SKA Specifications

Frequency : 70 MHz ÷ 25 GHz
Bandwidth : ± 50% of frequency
Spectral channels: 16384 per band per baseline

Rms Sensitivity : 400 μJy in 1 min at 70-300 MHz
200 μJy in 1 min at 0.3-10 GHz

Field of view: 200 deg^2 at 70 MHz
200-1 deg^2 at 0.07-1 GHz
1 deg^2 at 1-10 GHz

At least 4 simultaneous FoV

Maximum baseline : > 3000 km

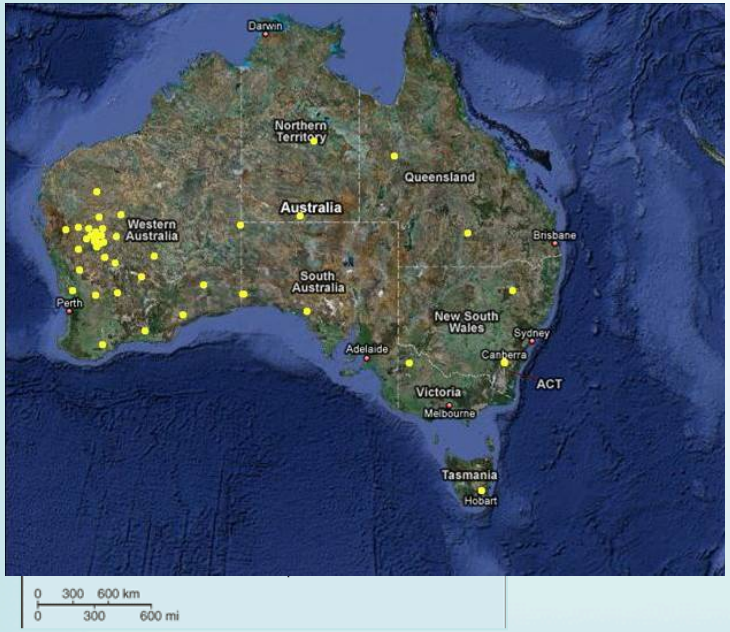
Angular resolution : < 0.1″

Calibrated polarization purity: 10000:1

Image dynamic range : > 1.000.000

SKA Site

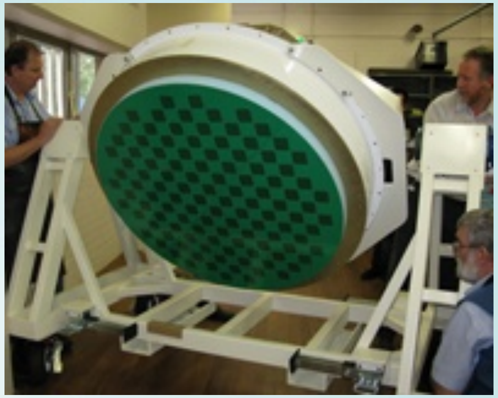
Extremely radio quiet environment
At least 3000 km in extent
Low ionospheric turbulence
Low tropospheric turbulence



Australia
ASKAP

South Africa + 8 countries
MeerKAT

ASKAP (Australia SKA Precuror)



36 dishes, each 12m diam, equipped with PAF

30°^{2} field of view FoV
simultaneous beams

Phased Array Feed (PAF) :
30 separate /simultaneous
beams of 1 sq deg to give
a FoV of 30 square
degrees at 1.8 GHz

0.7-1.8 GHz, bandw 0.3 GHz, 16000 channels
➔ 20″ res at 1.4 GHz,

max baseline ~ 6 km

Meer KAT (South Africa SKA Precuror)

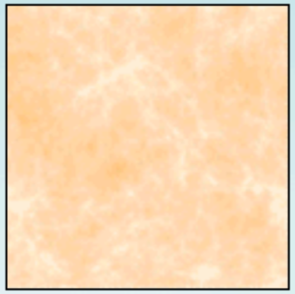
64 dishes

13.5 m diam

0.5 – 14.5 GHz
Centrally condensed,
maximum baseline ~ 20 km

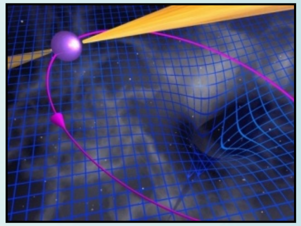
KAT 7 : 7 dishes
made of fibre glass
freq 1.2 – 1.95 GHz
max baseline 185 m

SKA Key Science Projects



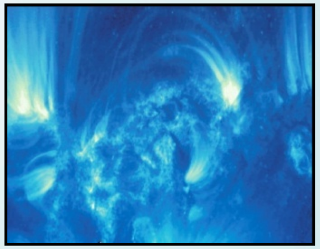
Origin of the Universe :

1. Formation of first objects/EoR
2. Evolution of galaxies/ Cosmology/ DE



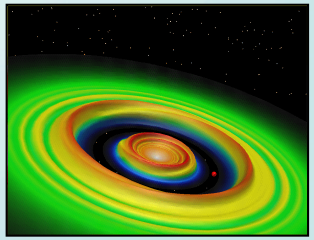
Fundamental Physics :

3. Pulsars/ General Relativity/ Gravitational Waves
4. Cosmic Magnetism



Origin of life :

5. Cradle of life and intelligent life



Total intensity survey : down to sub-μJy flux level

The MicroJy and NanoJy Radio Sky: Source Population and Multi-wavelength Properties

2011

Paolo Padovani*
European Southern Observatory, Karl-Schwarzschild-Str. 2, D-85748 Garching bei München, Germany

All objects that will be detected from currently planned all-sky surveys in X-rays, optical, infrared, will have **<u>a radio counterpart</u>** with SKA.

On large areas of the sky, and at lowest flux levels (< 0.1 μJy), radio sources detected with SKA will have no counterparts: rely only on radio information for size, morphology redshift, etc.

Optical/IR match : on small areas

Padovani 2011

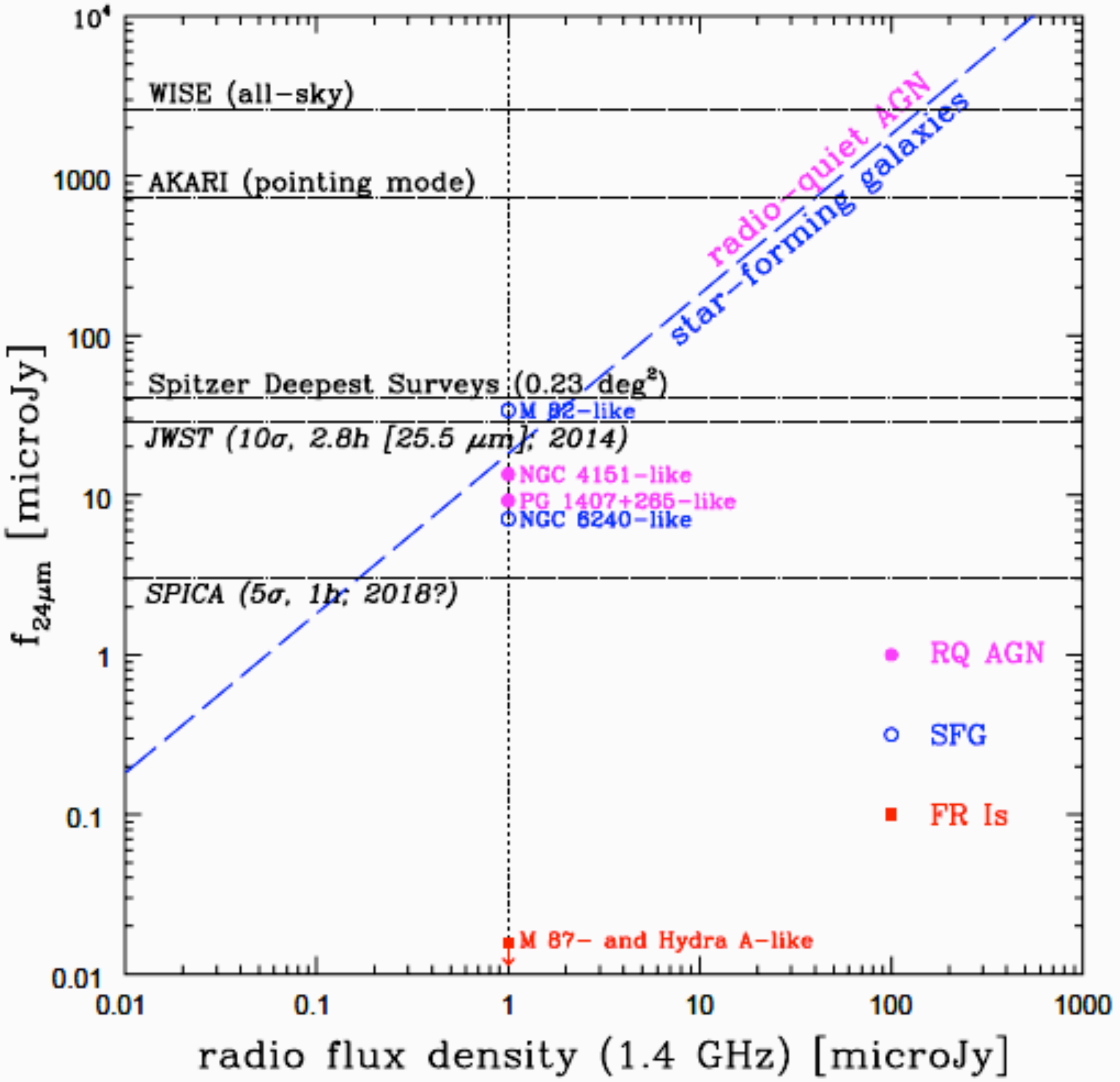


Figure 4. 24μm flux density vs. the 1.4 GHz radio flux density for faint radio sources. The diagonal dashed line represents the locus of SFG and radio-quiet AGN based on the "IR-radio relation". The scaled IR flux densities of prototypical representatives of the three classes at $S_{1.4\mathrm{GHz}} = 1$ μJy are also shown, with FR Is being so faint as to be actually off the plot at $f_{24\mu m} \sim 0.2 - 0.8$ nanoJy. The horizontal dot-dashed lines indicate the approximate point-source limits of (from top to bottom): WISE, AKARI (pointing mode), the deepest Spitzer surveys, JWST, and SPICA. Launch dates for future missions, or best guesses at the time of writing, are also shown. See text for more details.

Conclusions

Big projects will give big answers to questions of modern astrophysics but coordinated studies will be crucial to reach a comprehensive view

Thank you