

Science WG Session



Wednesday, March 24 (09:45–12:30)

Agenda

- Report from the Configurations Task Force
- Presentation on “Redunancy in Calibration”
- Discussion: configurations and calibration issues
- *coffee*
- Poster shotgun
- Science during the rollout of the SKA
- Sharpening the SKA Science Case

Science and the Initial Construction Phase

- What should be constructed initially?
- SWG looked at what radio telescopes will be in operation circa 2015
- Baseline design: 300 15-m dishes + low-frequency sparse aperture array
- SWG assessment
 - $A_{\text{eff}}/T_{\text{sys}}$ is vitally important.
 - Reduced frequency range would be acceptable (nominal is 70 MHz to 10 GHz)
 - High angular resolution is likely to be scientifically important niche
 - $b \sim 150$ km
 - Low frequencies are an integral component

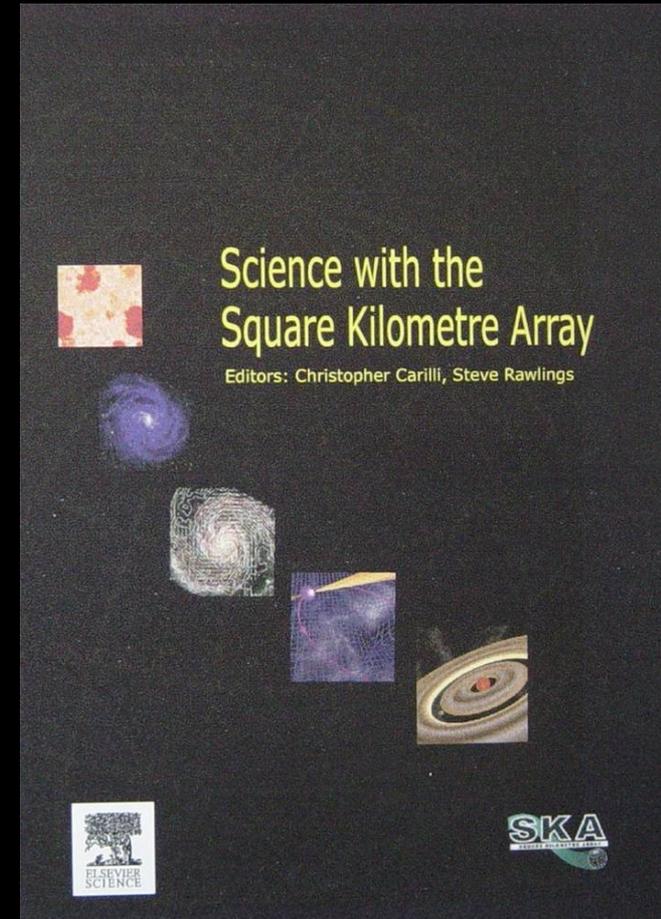
SKA Key Science



International working group

- Strong-field Tests of Gravity with Pulsars and Black Holes
- Galaxy Evolution, Cosmology, & Dark Energy
- Emerging from the Dark Ages
- The Cradle of Life/Astrobiology
- The Origin and Evolution of Cosmic Magnetism

Exploration of the Unknown



*Science with the Square
Kilometre Array*

(2004, eds. C. Carilli & S.
Rawlings, *New Astron.*
Rev., 48)

Sharpening the Science Case



- System Conceptual Design Review
 - scope and timeline too ambitious
 - combination of science goals pushing instrumental design into impossible parameter space
 - establish scientific priorities
- ALMA Key Science
 1. The ability to detect spectral line emission from CO or CII in a normal galaxy like the Milky Way at a redshift of $z = 3$, in less than 24 hours of observation.
 2. The ability to image the gas kinematics in protostars and in protoplanetary disks around young Sun-like stars at a distance of 150 pc (roughly the distance of the star-forming clouds in Ophiuchus or Corona Australis), enabling the study of their physical, chemical and magnetic field structures and to detect the tidal gaps created by planets undergoing formation in the disks.
 3. The ability to provide precise images at an angular resolution of 0.1". Here the term “precise image” means being able to represent, within the noise level, the sky brightness at all points where the brightness is greater than 0.1% of the peak image brightness.

Sharpening the Science Case

Options

- Do nothing.
 - recommendations from a panel not constituted to evaluate the science
 - not clear that this will restrict the technical parameter space
- Resurrect SKA “headline science”
 - not clear that all SKA Key Science Projects can be cast in this manner
- Synthesize current SKA Key Science Projects into smaller group analogous to ALMA
 - What if science goals outstrip technology?