis terrestrial transmitters such

as airport radars. For a source at 10 pc distance, detection could be made in 15 minutes. With longer integrations, unbiased urveys of all (>10,000) stars within 60 pc are



The SKA Cradle of Life science working group (SWG) is one of the eleven working groups advising the SKA Organisation on design, comm uture operations, with a focus on the above science topics. Sign-up is open to cientists from any country. Speak to Matthijs, or contact one of the current SWG chairs, Izaskun Jimenez-Serra or Doug Johnstone

Note: SWG # key science project (KSP). Proposals for KSPs: ~late 2022. KSPs wi use ~50%-70% of time in first years of operations.

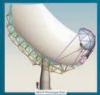




The SKA Dish Consortium is responsible for all activities necessary to prepare for the procurement of the SKA dishes, including the design and verification of the antenna structure, optics, feed suites, receivers, and all supporting systems and infrastructure for SKA1-mid.

The Dish element of the SKA includes planning for manufacturing of all components, the shipment and installation on site of each dish (including feeds and other components) and

several thousand 15m wide dishes, all with identical performance characteristics all built with new design ideas, and built to last and tolerate the harsh conditions of the deserts in which they will operate. Combine with that the overriding element of cost, and getting the very best price to performance ratio, and the dish element of the SKA is a formidable technical and engineering challenge.





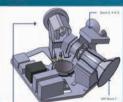
Milestones

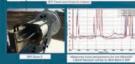
- Detailed Design Reviews scheduled for 2016
- The optics for the SKA antenna was finalised March 2015.
- design accommodates both Single Pixel Feeds and Phased Array Feeds with
- SKA-mid Band-1 Single Pixel Feed horn design completed and prototype testing underway at NRC.
- New members have recently joined the consortium (see below)

Single Pixel Feed observing frequency and sensitivity

Band 1	0.35-1.05 (Ghz)	28k
Band 2	0,95-1.76	
Band 3	1,65-3,05	50k
Band 4	2.85.18	22k
Band 5	4.6-13.8	25K





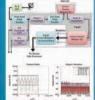




The Central Signal Processor (CSP) is the "brain" of the Square Kilometre Array (SKA). It converts digitised astronomical signals dietected by the SKA receivers into information needed by the Science Data Processor. The CSP element includes design of the hardware and farmware features necessary for the next generation of violaties, pulsar survey candidates and pulsar timing from the array.













Telescope Manager Consortium |

The "Telescope Manager" element includes all hardware and software necessary to control the SKA telescopes and associated infrastructure. The TM includes the co-ordination of the systems at observatory level and the software necessary for scheduling the telescope operations. It also includes the central monitoring of key performance metrics and the provision of central coordination of safety signals generated by Elements of the SKA. The TM provides software access to, and at, remote locations for transmission of diagnostic data and local control.

Telescope Manager (TM) Status

A schematic Diagram of Telescope Manage



(BKA)		
	BALLON	3681 mil
Transcep Respo	50 MHz - 250 MHz	310 899 - 14 049
Total Collecting Area	400 sq m	33,000 esm
Array Configuration	130,000 arresses serval our 500	167 priesson (Including 64 Moorket Dates)
	Manager Designation of the Real Property of the Rea	Manual District Manual District 150 km
-	Section 1 to 1 to 1 to 1	The State of

Telescope Manager (TM) Consortium		
	Description of the last of the	Propert Management (MESSA, Yosha'
IMC pred nay)	Inches	(Self-Self
		Distance (AC)
	States are being	INC Drein, GIR

TM Primary Responsibilities



TM Key Challenges



Mitigation Strategy









Milestones

CSP Baseline Design Review Stage 1 Review (SRR & POR)

Sub-element CDRs & Prototype Test Reports

Kick-aff

Delta PDR

Stage 2 Closure







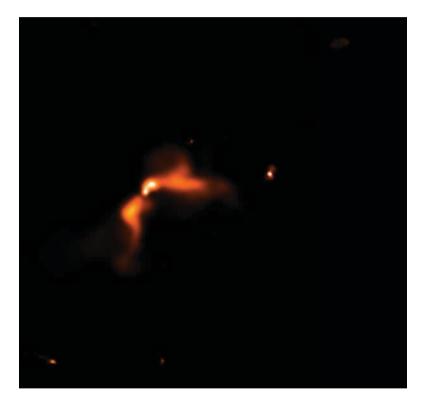
Data Challenges #1

- Continuum image cube
- SKA Mid, 1 or more frequency bands
- One pointing, 8h observations
- Data info:
 - Image of 32K pixels per side for the full FoV
 - 0.24" pixel resolution in Band2
 - Size of a single frequency slice: 4Gb



Data Challenges #1

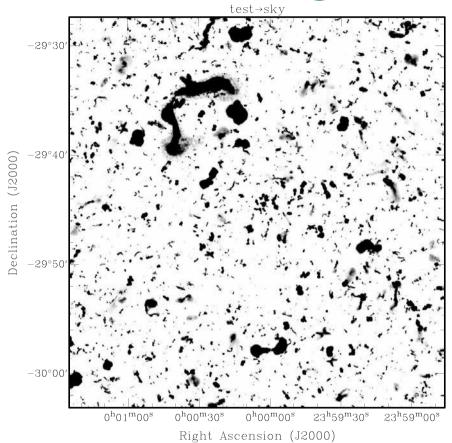
- Sky model: in progress
 - List of sources: from T-RECS (Bonaldi et al. 2018)
 - AGNs and SFGs, spectra from 150 MHz-20 GHz
 - Image of the sky:
 - Galsim-based package by I. Harrison to draw SFGs, modelled as Sersic profiles
 - An atlas of real AGN images is used to add AGNs to the sky model

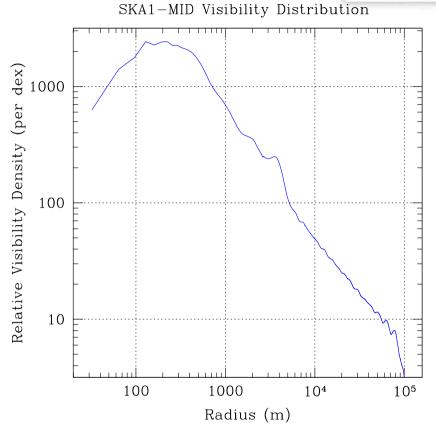


Zoom-in of AGN skymodel map

Data Challenges #1







- Telescope simulation: in progress
 - MIRIAD-based simulation code
 - Using actual SKA dish voltage pattern and SKA1-Mid configuration
 - Have developed new gridding algorithms to cope with data density contrast vs scale



- 2018 IAU GA, 20 31 August
 - Great event, thanks to all who assisted!
- 2019 SKA Science Meeting and KSP Workshop
 - Please register now!
 - Web site: https://indico.skatelescope.org/event/467
- 2019 EWASS call for proposals
 - 9 September 2018 deadline
 - One (last minute) submission led by Chiara Ferrari and Jeff Wagg
 - Will still coordinate on programme!
- 2020 URSI GA, 29 Aug 5 Sept.
 - Call for workshops/sessions







Community Updates

- Upcoming SWG/FG Meetings?
 - Cosmology: 13/14 September, Turin
 - EoR/CD: 24/26 September, London
 - Scintillometry Workshop: 22/26 October, Shanghai
 - HI PHISSC: 11/13 February, Perth
 - FRBs: week of 18 February, Amsterdam
 - Others?
- Updates from participating SWG/FG Chairs
 - 5555

SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope



www.skatelescope.org