The SKA Molonglo Prototype (SKAMP) Project
SKA Meeting - April 2006

Anne Green

SKA Molonglo Prototype Project (SKAMP)

- Project goal: provide a new low frequency spectral line capability to augment the national facility and contribute to the Australian SKA effort.
- Technology developments: fast digital signal processing & transport, wide-field imaging for continuum and polarisation studies, management of large data sets, RFI mitigation.
- Key science outcomes: blind survey of red-shifted HI to test predictions for mass-assembly of galaxies from CDM scenarios, direct measure of HI mass function at high red-shift, cosmic magnetism studies.
- Opportunity to test issues on 1% collecting area of SKA

SKAMP Team

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- Michael Kesteven
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Argus Technologies

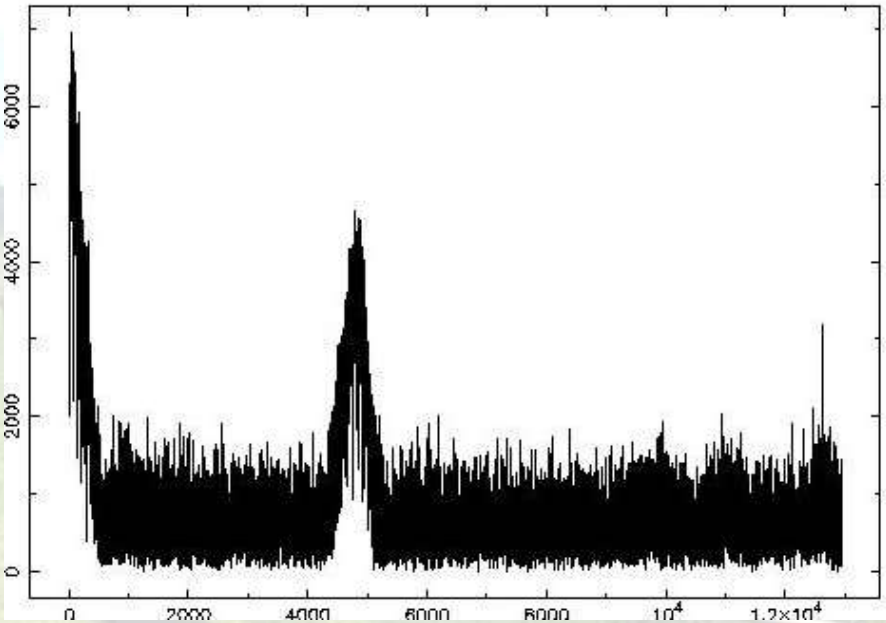
- Bevan Jones
- Martin Owen
- Peter Liversidge

SKAMP Milestones

- **STAGE 1**: 96 stations, 843 MHz continuum, BW 4 MHz, field-of-view 5 square degrees, 12 hr σ is 0.8 mJy (confusion limit is 0.12 mJy for 43" spatial resolution).
- **STAGE 2**: Spectral-line correlator, 830 – 860 MHz, BW 30 MHz, Tsys 55K (as before), field-of-view 4 square degrees, 6000 channels, maximum spectral resolution 5 kHz, 12 hr σ is 0.12 mJy (spectroscopy not confused).
- **STAGE 3**: Dual polarisation feed, 650 – 1100 MHz, BW 100 MHz, 6000 channels, maximum spectral resolution 5 kHz, Tsys now 40K, 12 hr σ is 0.1 mJy (polarimetry not confused).

Narrowband continuum correlator

- 96 independent stations: 88 telescope stations + reference antennas
- Proof of concept complete
  – final debugging in progress
- Drift scan on calibrator source



Spectral-line correlator racks ready

- Racks installed for fibre patch panels, polyphase filterbanks & correlator.
- Schematics for boards nearly complete.
- For 6000 channels and 6 sec integration cycle, data rates per board will be about 0.2 Gb/s
- Total data acquisition rate for 24 ethernet connections is about 0.5 GByte/sec. Some real-time analysis and compression is essential!

Altium sponsorship - nanoboards

- FPGA-based development board.
- Interactive implementation & debugging.
- Identical sets to be located at the telescope and CSIRO for seamless interfacing of systems.

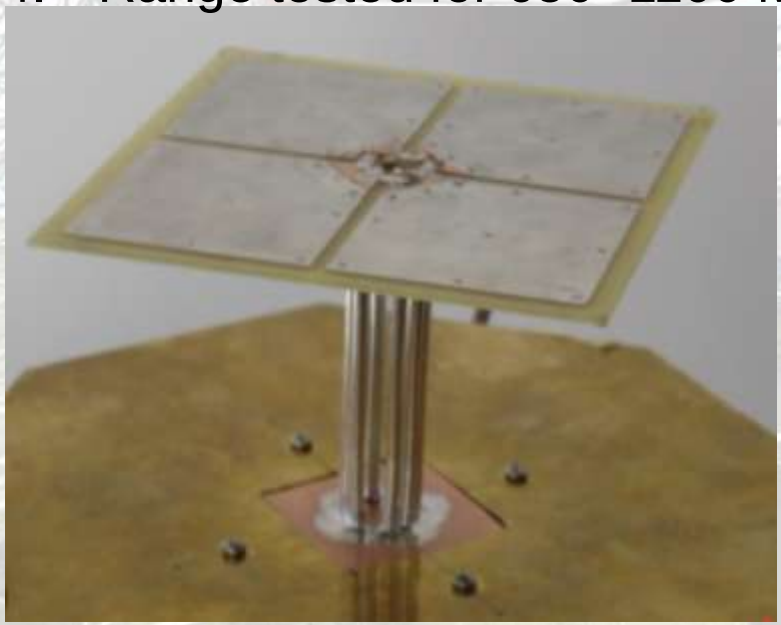
Optic fibre network – connection of pits to the 88 bays complete; long runs to the Control Room 60% implemented

Rapid Prototype Telescope (RPT)

- Double mesh – reduces leakage
- Predict Tsys to improve by 15K
- Crimp added to reduce surface distortions
- Separate 17m bay to test feeds in realistic environment

Wideband feed prototype module

1. 8-element module, 1.4 m length
2. Wide-band dipoles – no moving parts
3. Polarisation axes oriented along & across axis of feed – better performance than dual-slant feeds
4. Range tested for 650 -1100 MHz



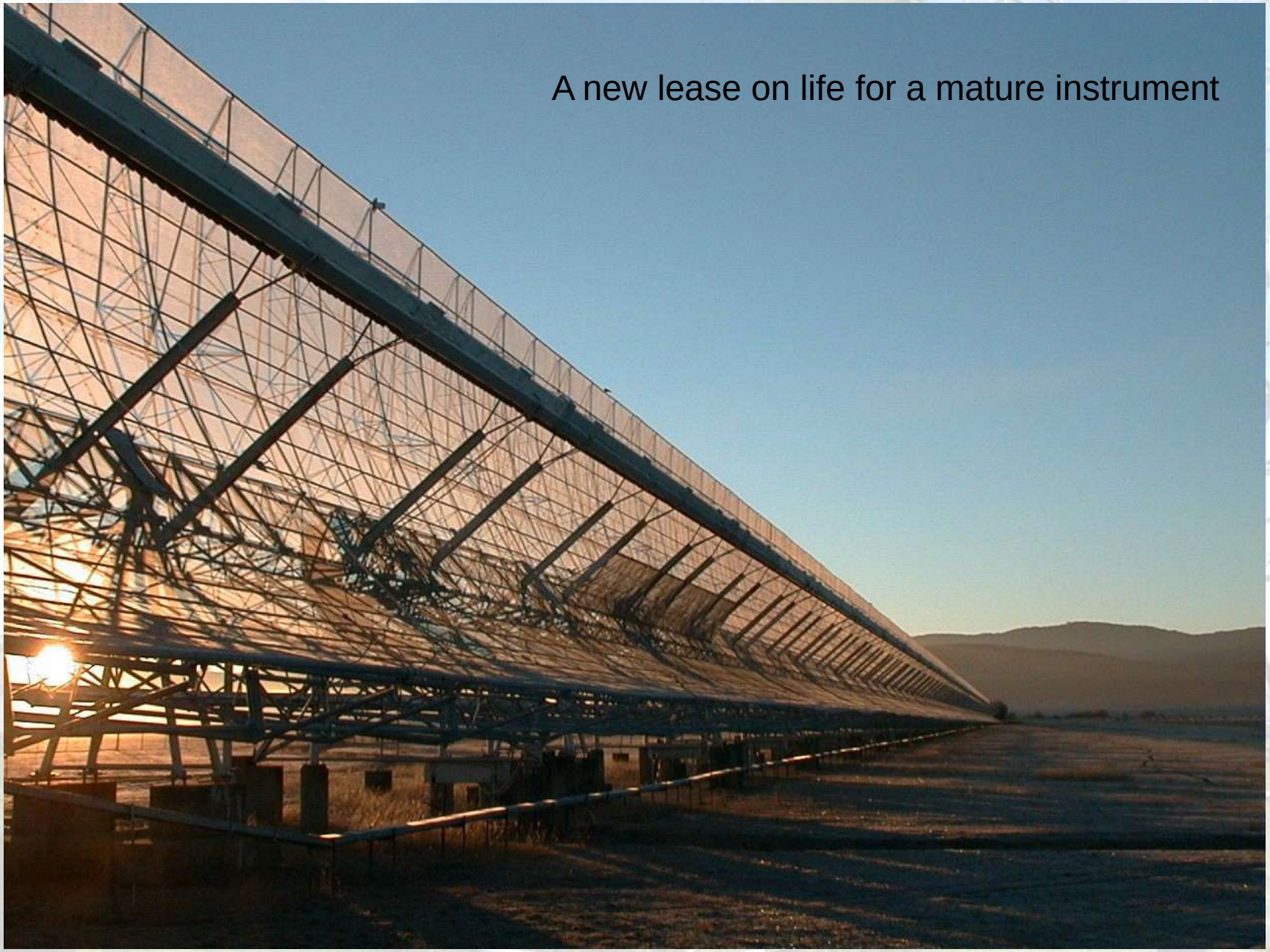
Leung

Feedline prototype support manufactured

Analogue Beam-forming prototypes designed:
Stage 1 combines the 8 elements of a module
Stage 2 combines 6 modules, gives 4 outputs per bay

Summary of SKAMP Project status

- Complete signal pathway from front-end to correlator is specified & designed – several sections in prototype or nearing completion.
- Good progress with major digital systems (filterbanks & correlator).
- Planning for data acquisition software and analysis algorithms under way – expected data rates of 0.5 GByte/sec mean some real-time analysis essential.
- Integration of dual polarisation feed module and RPT has been planned.


A new lease on life for a mature instrument