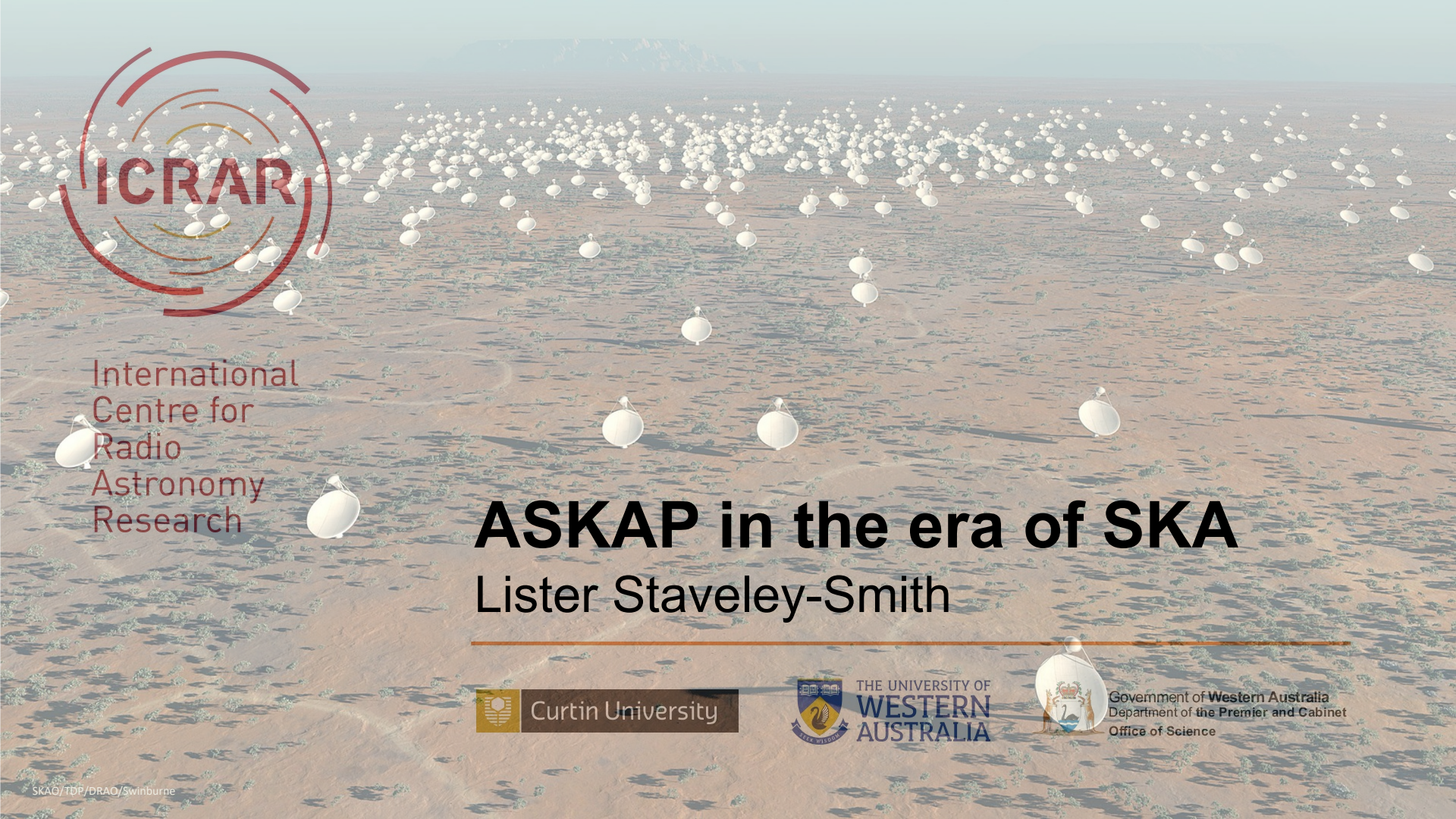

ICRAR
International Centre for Radio Astronomy Research
ASKAP in the era of SKA
Lister Staveley-Smith
Curtin University
THE UNIVERSITY OF WESTERN AUSTRALIA
Government of Western Australia
Department of the Premier and Cabinet
Office of Science
SKAO/TDP/DRAO/Swinburne

SKA and ASKAP

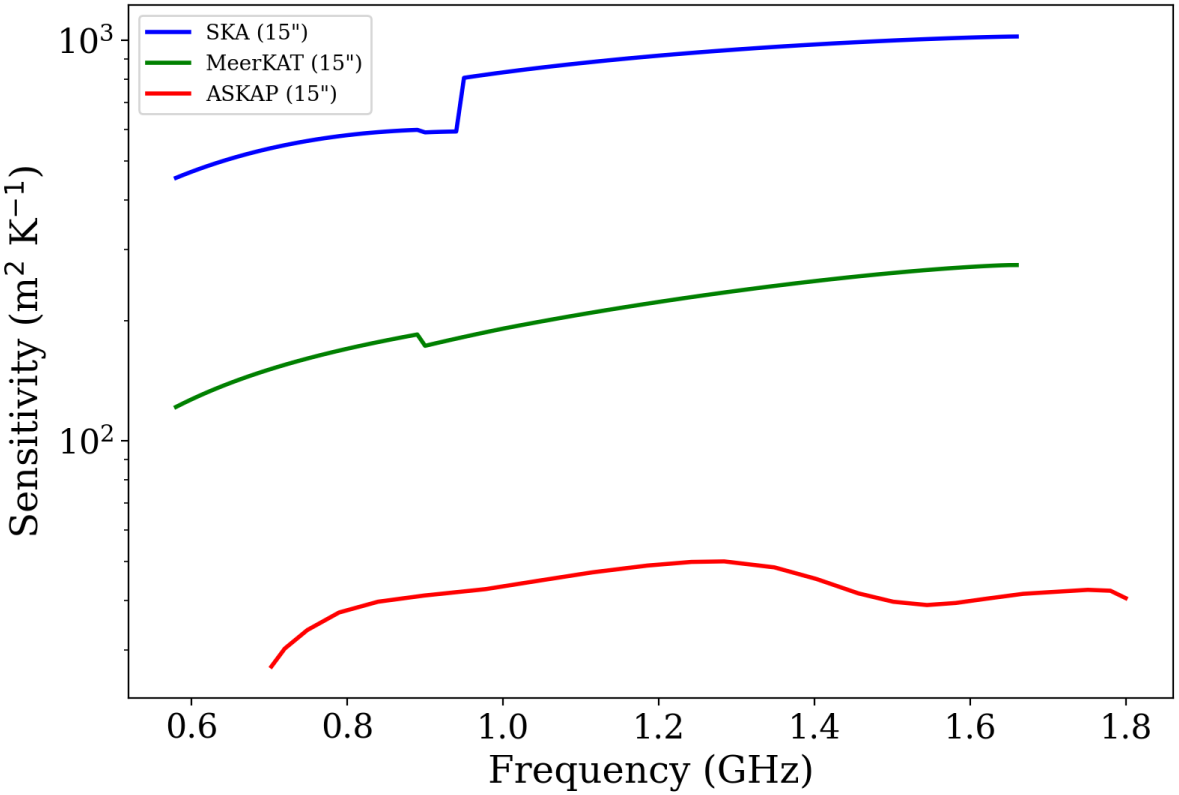
SKA strengths:

- Sensitivity
- Angular resolution
- Frequency range

ASKAP strengths:

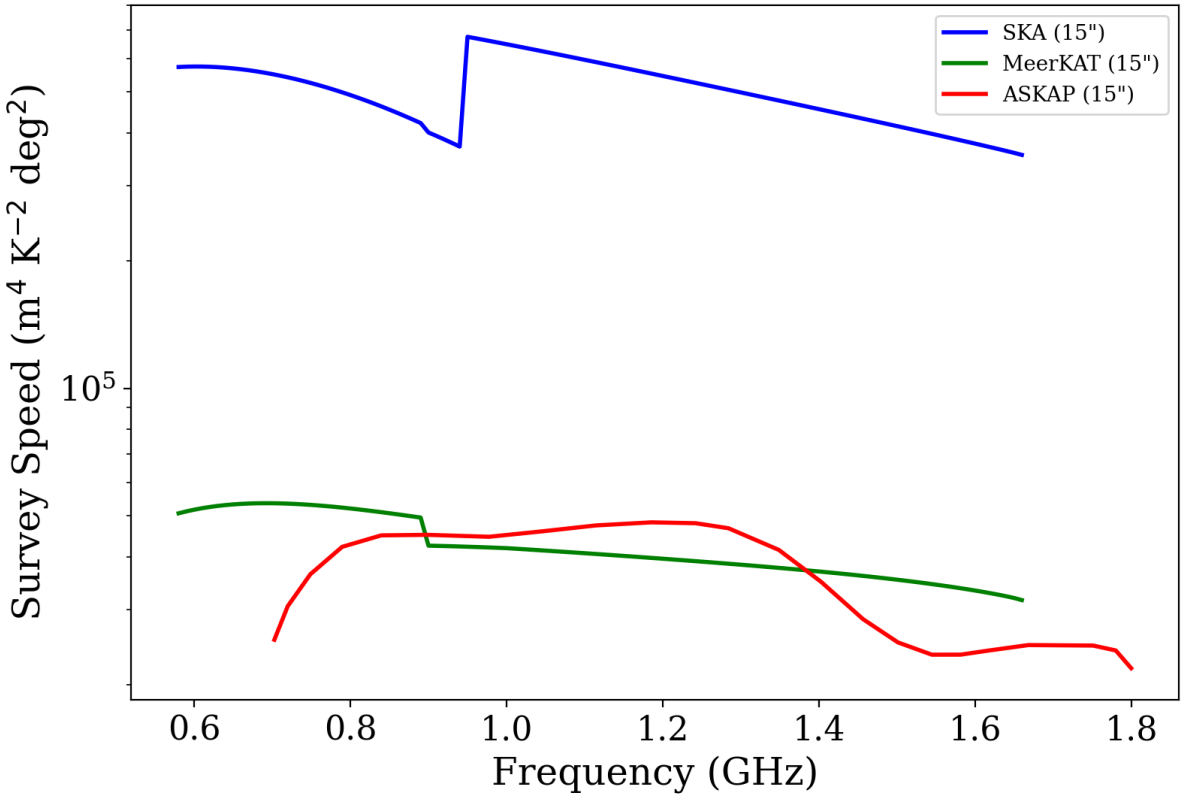
- Field of view
- MRO RQZ
- Large-area, multi-year survey projects

Sensitivity at fixed resolution

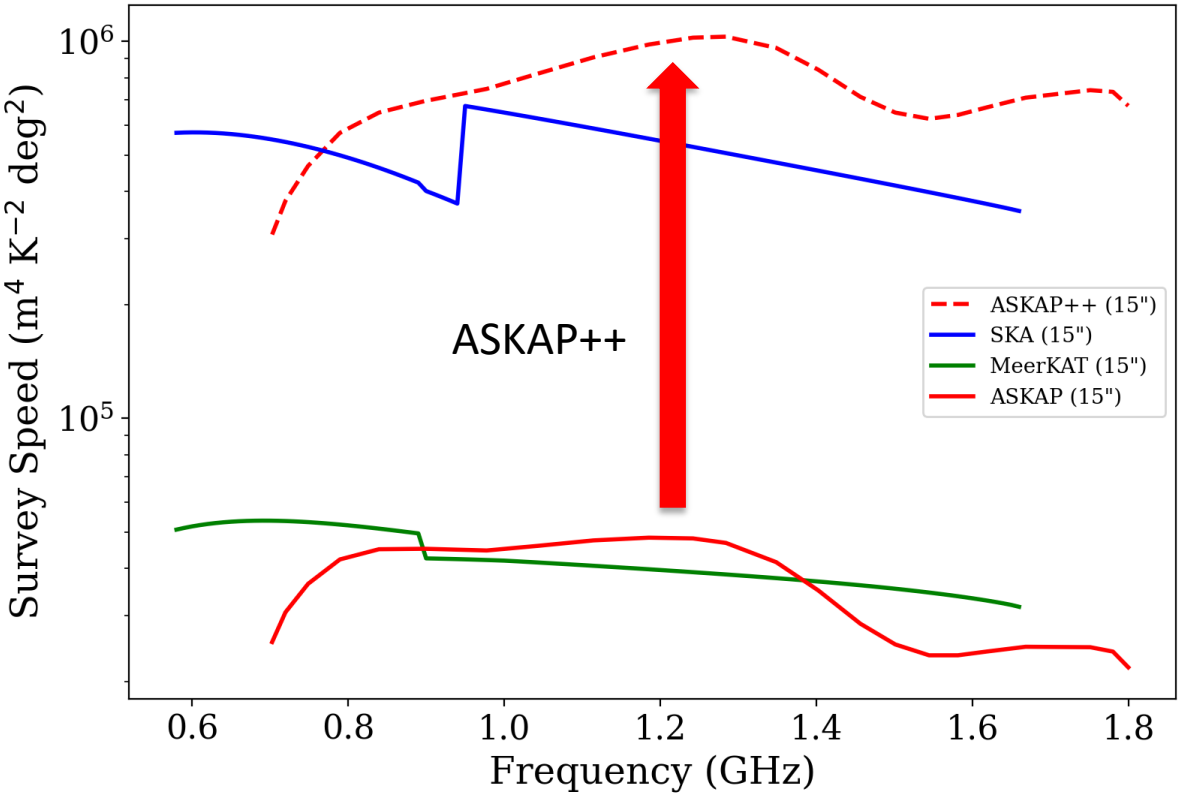


See also Braun+ (2019)

Survey speed at fixed resolution

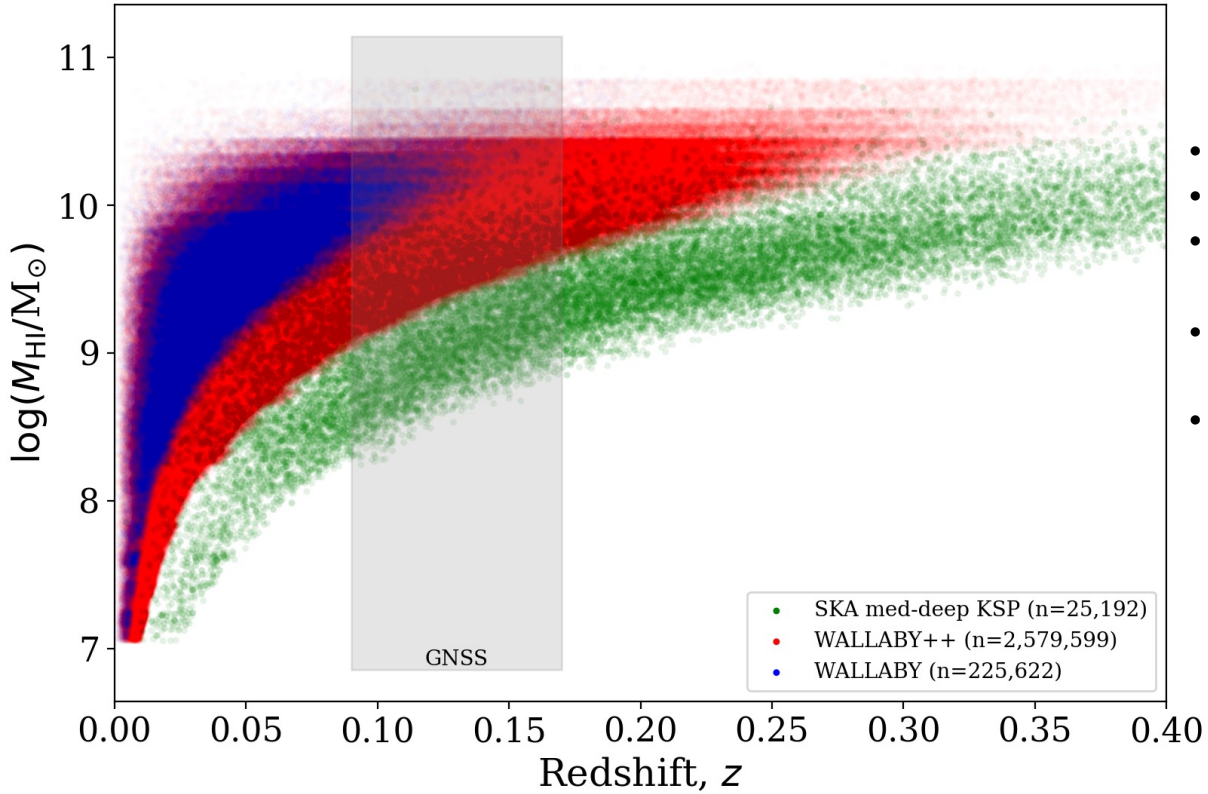


Survey speed at fixed resolution



Similar survey speeds would make ASKAP an excellent survey/finder telescope for SKA-mid at similar angular resolution to SKA-low

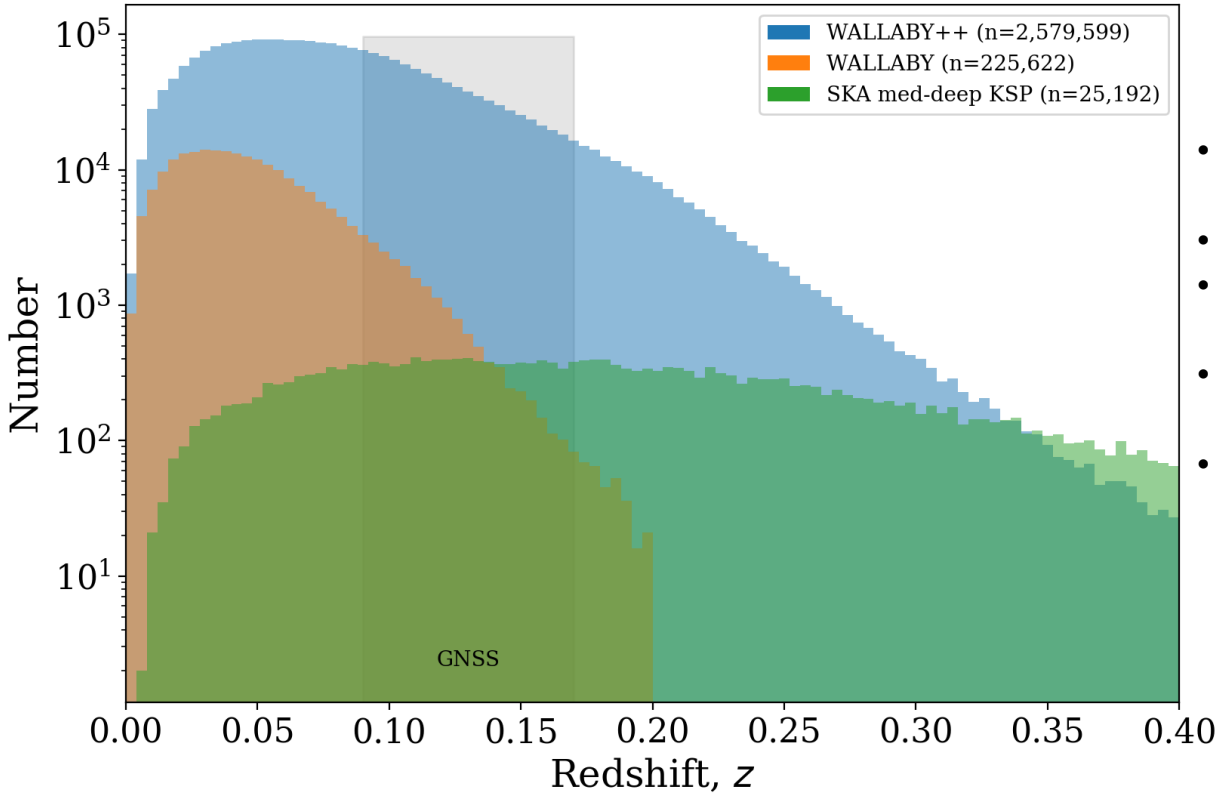
Example: WALLABY++



WALLABY++

- 11x more galaxies
- 2x resolution
- Similar column-density sensitivity
- 1.7x higher mean redshift
- Complements SKA medium-deep KSP (SS+ 2015)

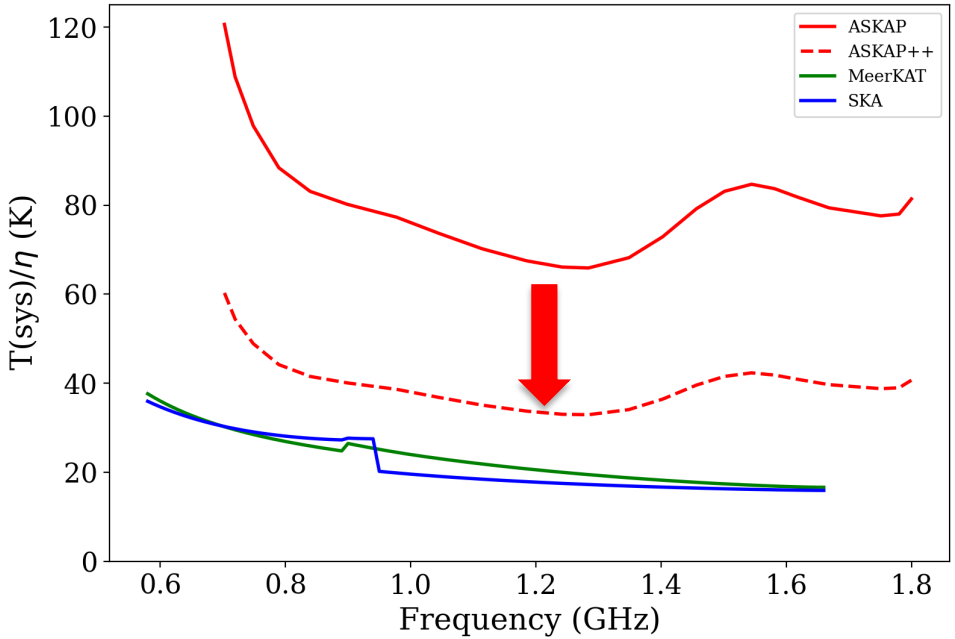
Example: WALLABY++



WALLABY++

- Best possible local H_0 measurement
- Best growth factor
- Tighter constraints on GR/LCDM
- Evolution of halo mass function
- Environmental dependence of gas content

Possible upgrade path



- **Existing technology:**
  - 50% more 12-m antennas in same 6-km footprint
- **CryoPAF/SKA technology:**
  - Double number of beams
  - Double bandwidth
- **New technology:**
  - Half system temperature (non-cryogenic)
  - Extended frequency range?

Summary

MRO is world's best radio-quiet site

ASKAP++ is a unique opportunity to build SSP legacy:

- Complementary to SKA-mid which is better suited for deep pointed observations
- Complementary in angular resolution to SKA-low
- Order of magnitude improvement in science capabilities

Many upgrade paths:

- Simplest is retaining footprint, antenna size, PAF tech, but upgrading Tsys, beamformer, correlator
- Probable lower operating costs

Thanks

ASKAP was build as a technology demonstrator at the world's best radio-quiet observatory site. An upgrade would turn it into a world-leading 'SKA-survey' facility at a cost of 2% of the SKA.

Background: CSIRO Rapid ASKAP Continuum Survey