



International
Centre for
Radio
Astronomy
Research

Internship: Analysis, design and verification of an RF Reference Source

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University associate



Introduction



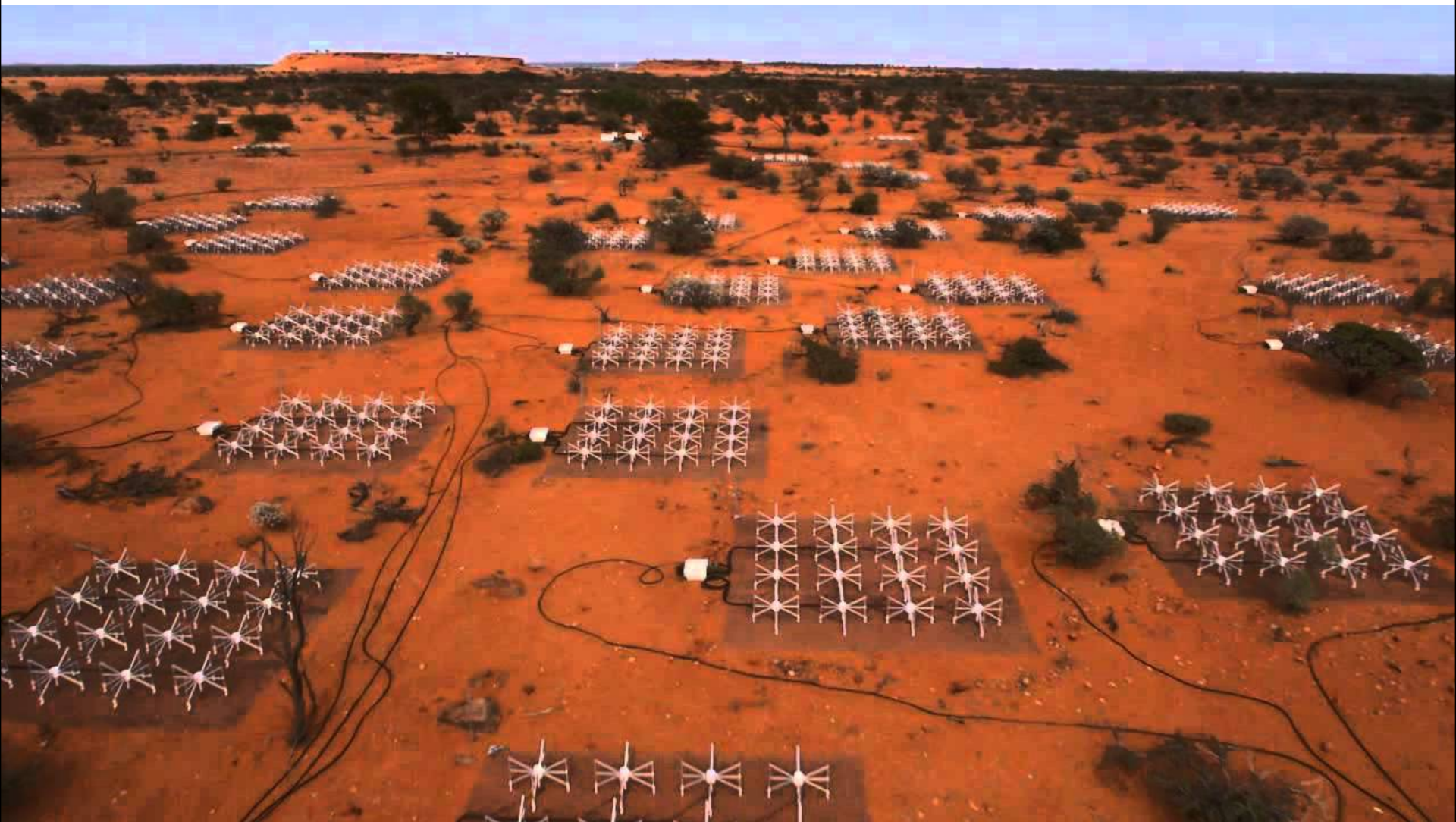


Introduction

- Murchison Widefield Array (MWA)
- Square Kilometre Array (SKA) precursor
- Radio astronomy
- Western Australia
- Ø 3 km
- 128 tiles, 4x4 antennas each, 2048 in total
- 80 – 300 MHz
- Continuously being improved and expanded

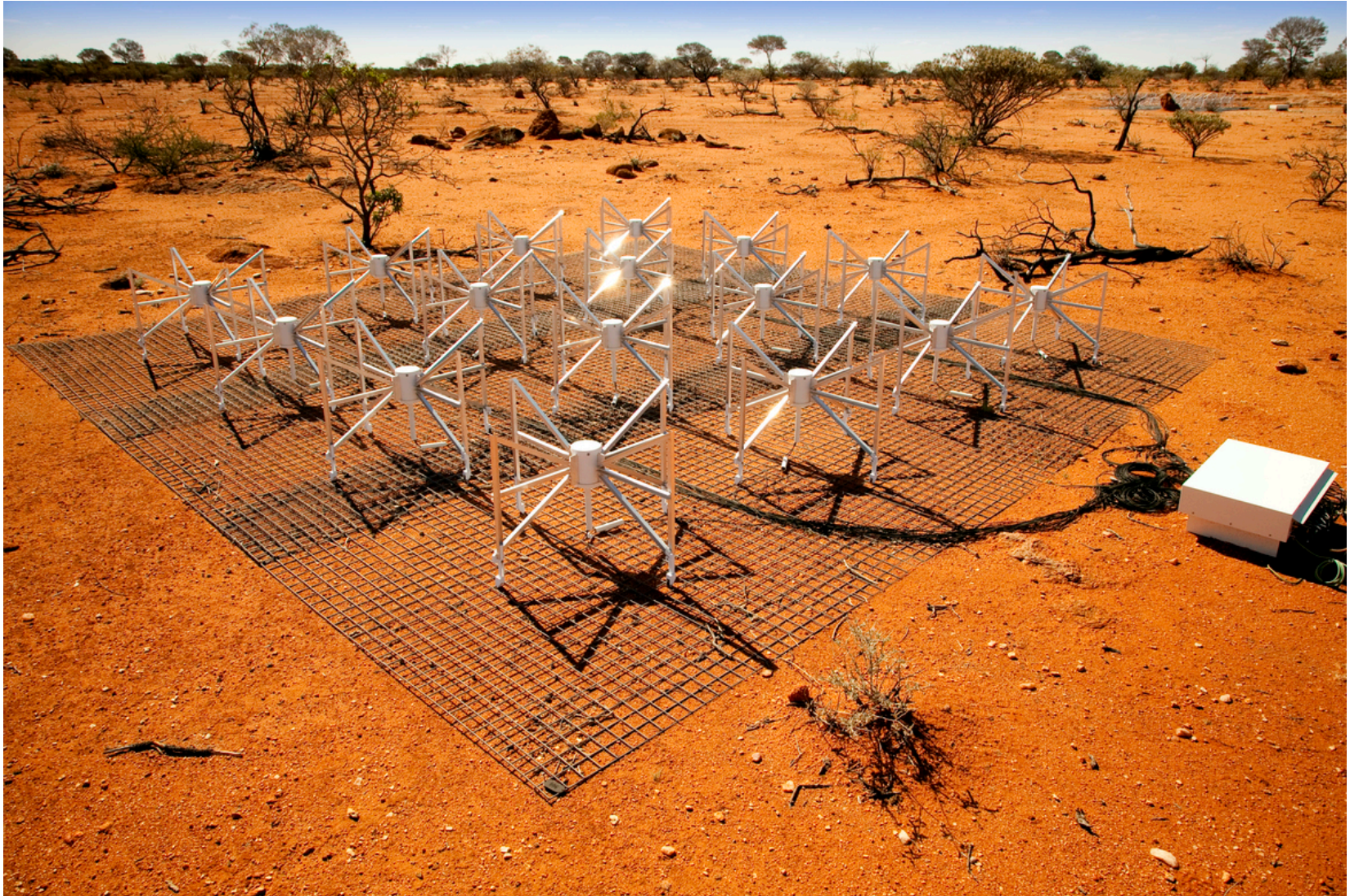


Introduction:



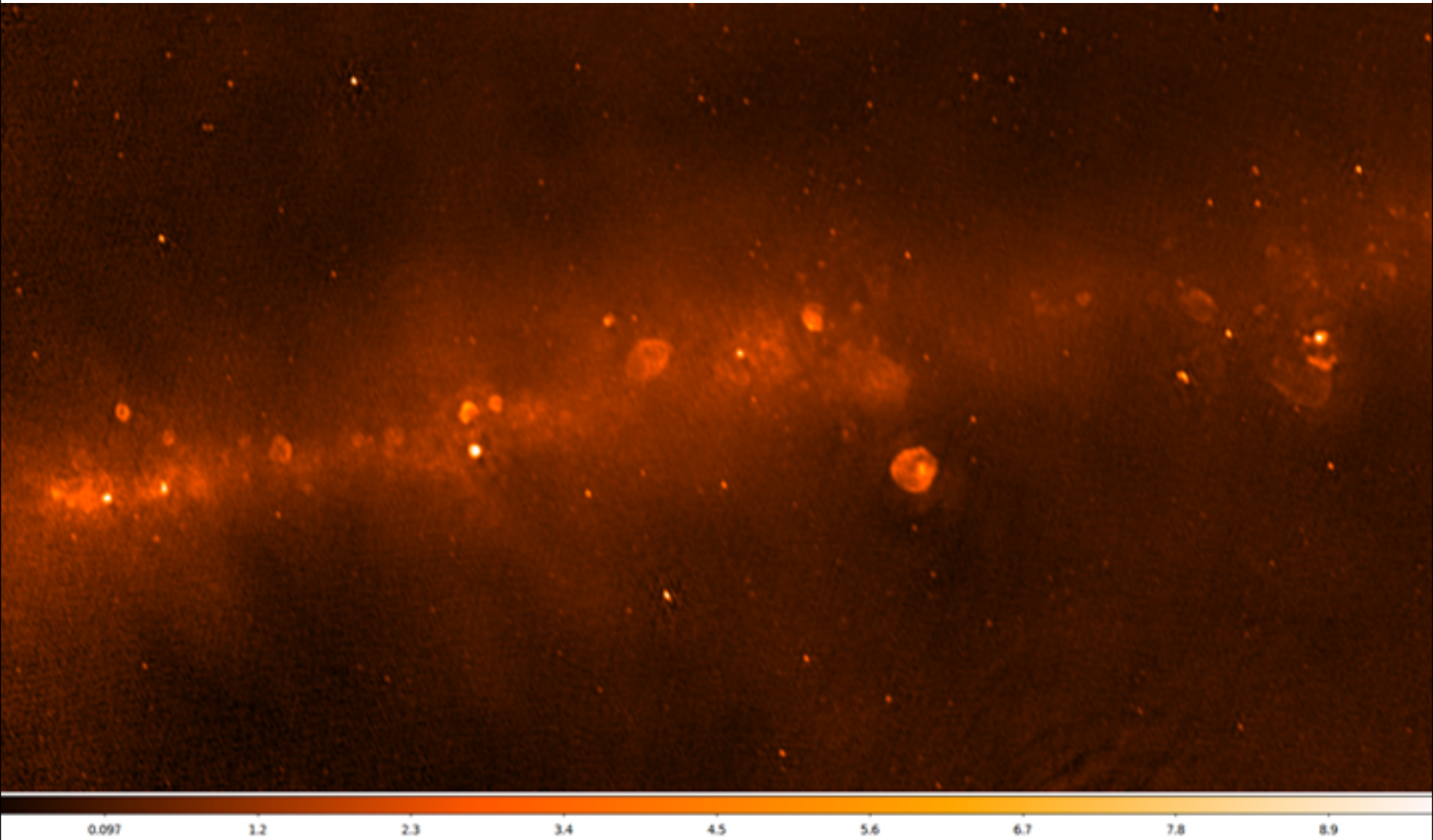


Introduction:

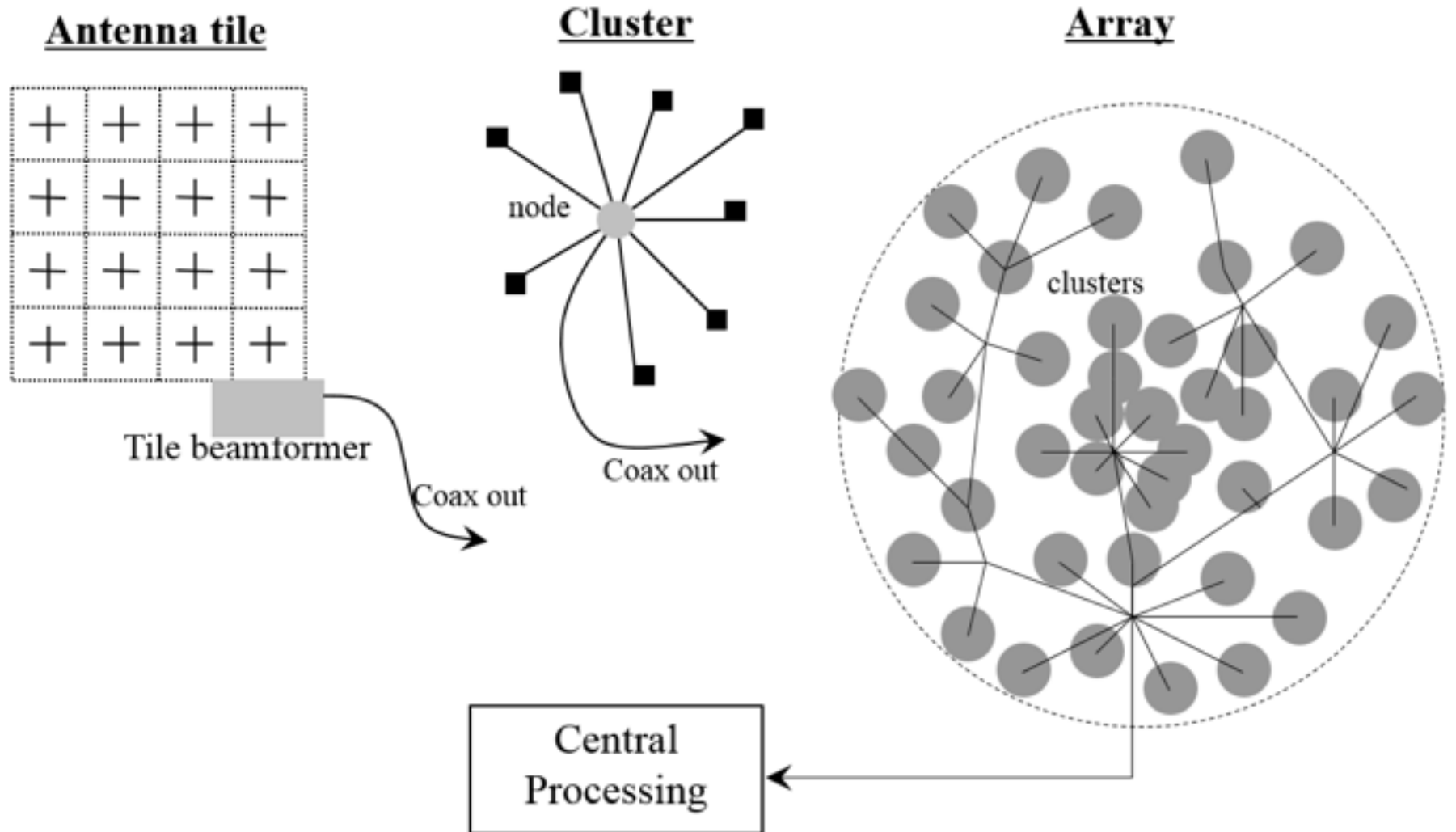




Introduction:



System overview





System overview

- 16 antennas per tile ($X + Y = 32$ channels)
- 1 analog beamformer per tile
- 2 coax cables from tile to receiver
- 8 tiles per receiver (16 channels)
- Digitization and channelization
- 16 optical fibers from receivers to server room (320Mb/s)
- Correlation, pre-processing and local storage
- 1 optical fiber from server room to Pawsey supercomputer in Perth (10 GB/s)



System overview

- 2048 antennas
- 4096 amplifiers
- 128 groundplanes
- > 30 km 'small' coax
- 8 receivers
- ~ 5 km 'big' coax
- 48 GPU correlators
- ~ 800 + 80 km optical fiber
- 80 TB local storage
- 20 PB Perth storage

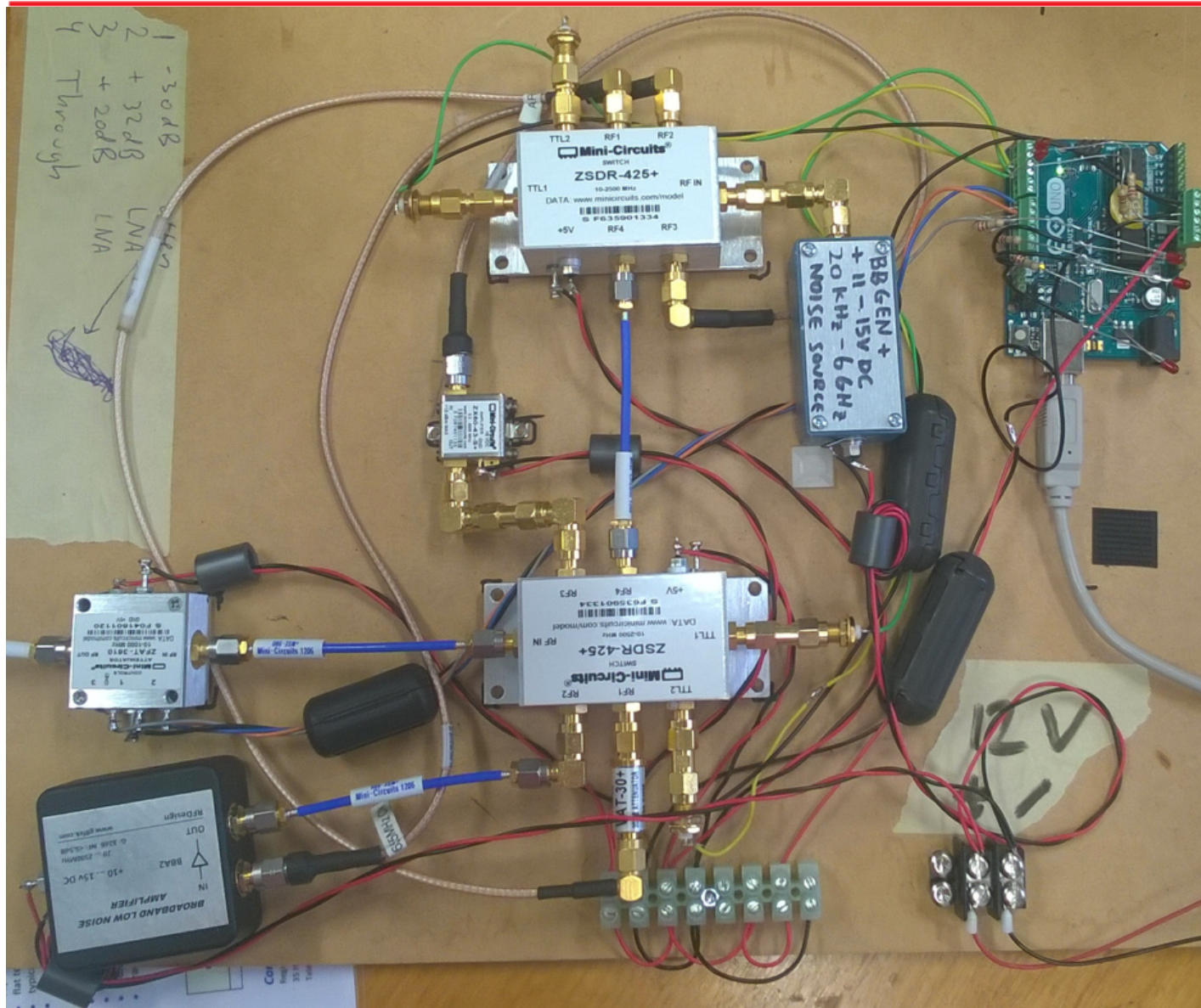


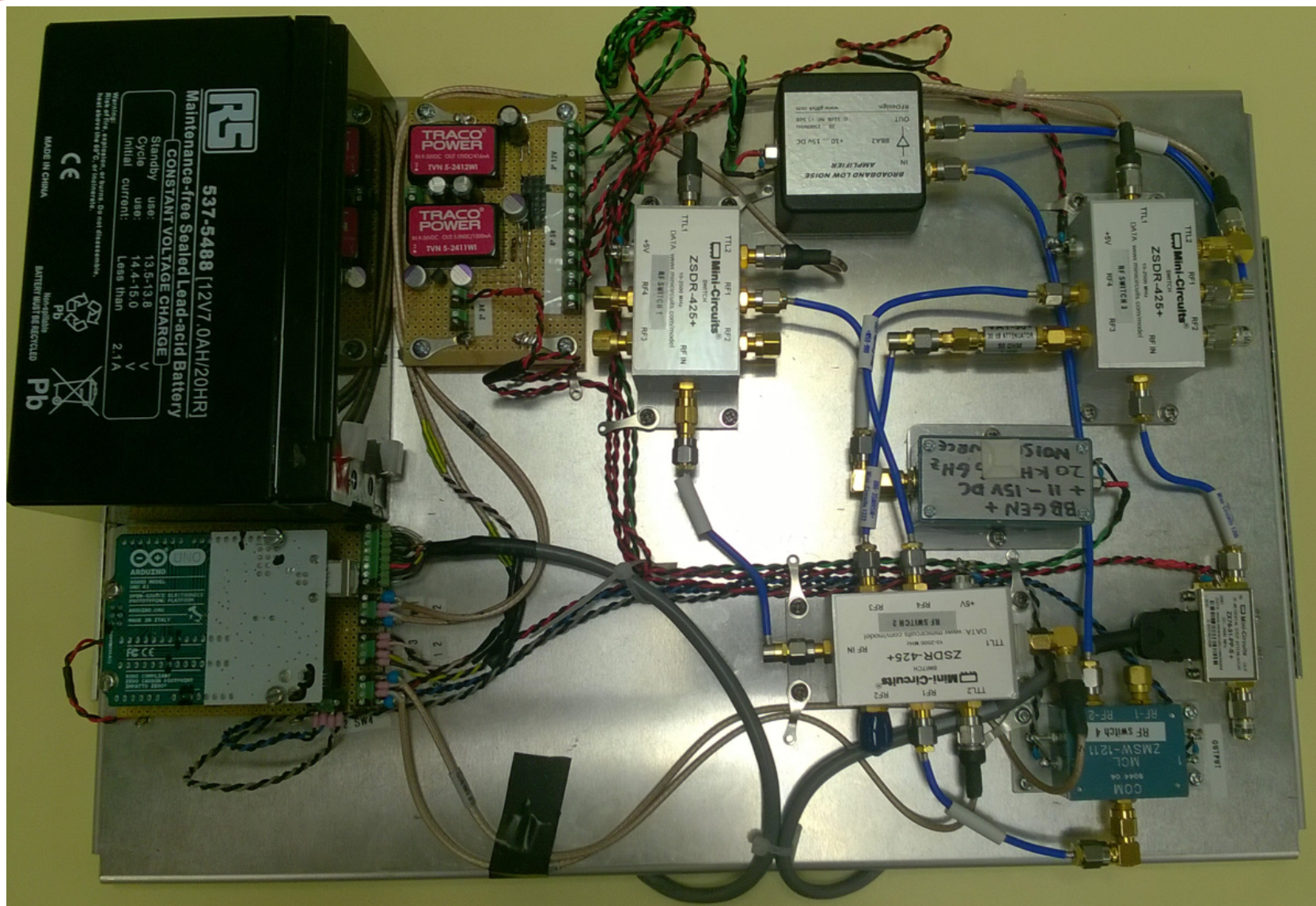
Project

Design, build and test an RF reference source. This source will be used to characterize equipment to be used on-site

- Dynamic range: -186 – -126 dBm/Hz
- Bandwidth: 50 – 2000 MHz
- Predictable and repeatable output
- RFI emission: 20 dB below MIL-STD-461 (4 dB μ V/m)
- USB control
- Battery powered operation

Project







Project





Why is ICRAR cool?

- People are very smart, nice and supportive
- Many disciplines
 - EM
 - EMC
 - RF electronic design
 - Signal processing (analog and digital)
 - Digitalization
 - Real time data handling
 - Radio astronomy
- International environment
- Very good facilities
- MWA is an awesome project
- Good chance of a site visit
- They pay your accommodation



Why is Australia cool?

- People are nice, kind and friendly
- People speak English (with funny accent)
- Weather is nice
- Relaxed culture
- Used to cyclists (somewhat)
- Great nature and wildlife
- Combine with a holiday to Australia / Indonesia



Bottom line

Go abroad, there is much to explore

Now is your chance

You won't regret it



Questions?

- Feel free to ask later or email: tvn@thor.edu

