International Centre for Radio Astronomy Research

The University of Western Australia
Achieving International Excellence

Curtin University of Technology

ICRAR is a partnership between The University of Western Australia and Curtin University of Technology

Wallaby

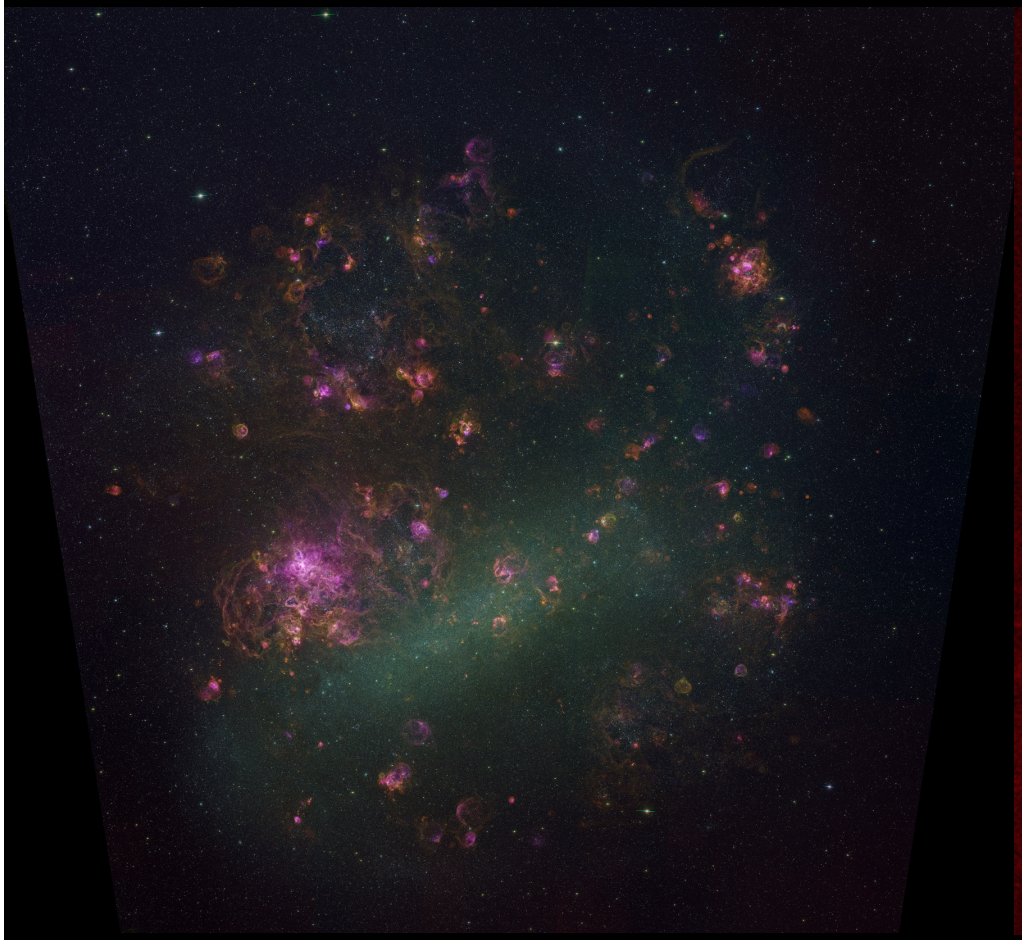
Lister Staveley-Smith

International Centre for Radio Astronomy Research

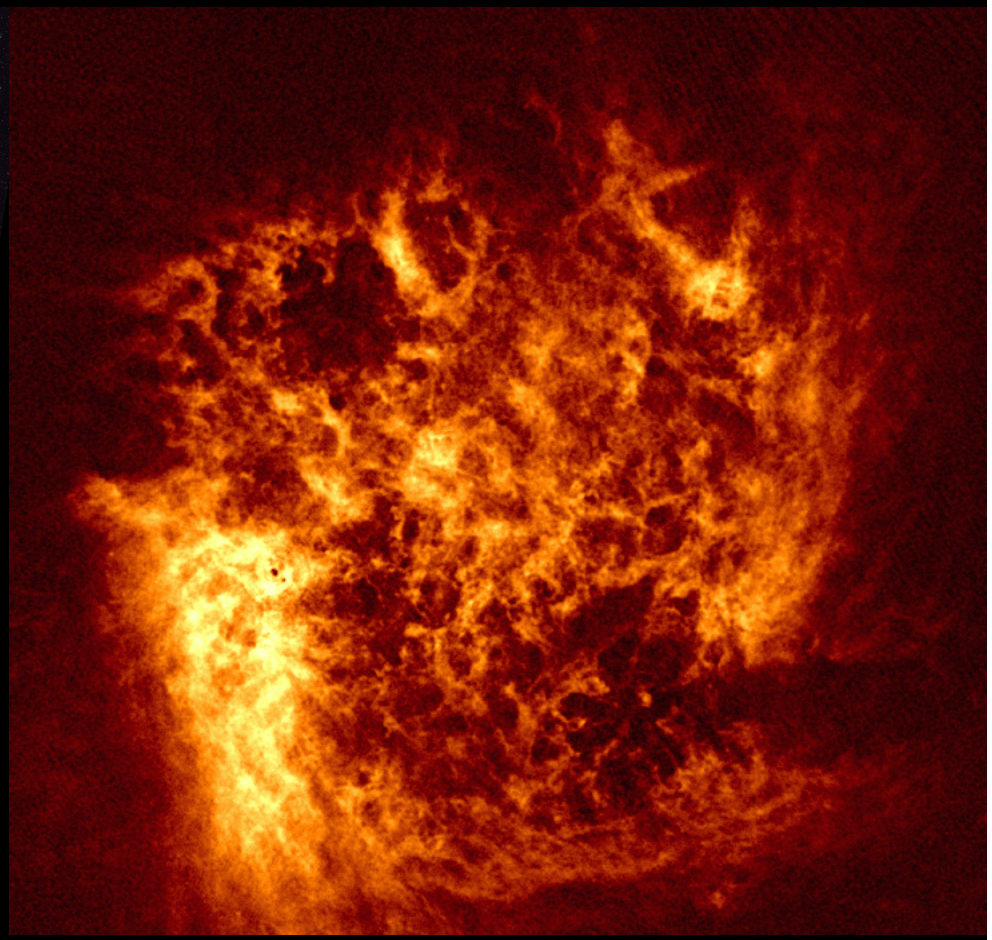
Outline

- Wallaby/HI science
- Wallaby design study
  - working groups
  - simulations
  - techniques
  - data intensive research pathfinder (DIRP)
- Communication, fellowships

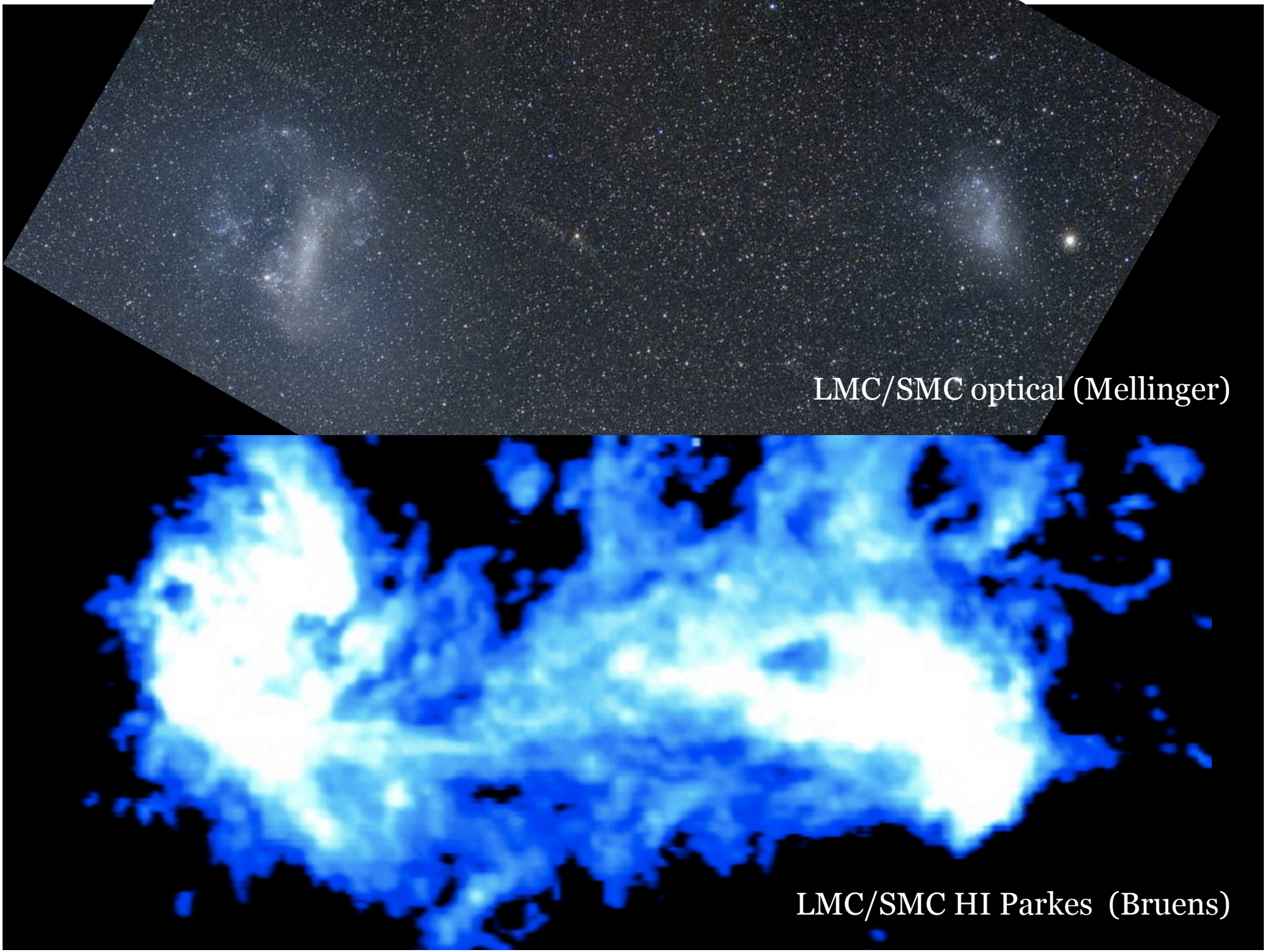
LMC



Stars & ionised gas
(Smith; CTIO)

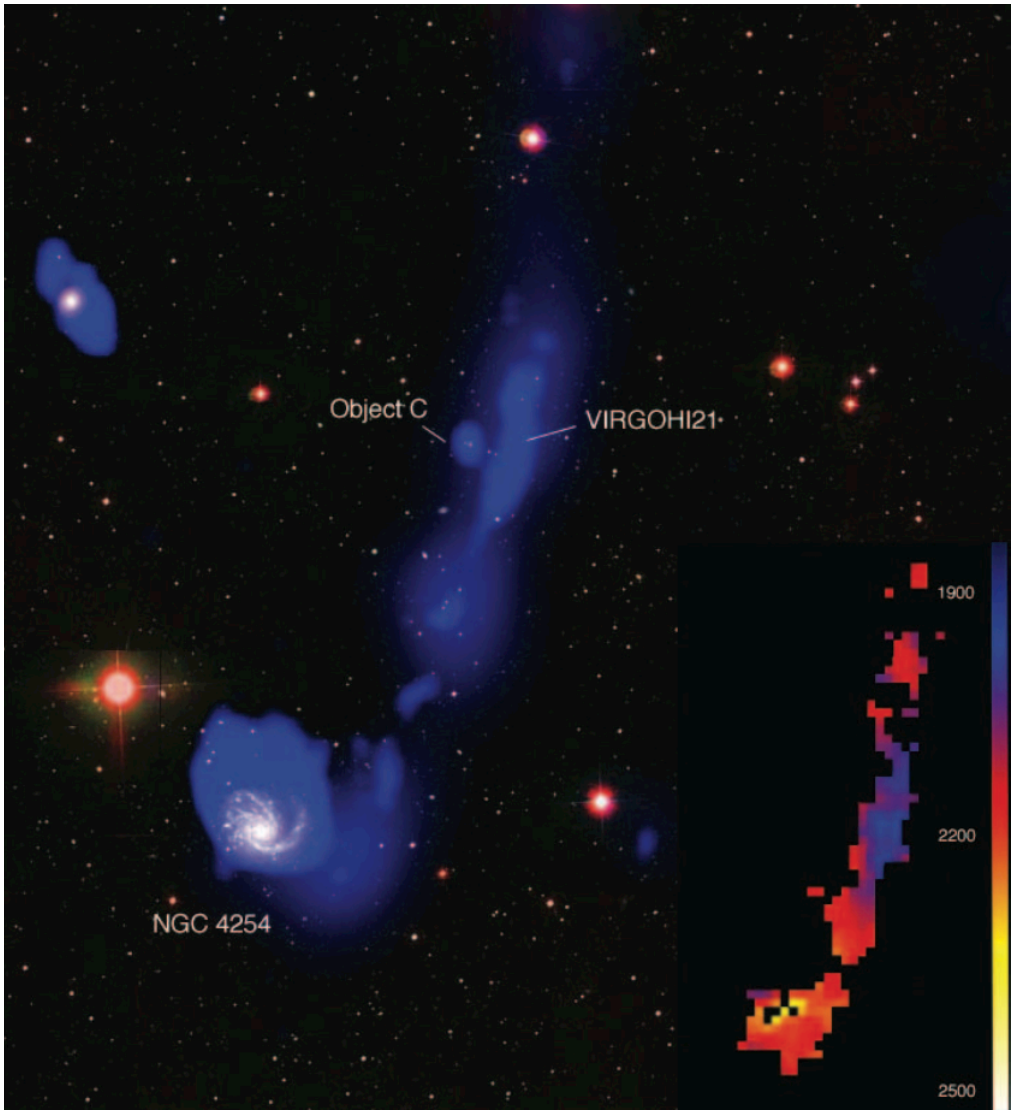


HI (Kim et al., Staveley-Smith et al.; ATCA/PKS)


LMC/SMC optical (Mellinger)
LMC/SMC HI Parkes (Bruens)

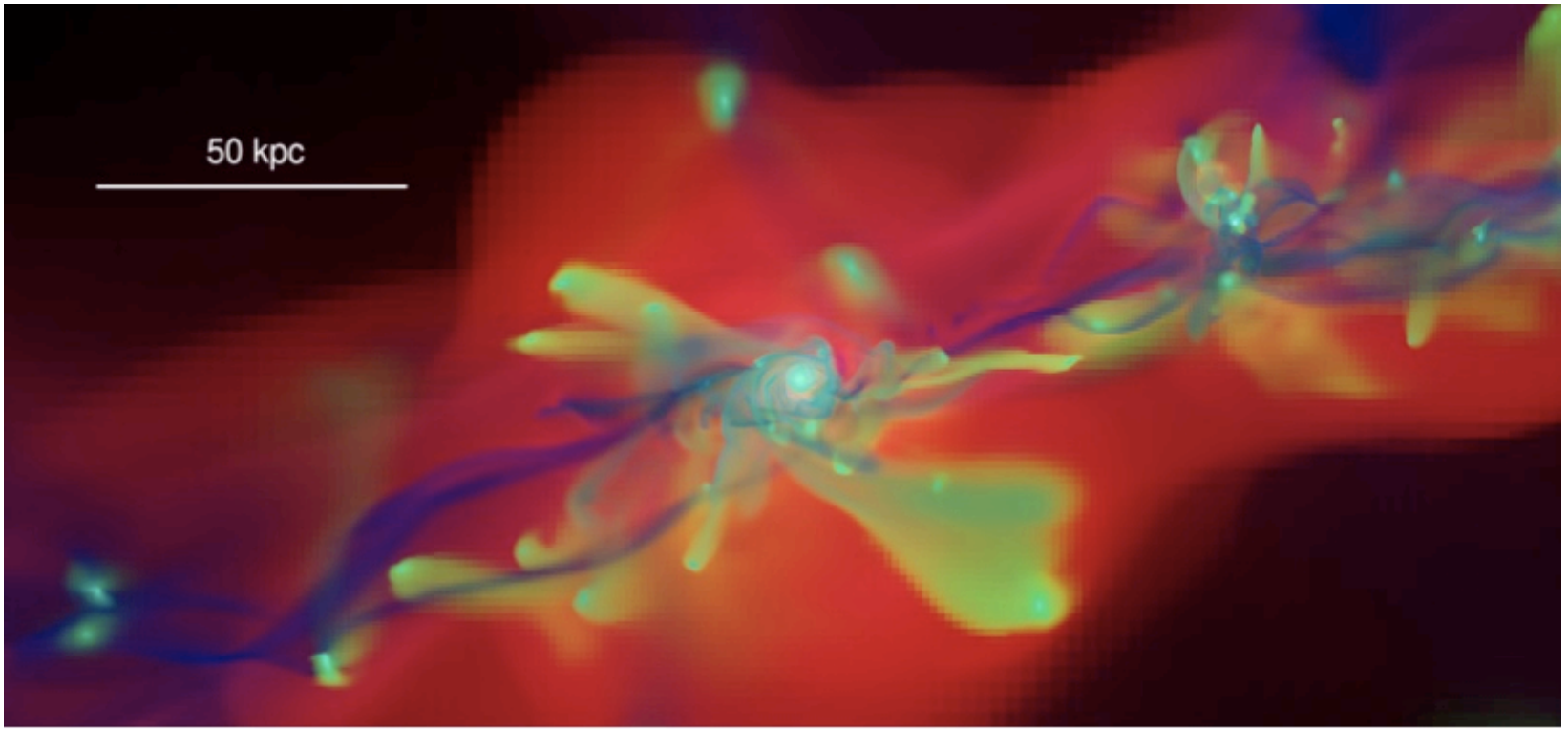
Dark and tidal galaxies

- ‘Dark’ galaxy VirgoHI21 detected in HIJASS observations (Davies et al. 2004).
- Minchin et al. (2005) claim lack of stars (inc.HST) and high rotation velocity suggestive of true dark galaxy.
- Other observations (Kent et al. 2007) and models (Bekki et al. 2005; Duc & Bournaud 2008) suggestive of tidal interaction.
- ALFALFA Virgo results (Kent et al.)



Duc & Bournaud (2008)

Simulations



‘Cold’ gas (blue) flowing into a galaxy at z=3 (Agertz, Teyssier & Moore 2009)

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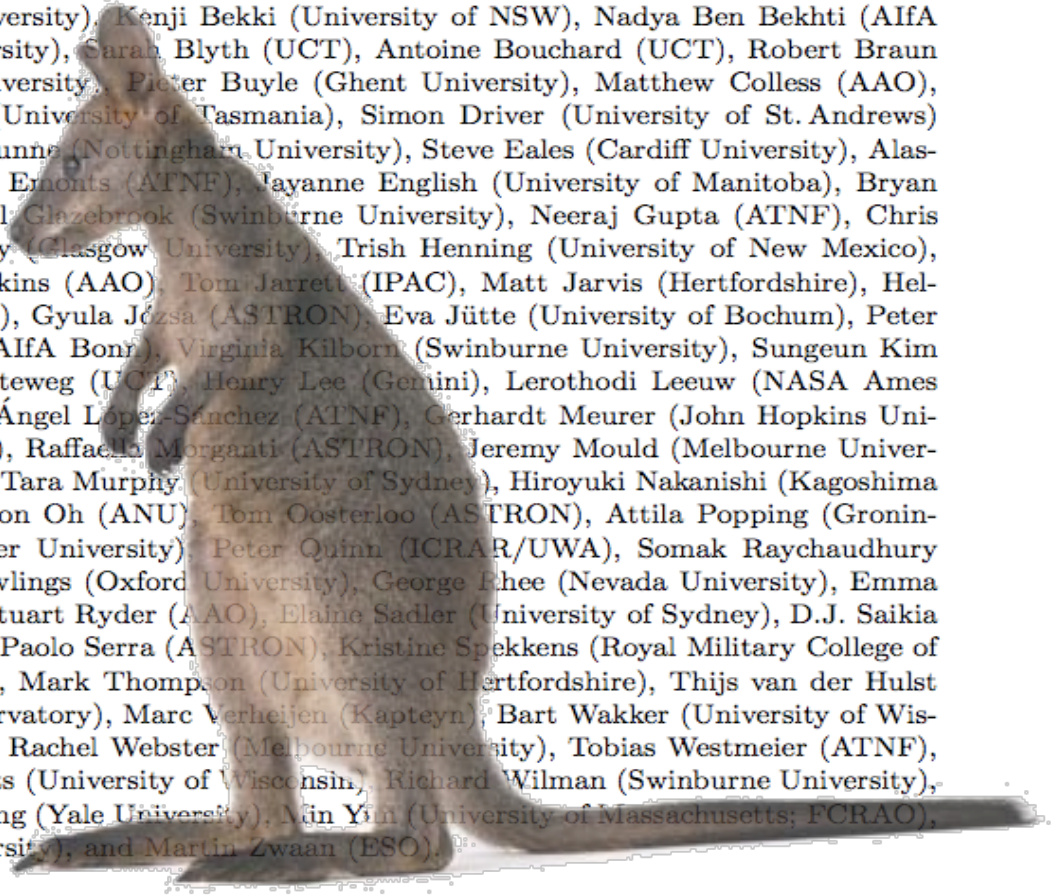
Wallaby (WIDEBAND ASKAP L-BAND LEGACY ALL-SKY BLIND SURVEY)

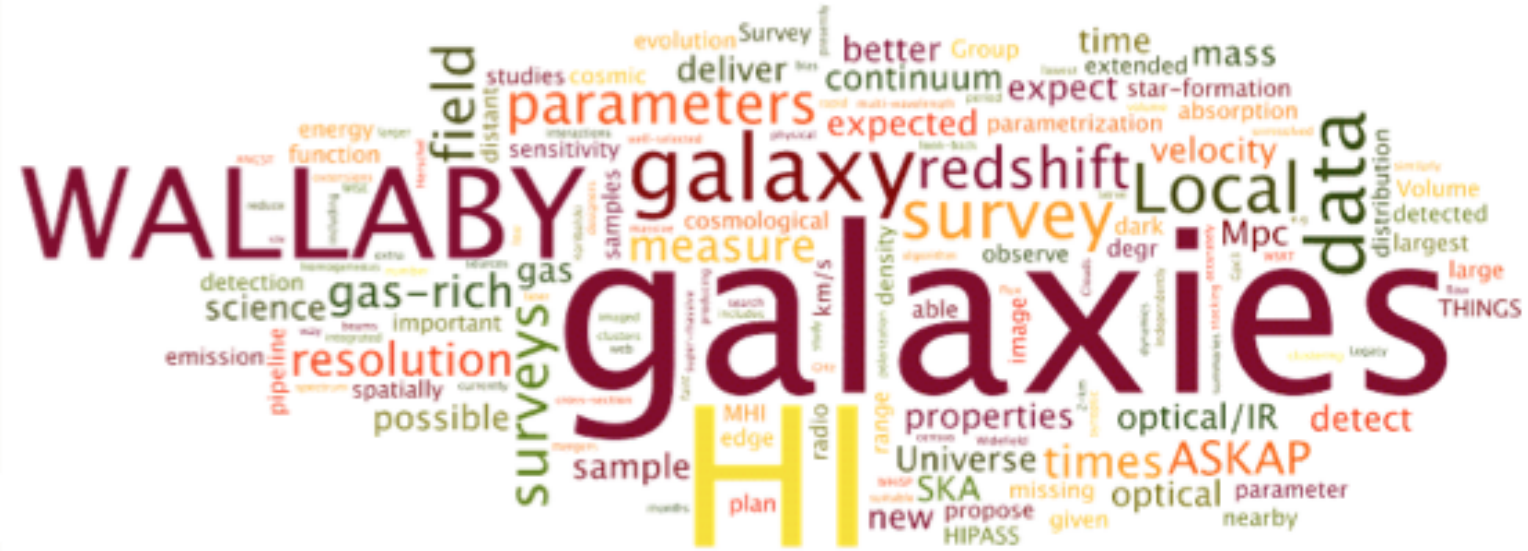
Principal Investigators: B. S. Koribalski (ATNF) & L. Staveley-Smith (ICRAR/UWA)

Survey Team: Alexandra Abate (Laboratoire de l'Áccélérateur Linéaire), David Barnes (Swinburne University), Carlton Baugh (Durham University), Kenji Bekki (University of NSW), Nadya Ben Bekhti (AIfA Bonn), Chris Blake (Swinburne University), Sarah Blyth (UCT), Antoine Bouchard (UCT), Robert Braun (ATNF), Michael Brown (Monash University), Pieter Buyle (Ghent University), Matthew Colless (AAO), Erwin de Blok (UCT), John Dickey (University of Tasmania), Simon Driver (University of St. Andrews) Alan Duffy (ICRAR/UWA), Loretta Dunne (Nottingham University), Steve Eales (Cardiff University), Alastair Edge (Durham University), Bjorn Emonts (ATNF), Jayanne English (University of Manitoba), Bryan Gaensler ((University of Sydney), Karl Glazebrook (Swinburne University), Neeraj Gupta (ATNF), Chris Harris (ICRAR/UWA), Martin Hendry (Glasgow University), Trish Henning (University of New Mexico), Benne Holwerda (UCT), Andrew Hopkins (AAO), Tom Jarrett (IPAC), Matt Jarvis (Hertfordshire), Helmut Jerjen (ANU), Heath Jones (AAO), Gyula Józsa (ASTRON), Eva Jütte (University of Bochum), Peter Kalberla (AIfA Bonn), Jürgen Kerp (AIfA Bonn), Virginia Kilborn (Swinburne University), Sungeun Kim (Sejong University), Renée Kraan-Korteweg (UCT), Henry Lee (Gemini), Lerothodi Leeuw (NASA Ames Research Center; SKA South Africa), Ángel López-Sánchez (ATNF), Gerhardt Meurer (John Hopkins University), Martin Meyer (ICRAR/UWA), Raffaella Morganti (ASTRON), Jeremy Mould (Melbourne University), Erik Muller (Nagoya University), Tara Murphy (University of Sydney), Hiroyuki Nakanishi (Kagoshima University), Ray Norris (ATNF), Seheon Oh (ANU), Tom Oosterloo (ASTRON), Attila Popping (Groningen University), Chris Power (Leicester University), Peter Quinn (ICRAR/UWA), Somak Raychaudhury (University of Birmingham), Steve Rawlings (Oxford University), George Rhee (Nevada University), Emma Ryan-Weber (Swinburne University), Stuart Ryder (AAO), Elaine Sadler (University of Sydney), D.J. Saikia (NCRA), Anja Schröder (KAT Office), Paolo Serra (ASTRON), Kristine Spekkens (Royal Military College of Canada), Christian Struve (ASTRON), Mark Thompson (University of Hertfordshire), Thijs van der Hulst (Kapteyn), Wim van Driel (Paris Observatory), Marc Verheijen (Kapteyn), Bart Wakker (University of Wisconsin), Brad Warren (ICRAR/UWA), Rachel Webster (Melbourne University), Tobias Westmeier (ATNF), Matthew Whiting (ATNF), Erik Wilcots (University of Wisconsin), Richard Wilman (Swinburne University), Benjamin Winkel (AIfA Bonn), Ivy Wong (Yale University), Min Yun (University of Massachusetts; FCRAO), Daniel Zucker (AAO/Macquarie University), and Martin Zwaan (ESO).



Wallaby

- A-rated ASKAP Survey Science Proposal (with EMU)
- Entered Design study phase



Wallaby: summary

- *Angular resolution*: 30 arcsec (10 arcsec)
- *Area*: 3π
- *Bandwidth*: 300 MHz (z=0 to 0.26)
- *Frequency resolution*: 18.3 kHz (4 km s^{-1})
- *RMS flux density (0.1 MHz)*: 0.7 mJy/beam
- *RMS column density sensitivity (0.1 MHz)*: 1.7×10^{19} cm^{-2}
- Cube volume: 330 TB (4 PB)
- uv data volume: 50 PB

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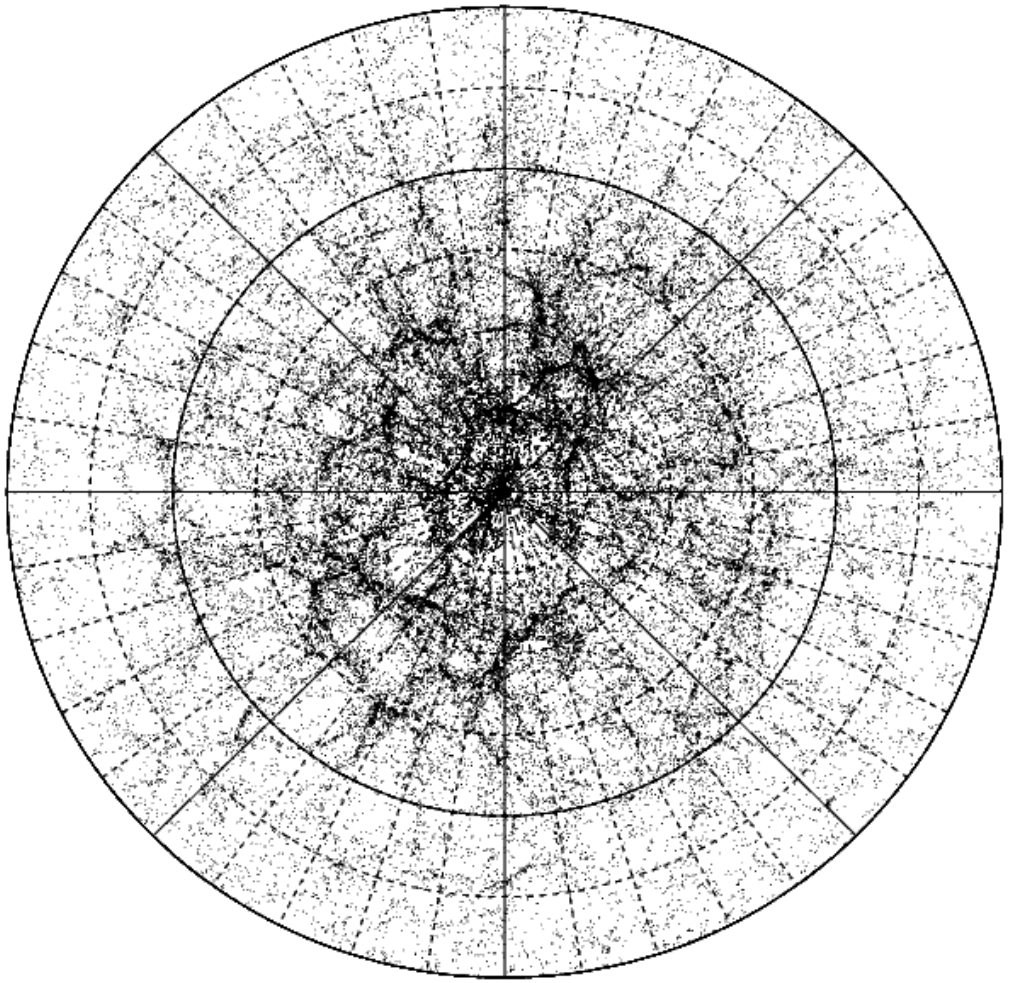
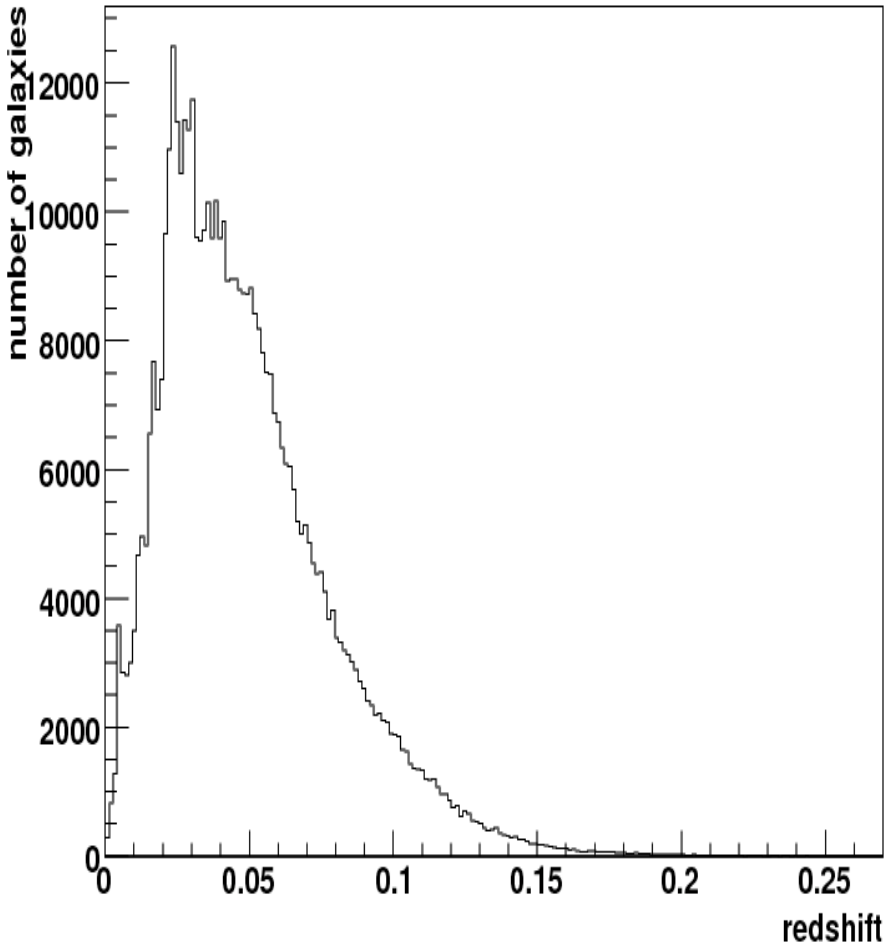
Science aims

- Local Group
  - MW halo
  - low-mass galaxies
- Galaxy properties in different environments
  - HI mass function
  - Understanding star formation
- Cosmology
  - SkyMapper Tully-Fisher/SN1A dark matter map
  - Baryon oscillations at z=0

Wallaby: Simulated sky and redshift distribution (Beutler)

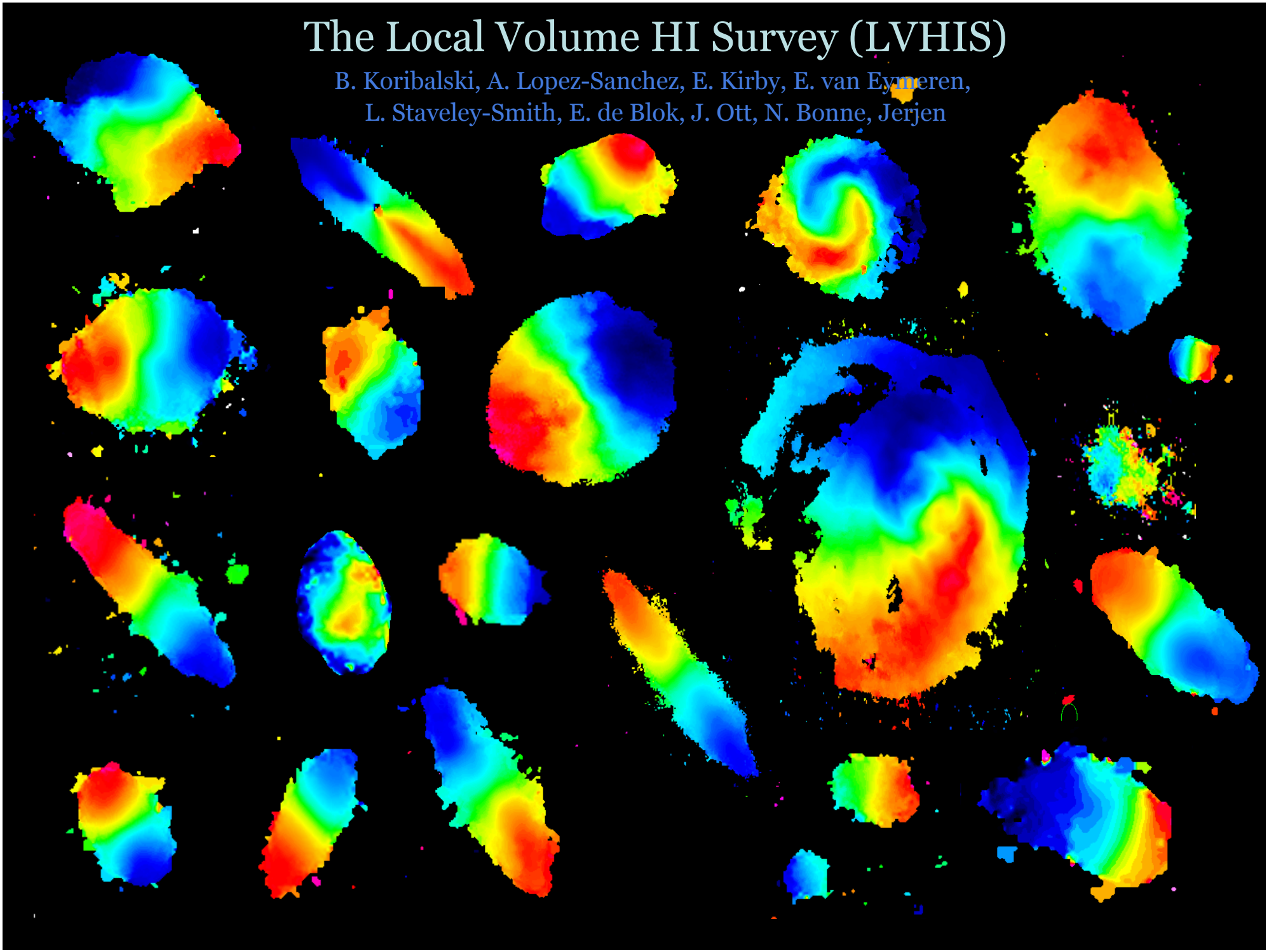




500,000 galaxies (670,000 inc. Apertif)

The Local Volume HI Survey (LVHIS)

B. Koribalski, A. Lopez-Sanchez, E. Kirby, E. van Eymeren,
L. Staveley-Smith, E. de Blok, J. Ott, N. Bonne, Jerjen



Blind HI survey wedding cake

- All-Sky (40,000 deg^2)
  - *Wallaby (ASKAP) + Apertif (WSRT) + FAST*
  - *500,000 galaxies out to z=0.26*
- Medium Deep (1000-5000 deg^2)
  - *SDSS (Apertif)*
- Deep (60-200 deg^2)
  - *Dingo (ASKAP)*
  - *100,000 galaxies out to z=0.4*
  - *150 deg^2 (GAMA/GAMA2 regions)*
- Ultra-deep (2-30 deg^2)
  - *Dingo (30 deg^2 out to z=0.4)*
  - *MeerKAT (4 deg^2 out to z=1.4)*
  - *[eVLA (clusters at z<0.4)]*

ASKAP

Apertif

MeerKAT

Wallaby working groups

TECHNICAL WORKING GROUPS

1. TWG 1 - Simulations and mock surveys
2. TWG 2 - Commissioning plans and evaluation
3. TWG 3 - Data processing and visualisation
4. TWG 4 - Source-finding and cataloguing
5. TWG 5 - Completeness and reliability studies
6. TWG 6 - Postage stamps
7. TWG 7 - Stacking

Alan Duffy talk

Matt Whiting talk

Tobias Westmeier talk

Russell Jurek talk

SCIENCE WORKING GROUPS

1. SWG 1 - Local Group
2. SWG 2 - Local Universe
3. SWG 3 - Galaxy Environments
4. SWG 4 - Intergalactic HI
5. SWG 5 - HI Mass Function
6. SWG 6 - Large-scale Structure
7. SWG 7 - Galaxy Clusters
8. SWG 8 - Galactic Halo
9. SWG 9 - ASKAP Survey Synergies
10. SWG 10 - Multi-frequency Synergies

Gerhardt Meurer talk

Brad Warren talk

Florian Beutler talk

related talks

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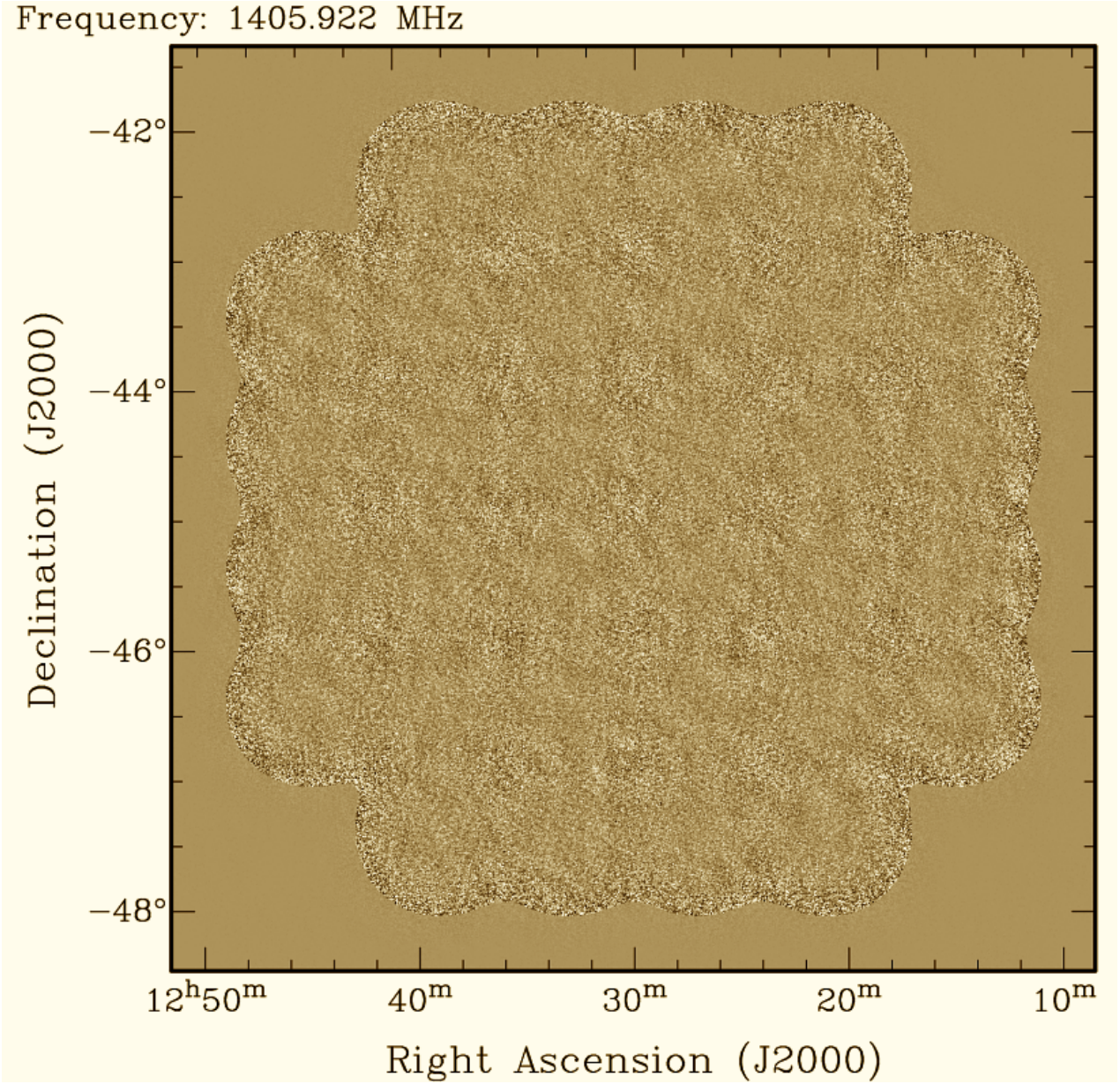
Wallaby simulations

- Simulations plan in place
  - SPH/gadget3 (Duffy, Crain et al.)
  - Semi-analytic (Baugh, SAX etc)
  - Semi-empirical (Wilman et al.)
- Science simulations
- Telescope simulations (Whiting, Serra et al.)

Wallaby simulation:

confusion not a problem; non-uniform noise might be.



- 30 deg^2
- 32 (ideal) beams
- 30 antennas
- 2 km baseline
- 8 hrs
- 92.5 kHz (20 km s^{-1})
- SKADS-SAX input catalogue (Obreschkow et al.)

ASKAP computing group

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ICRAR/Pawsey

ICRAR Requirements for Phase 1 Pawsey Systems

C. Harris, K. Bekki, R. Dodson, A. Duffy, M. Glossop, P. Hall,
M. Meyer, T. Potter, P. Quinn, L. Staveley-Smith, S. Tingay,
K. Vinsen, R. Wayth , A. Wicenec

Version 0.24

26 April 2010

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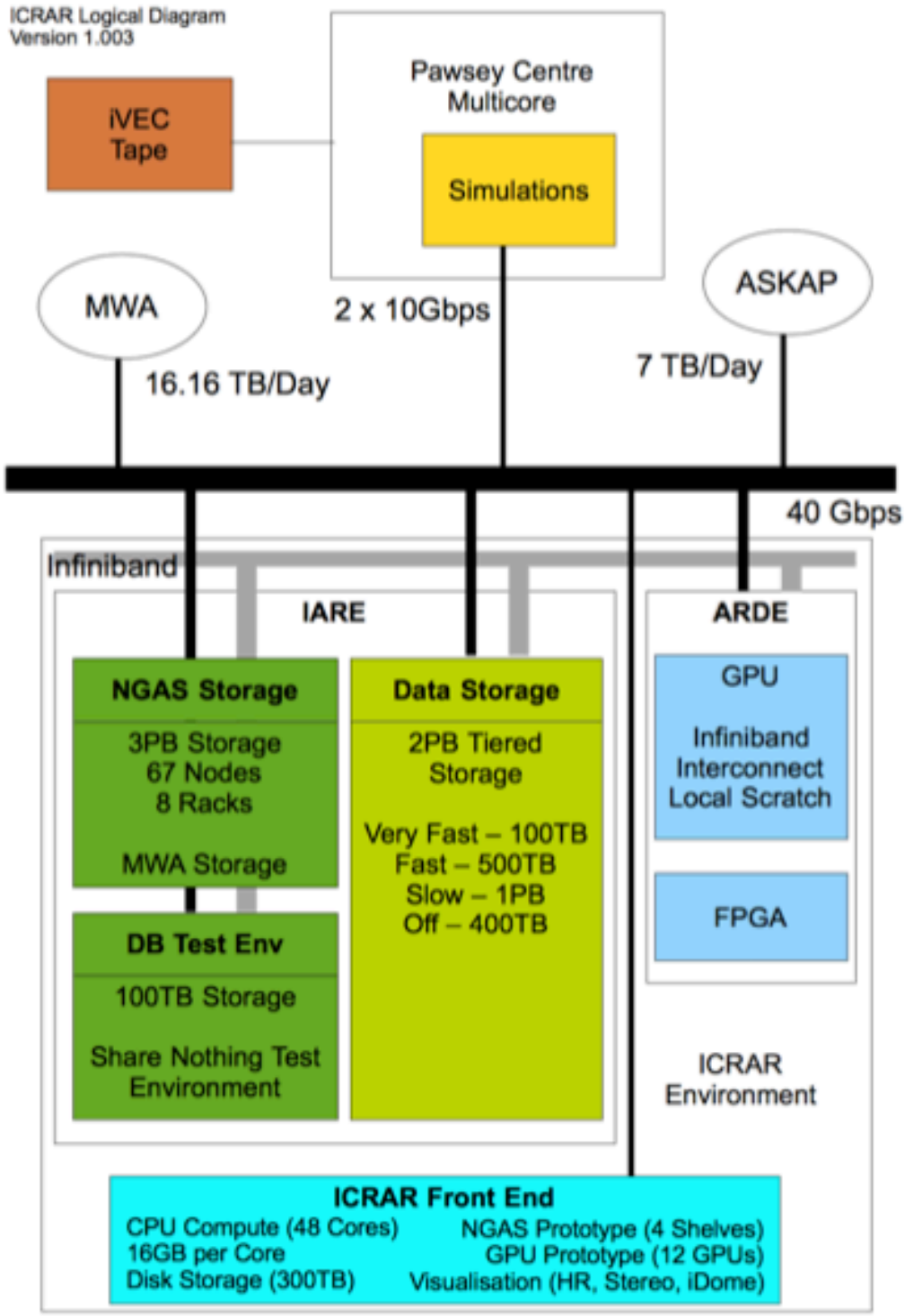
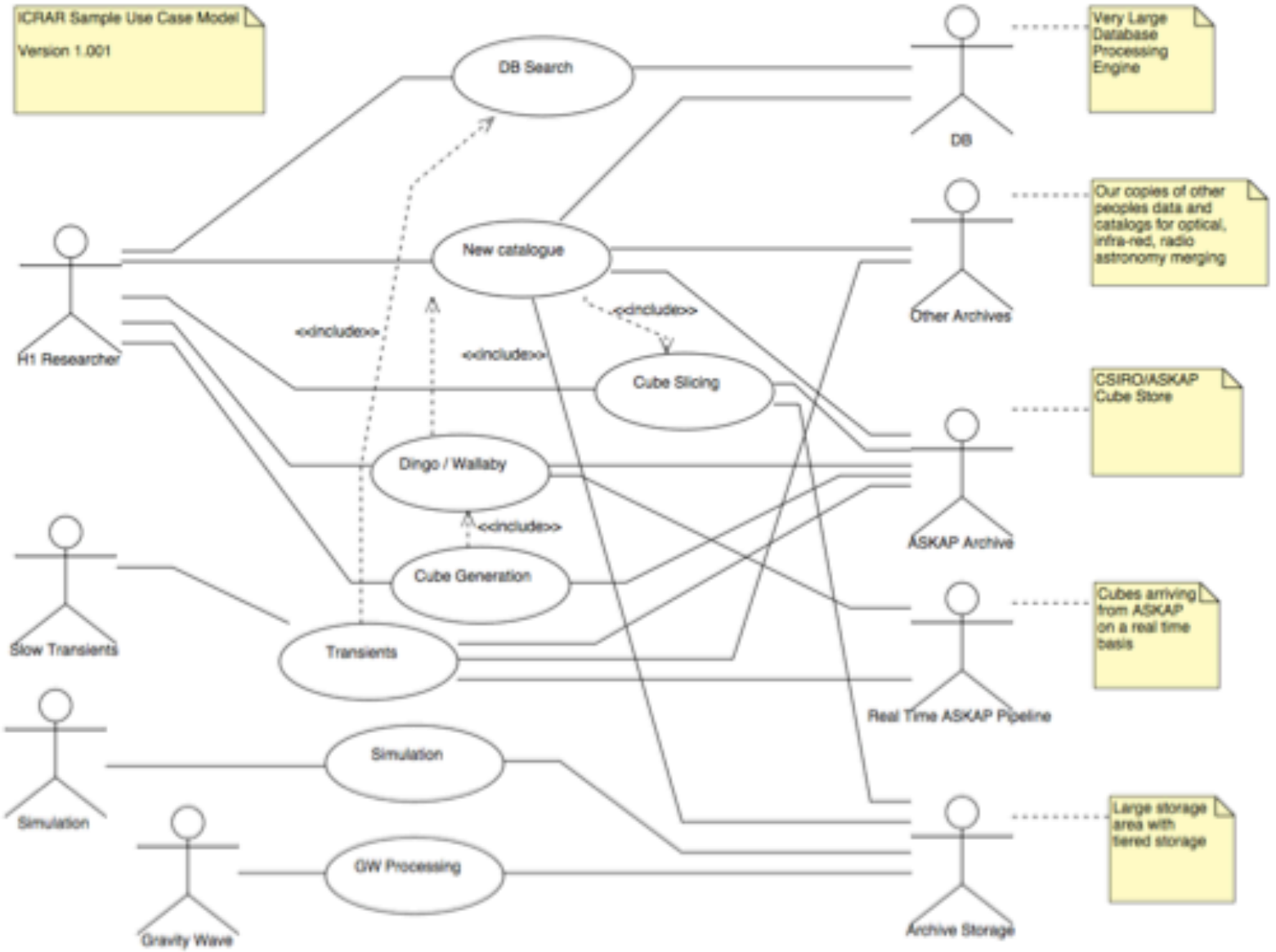
Pawsey data intensive research pathfinder:

- Post-processing of WALLABY/DINGO data (after CSIRO Science Archive Facility)
- MWA archive
- Archive development
- Architecture Research and development




ICRAR Sample Use Case Model
Version 1.001
DB Search
New catalogue
Cube Slicing
Dingo / Wallaby
Cube Generation
Transients
Simulation
GW Processing
<<include>>
<<include>>
<<include>>
<<include>>
H1 Researcher
Slow Transients
Simulation
Gravity Wave
DB
Other Archives
ASKAP Archive
Real Time ASKAP Pipeline
Archive Storage
Very Large Database Processing Engine
Our copies of other peoples data and catalogs for optical, infra-red, radio astronomy merging
CSIRO/ASKAP Cube Store
Cubes arriving from ASKAP on a real time basis
Large storage area with tiered storage

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Upcoming Wallaby fellowships

- 2 SSFs at ICRAR & CSIRO
- Phase 2 ICRAR positions inc. ICT

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Communications

- Meetings
- sakai wiki
- redmine
- Newsletter

WALLABY Newsletter - No 1

April 2010

Editor: Bärbel Koribalski

Upcoming meetings

28 April 2010
ASKAP WG1+2 meeting from 9:30am @ ATNF (organiser: M. Whiting)

28 April 2010
3D Visualisation demo & workshop, from 1pm @ ATNF (organiser: Russell Jurek)

29 April 2010
Source-finding workshop 9:30am to 5pm @ ATNF (organisers: T. Murphy, A. Hopkins, M. Whiting & B. Koribalski)

6 May 2010
National Data Workshop 9:30am to 5pm @ USyd (organiser: D. Croton)

2 – 6 May 2010
Workshop on SKA Path-finder and Precursor HI Surveys: Commissioning and Simulation Needs. Arniston, South Africa. (Organisers: Erwin de Blok et al.)

1 June 2010
Bi-monthly meeting of the ASKAP Coordination and Management Group.

Welcome

It is time for an update on the Wallaby project and ASKAP in general. While web-pages and wikis are all nice and informative, I hope that summarizing news, working group activities, and upcoming events in a regular newsletter will be useful.

This "Wallaby Newsletter No 1" contains an overview of local activities, including the release of two sets of ASKAP simulations and the announcement by the Australian Research Council (ARC) of 100 Super Science Fellowships, a third of which are in the area "Astronomy and Space Science".

Future newsletters will contain contributions from Wallaby team members – YOU ☺, working group coordinators, etc. Please let me know if you like to edit the next "Wallaby News", a small task, but important to report on local news and create different perspectives. ☆

Postdocs needed

15, 2010. These are for (a) Focal Plane Array (FPA) development (with John O'Sullivan), (b) EMU (with Ray Norris) & (c) WALLABY (with Bärbel Koribalski) – details to be announced soon. These are in addition to other postdocs such as the Bolton Fellowship 2011. ☆

Upcoming meetings

Important local and international meetings, relevant to the Wallaby project, are listed in the yellow box to the left. These are also listed on our Wallaby web-page and wikis – see details below – with links to the respective workshop aims, programs and minutes. In future, I hope YOU ☺ will contribute upcoming meeting dates, recent events (Wallaby related talks, posters, papers, etc.), reports from working groups, relevant publications, etc. ☆

ASKAP – first antenna on site

The first ASKAP antenna arrived on site in Western Australia (WA) in December 2009. It was fully

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Summary

- Wallaby design study
  - in progress:
    - science simulations
    - telescope simulations (ASKAP computing group; WSRT)
    - HI studies with Parkes, Arecibo etc (stacking, imaging)
    - Source finding algorithms
  - soon:
    - visualisation
    - source parameterisation
    - detailed survey design
    - BETA commissioning