



**CAASTRO**  
ARC CENTRE OF EXCELLENCE  
FOR ALL-SKY ASTROPHYSICS



THE UNIVERSITY OF  
SYDNEY

# The ARC Centre of Excellence for All-sky Astrophysics

**Bryan Gaensler**

*CAASTRO Director*



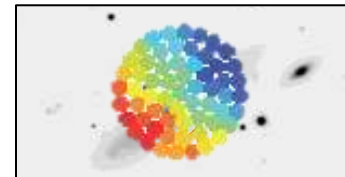
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**Australian Government**  
**Australian Research Council**





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# ARC Centres of Excellence

- › **Prestigious hubs** of expertise
- › Undertake highly **innovative** research
- › **Link** existing research strengths
- › Provide **high-quality training**
- › Opportunities to work on **large-scale problems** over long periods of time
  
- › ***Centre for All-sky Astrophysics (CAASTRO)***
  - seven years of funding (2011-2018), \$30M budget
  - budget: 75% staff/students/travel, 4% equipment, 17% admin, 4% outreach
  - Director, COO, Advisory Board, annual reports, KPIs ...



**Australian Government**

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**Australian Research Council**



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# The Centre for All-sky Astrophysics

## *The CAASTRO Vision: To be the international leader in wide-field astronomy*

- **DISCOVER:** Ground-breaking advances in understanding the Universe
- **INNOVATE:** New ways of processing & visualising complex data sets
- **PERFORM:** High-impact discoveries using SKA pathfinders
- **UNITE:** Network of top scientists in focused collaborative environment
- **EDUCATE:** Compelling opportunities and exciting stories







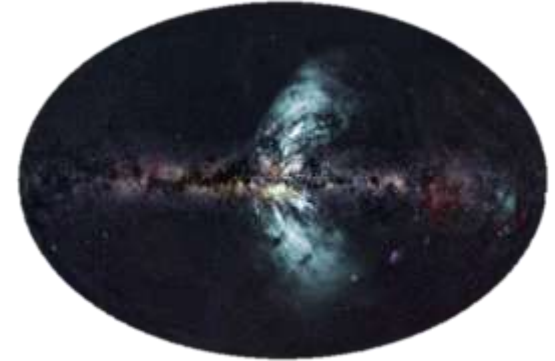
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# ARC Centre for All-sky Astrophysics



## › THE EVOLVING UNIVERSE (Stuart Wyithe)

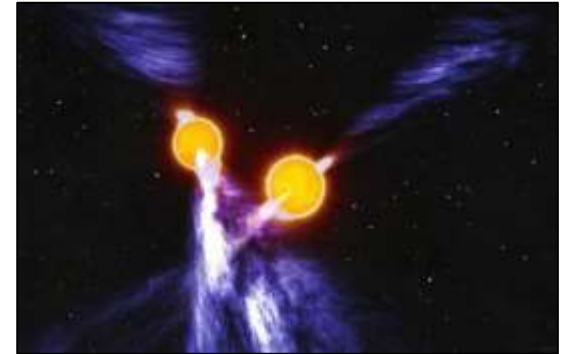
- When did the first galaxies form, & how have they then evolved? (6 research programs)
- **SkyMapper**: high-z quasars as reionisation targets



E. Carretti / CSIRO,  
A. Mellinger / CMU

## › THE DYNAMIC UNIVERSE (Matthew Bailes)

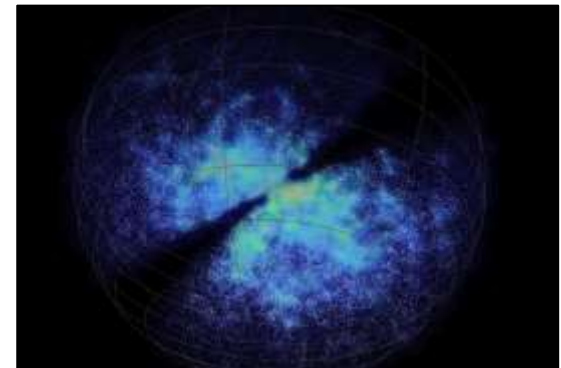
- What is the extreme physics that drives rapid change in the Universe? (4 research programs)
- **SkyMapper**: comprehensive census of the variable optical sky
- **SkyMapper**: paired with MWA, Molonglo, ASKAP



John Rowe Animations

## › THE DARK UNIVERSE (Tamara Davis)

- What are the Dark Energy and Dark Matter that dominate the cosmos? (4 research programs)
- **SkyMapper**: peculiar velocities (TF, supernovae)
- **SkyMapper**: cosmic acceleration (supernovae)



Chris Fluke / 6dF team



- › CAASTRO-led LIEF grant for Australian membership of PanSTARRS
  - CAASTRO, Monash, AAO, U. Hawaii
  - default by U. Hawaii in June 2013
  - ARC allowed repurposing for SkyMapper
- *SkyMapper national facility, 2014 - 2019*
- › Australians can join existing SkyMapper science collaborations
- › Australians can propose and lead new science programs (if no duplication)
- › International collaborators can be included on case-by-case basis
- › 20% of non-survey time available via TAC
- › Data made immediately available to all Australians
- › National Facility operations overseen by SkyMapper Executive:
  - ANU: B. Schmidt, M. Colless, H. Jerjen, G. Da Costa
  - Others: M. Brown (Monash), B. Gaensler (USyd), G. Meurer (UWA)



- › Major international conferences
  - “Reionisation in the Red Centre” (Jul 2013)
  - “Supernovae in the Local Universe” (Aug 2014)
  - “Astronomical Data Analysis” (Oct 2015)
- › Video conferencing and busy weeks
- › Strategic international partnerships
  - eROSITA / CAASTRO data sharing agreement
  - in progress: Australia-China astrophysics consortium
  - in progress: membership in LSST
- › Supercomputing: 8 million CPU-core hours per year via NCI
- › Training, education & outreach
  - formal mentoring and professional development
  - “CAASTRO in the Classroom” for high schools
  - “Astronomer in Residence” program, Uluru
  - social media (18000 Facebook likes, 43000 YouTube views)
  - planetarium shows, media library, video games
  - astronomy education research





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