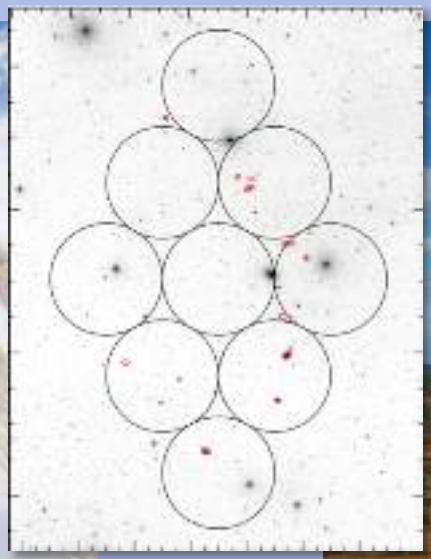



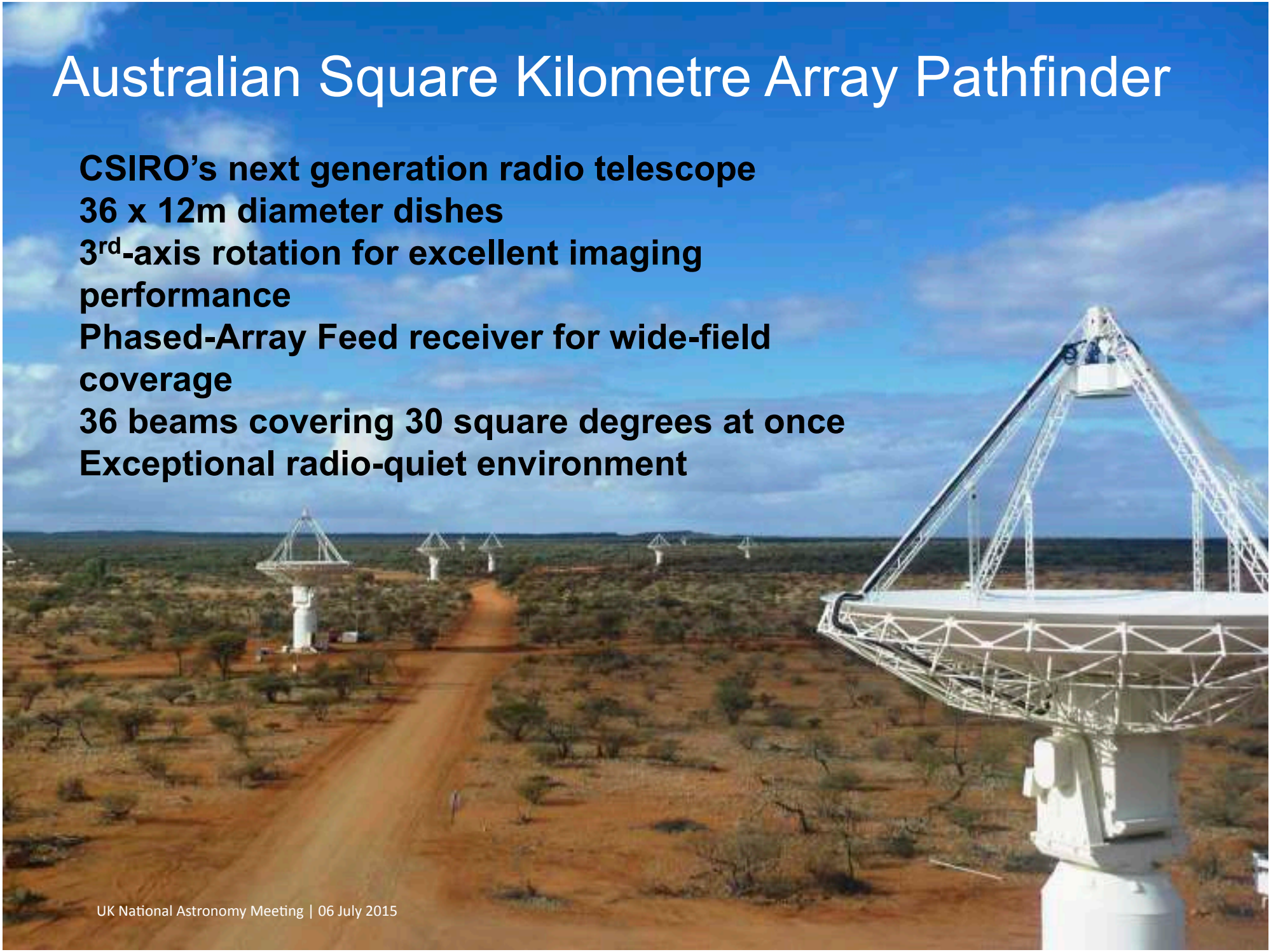

Commissioning and early science results from the Australian SKA Pathfinder

James Allison (Bolton Fellow)

CSIRO ASTRONOMY & SPACE SCIENCE
www.csiro.au

Australian Square Kilometre Array Pathfinder

CSIRO's next generation radio telescope
36 x 12m diameter dishes
3rd-axis rotation for excellent imaging performance
Phased-Array Feed receiver for wide-field coverage
36 beams covering 30 square degrees at once
Exceptional radio-quiet environment



ASKAP Survey Science Projects

- **WALLABY** (Koribalski/Staveley-Smith) All sky **HI survey** to z~0.2
- **EMU** (Norris) All sky **continuum** to 10 uJy rms
- **GASKAP** (Dickey/McClure-Griffiths) **Galactic** & Magellanic **HI/OH**
- **VAST** (Murphy/Chatterjee) **Transients** and variables (>5 sec)
- **CRAFT** (Hall) **Fast transients** (<5 sec)
- **FLASH** (Sadler) **HI absorption** to z = 1
- **POSSUM** (Gaensler/Landecker/Taylor) **Polarization** / RM grid
- **DINGO** (Meyer) **Deep HI** emission survey
- **COAST** (Stairs) **Pulsar timing** and searching
- **VLBI** (Tingay) ASKAP as part of the **Long Baseline Array**

Open access call for proposals. **10 Large Projects** chosen. Some 350 co-authors. **Data** to be made immediately **public**.

Early Science and Commissioning Team

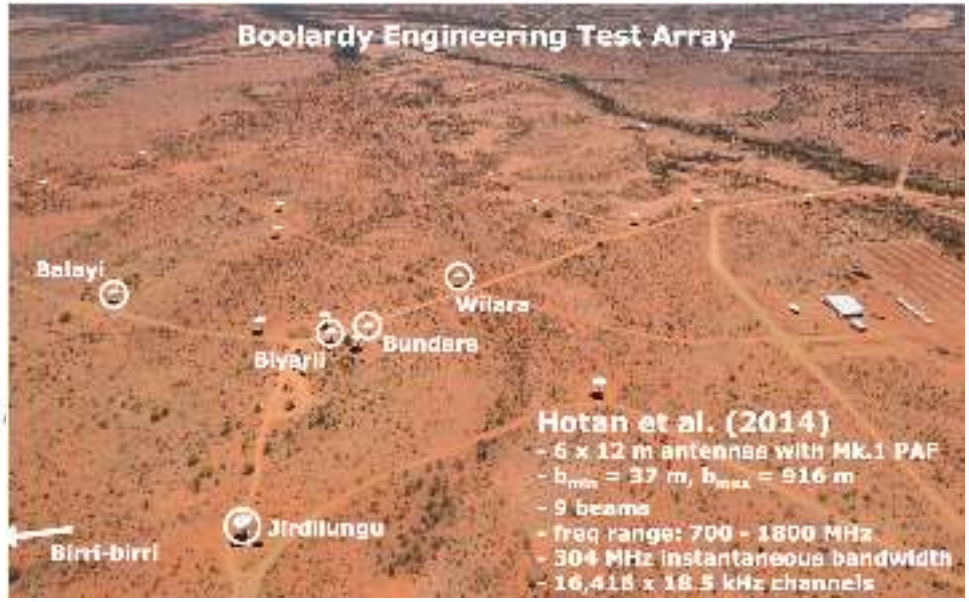
BETA - the Boolardy Engineering Test Array

What is BETA?

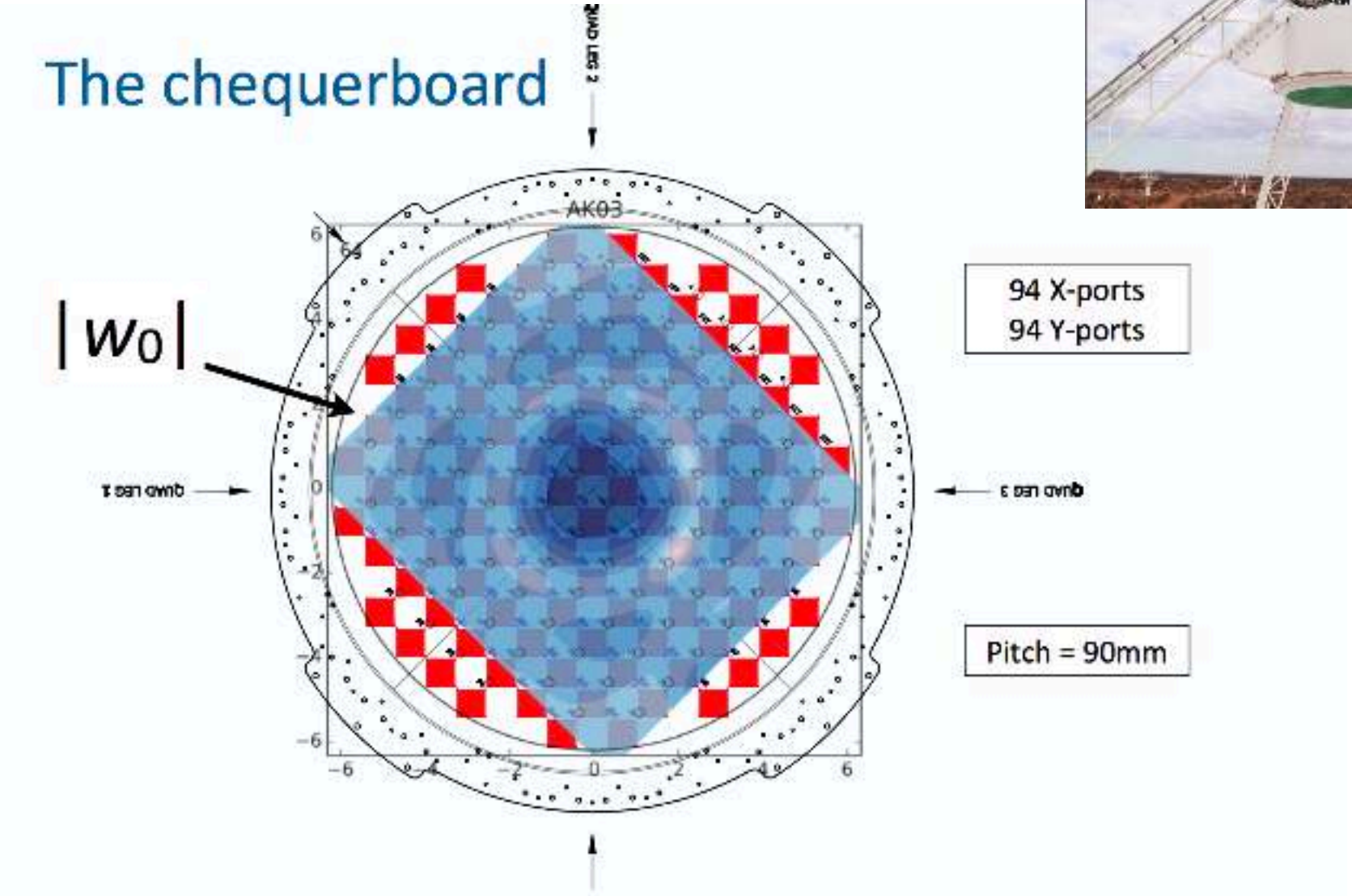
- a prototype for ASKAP
- 6 antennas fitted with Mark I PAFs and signal processing backend
- limited to 9 dual-pol beams

Table 1 Key parameters of the BETA telescope.

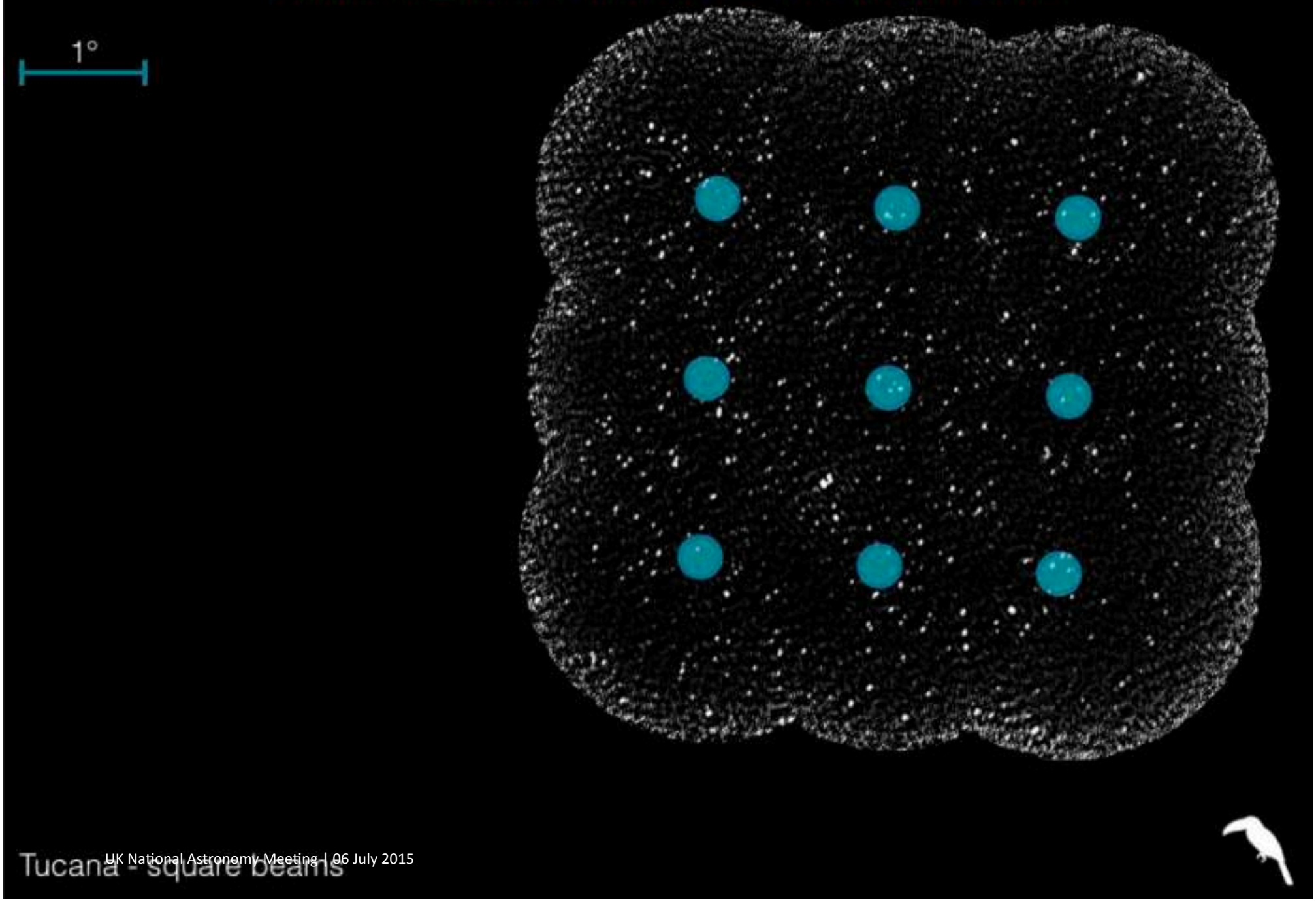
Number of Antennas	6
Antenna Diameter	12 m
Total Collecting Area	678.6 m^2
Maximum Baseline	916 m
Angular Resolution	1.3′ (see Fig. 4)
Observing Frequency	0.7 to 1.8 GHz
Simultaneous Bandwidth	304 MHz
Frequency Channels	16416
Frequency Resolution	18.5 kHz
Simultaneous Beams	9 (dual-pol)
Minimum Integration Time	5 s



Phased Array Feeds



3. INTERLEAVING FOR WIDE AREA IMAGING



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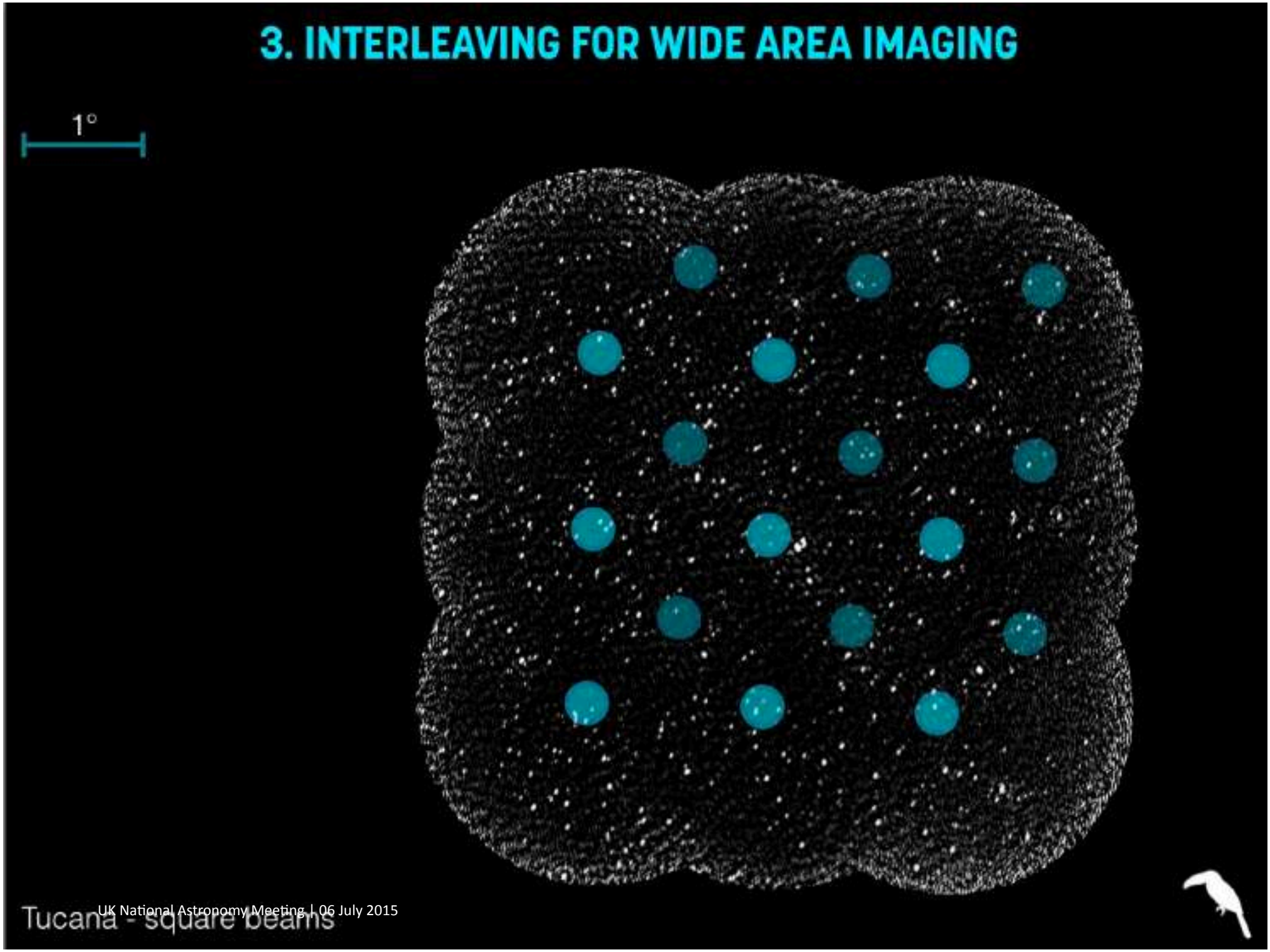
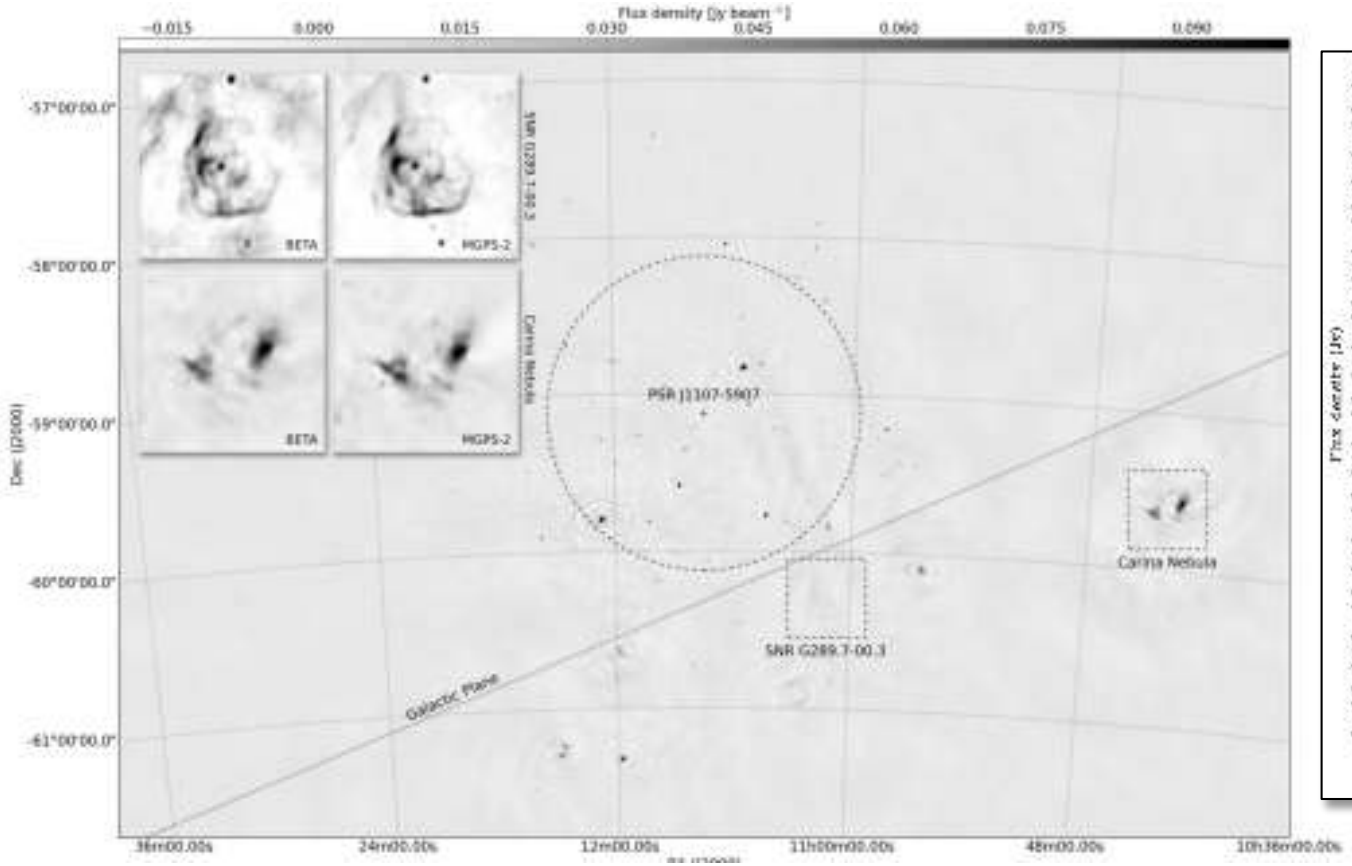
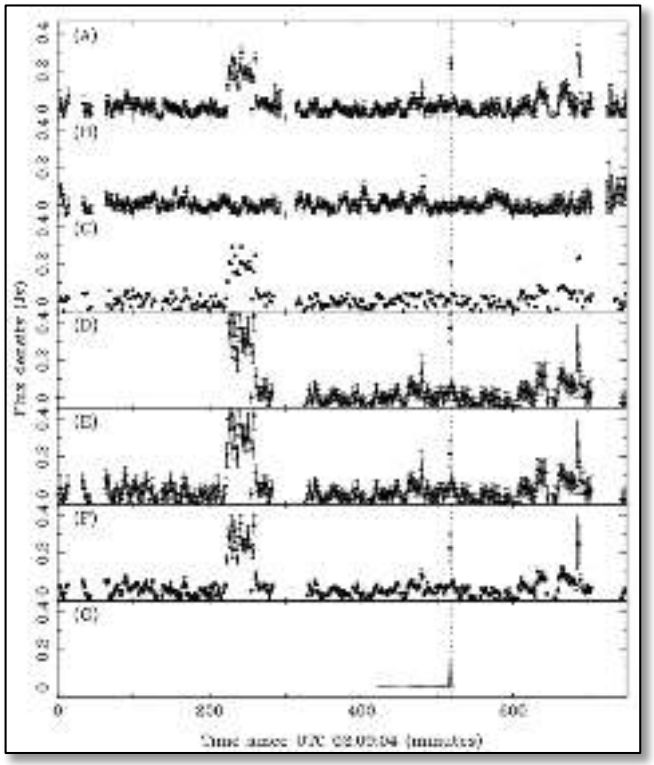


The Tucana Field (Ian Heywood/CSIRO)

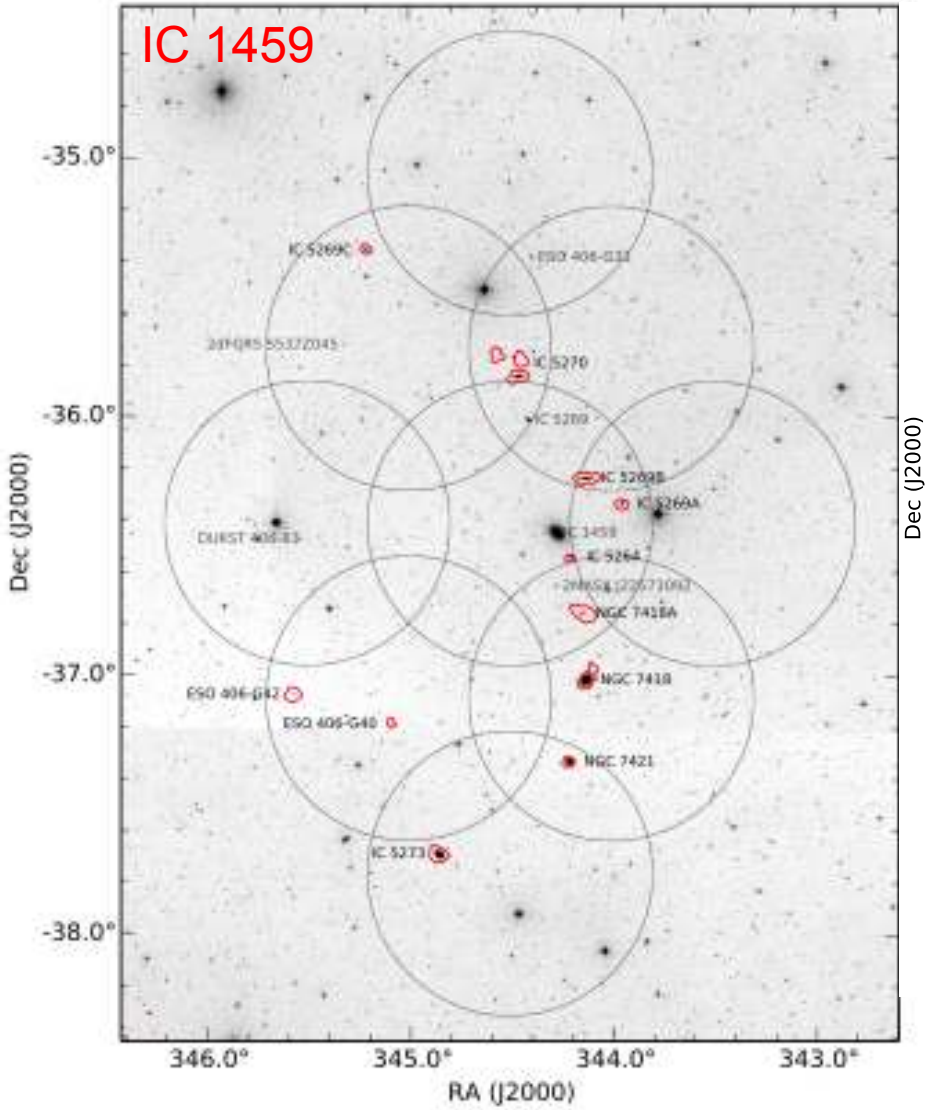
Intermittent pulsar with ASKAP-BETA

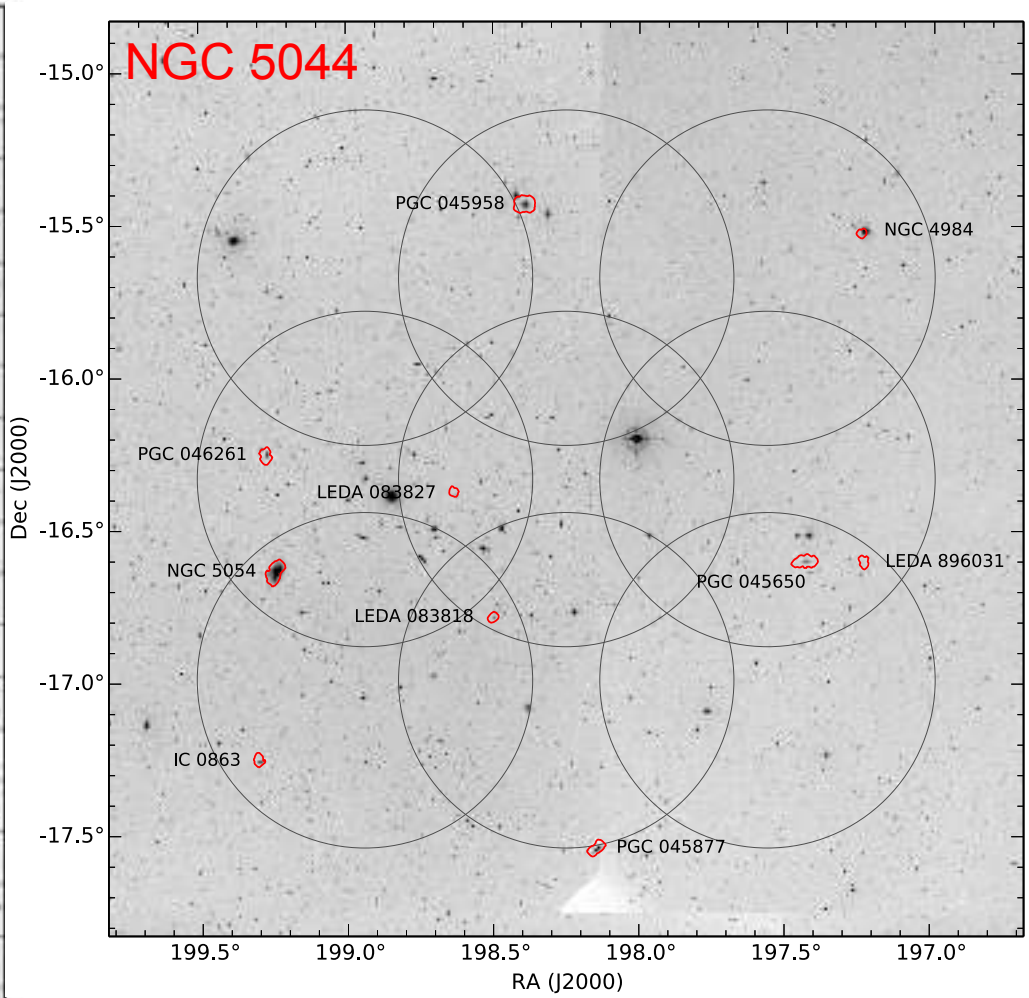




Hobbs et al. (submitted)

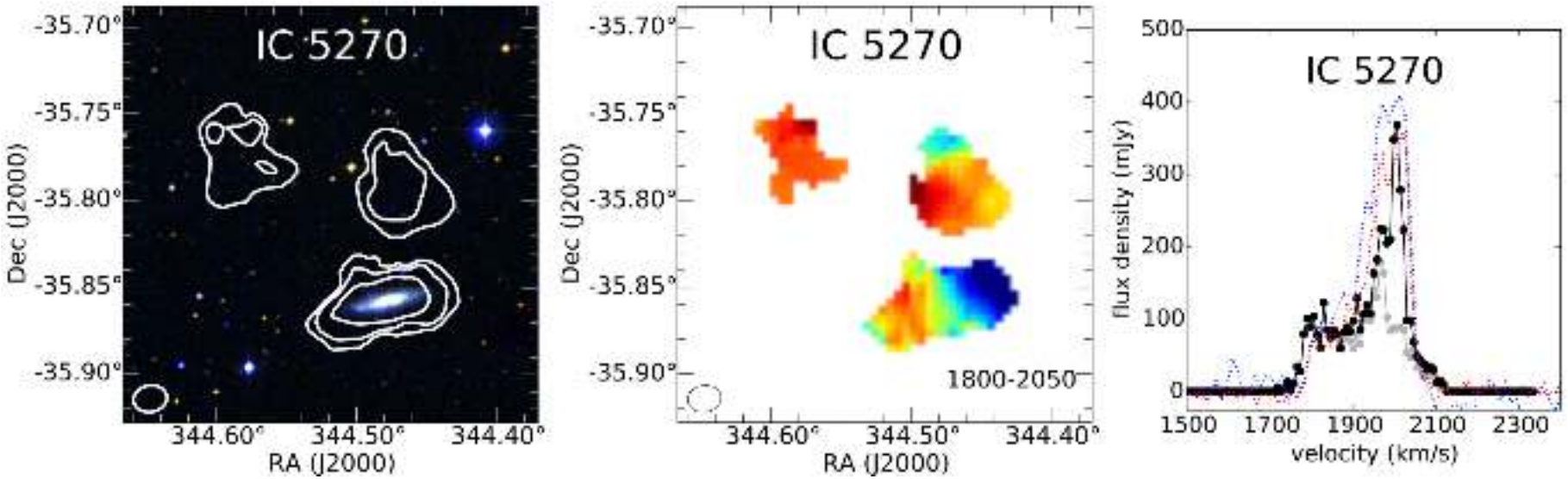
Imaging HI in nearby galaxy groups





Serra et al. (arXiv:1506.04399)

Imaging HI in nearby groups – extra clouds



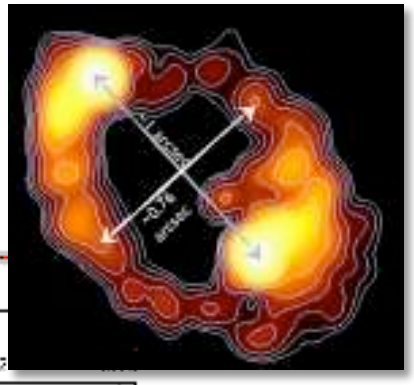
HIPASS spectrum (Single dish, 15’ beam) – Red

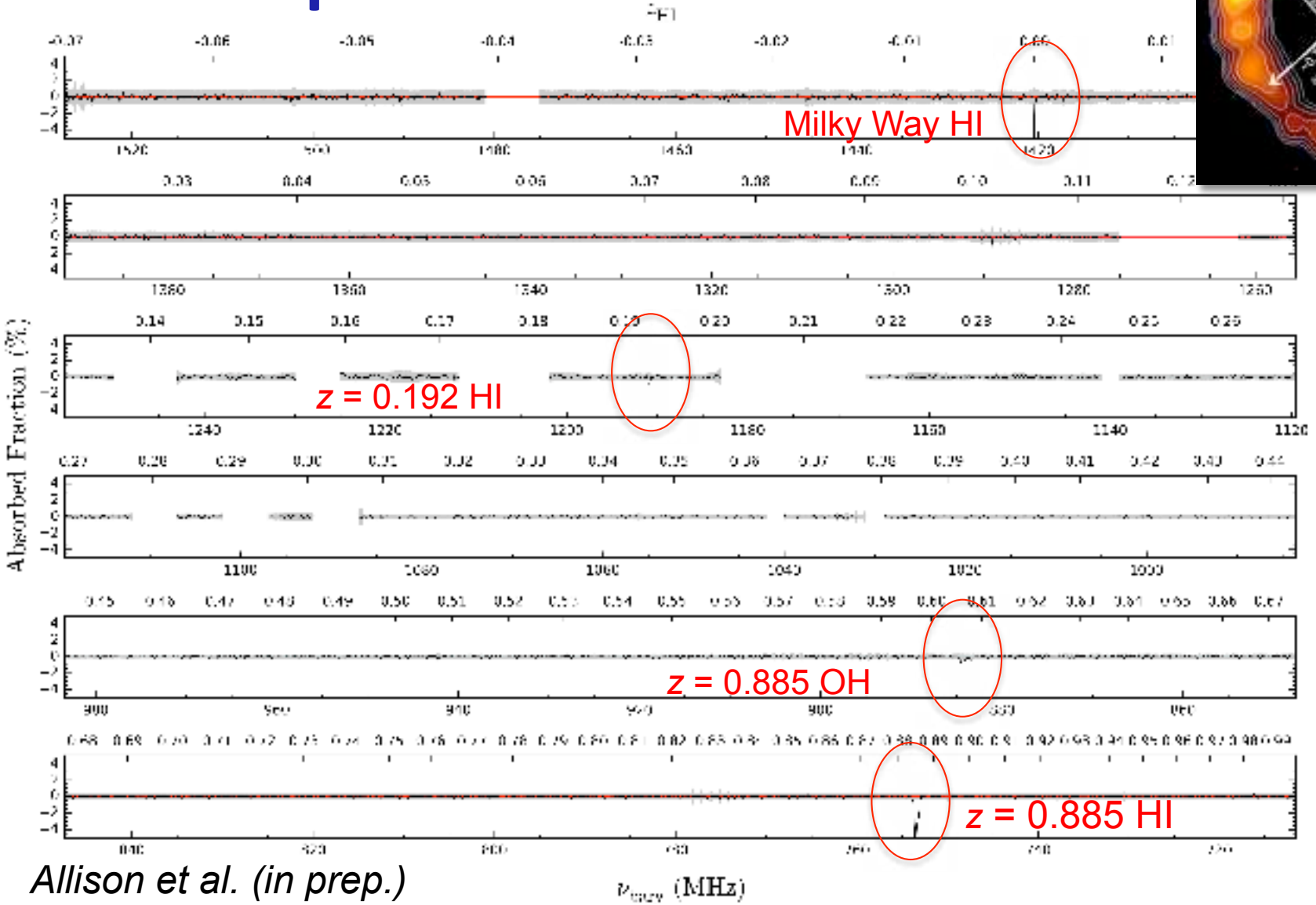
BETA total spectrum (6 antennas, 1’ beam) – Black

BETA galaxy spectrum - Grey

Serra et al. (arXiv:1506.04399)

HI absorption from z = 0 – 1





Allison et al. (in prep.)

Summary

- 6 ASKAP antennas fitted with first-generation phase array feeds
- Focus on commissioning and early demonstration science
- Can form up to 9 simultaneous beams in a single pointing
- Demonstrate continuum imaging and time-domain
- Widefield imaging of HI in galaxy groups
- Detection of HI in absorption over z = 0 - 1