# Space Activities in Australia and Efforts to Increase Collaboration

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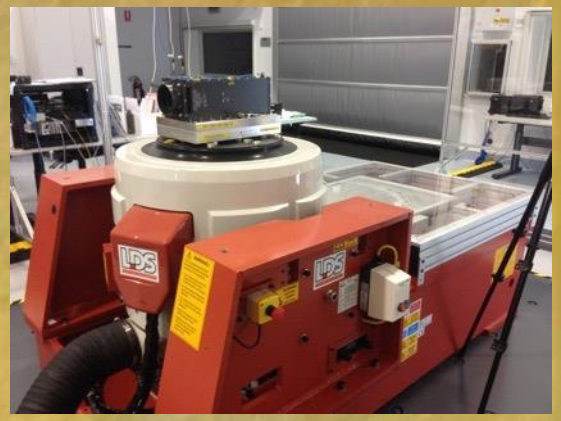
# The Advanced Instrumentation and Technology Centre


- National resource
- One-stop-shop for the Assembly, Integration and Test of precision instrumentation and small spacecraft
- Experienced personnel with significant instrumentation and space expertise
- Focus for national and international collaboration

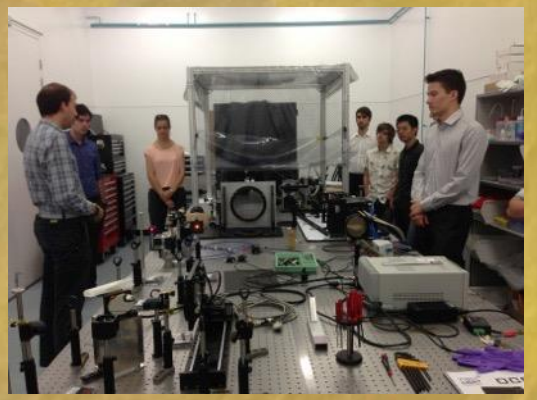
# Assembly, Integration & Test Capability

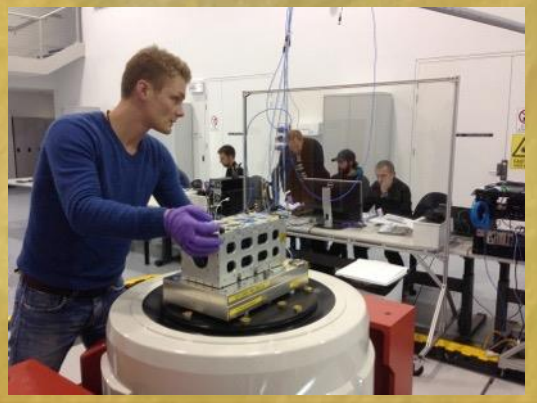
- Thermal Vacuum testing
- Vibration and shock testing
- Cleanrooms
- Thermal cycling
- Electromagnetic interference testing
- Mass properties measurement
- Optical test and metrology
- Electronics design and fabrication
- Precision machining and 3D printing
- Surface process laboratory
- Plasma cleaning chamber
- Satellite Ground Station (S-band and UHF)


# Education and Training

- Optical Design Course for Scientists and Engineers
- Vibration Test Training Course
- Satellite Integration & Test Training
- Space Short Course: Understanding Satellite Utilisation – Serving Australia from Space
- Student Internships and PhDs
- APRSAF Kibo-ABC
- UNISEC Mission Idea Contest
- STARS (Space Technology Astronomy Research Students) Program





# UNSW Canberra

- $10M investment - in-orbit science & R&D
  - Planning to fly a range of cubesat missions with specific scientific objectives
  - The first is a joint one with DSTO, partly as a learning exercise
  - Engineering team has been recruited
- On-Campus Facility Development:
  - Tvac with solar sim, clean rooms, ground station (initially with S-band & UHF)
- UNISEC activities:
  - UNSW Canberra team 2nd place in MIC3 in 2014
  - UNSW Canberra participating in pre-MIC4, this time both as a mission idea developer & a resource provider
- Several R&D projects already underway with a large European space company

# Falcon Telescope @ UNSW Canberra

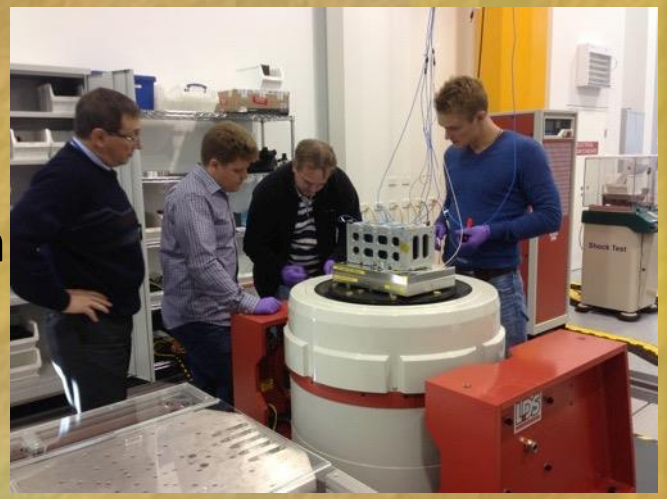
- Now on campus – a 20“ optical telescope which forms part of the Falcon Telescope Network
- This is one of > 20 such telescopes
- For observing objects in orbit
- Can task any of the other telescopes to an object of interest
- Adaptive optics modifications will enable light curve derivation for orbital debris

# Education and Training @ UNSW Canberra

- Masters of Space Engineering & Masters of Space Operations
  - Face to face & online (distance) enrolment available
- Unisec Mission Idea Contest participation (MIC3 - 2nd place & pre-MIC4)
- Postgraduate research ❾ current topics:
  - Fluidic Thrust Vectoring for spacecraft attitude control
  - Martian surface thermal control
  - Formation Flying
  - Code development for improved orbit prediction
  - Deployable Cubesat Radiator development
  - Heating concept for improved ground-based re-entry simulation

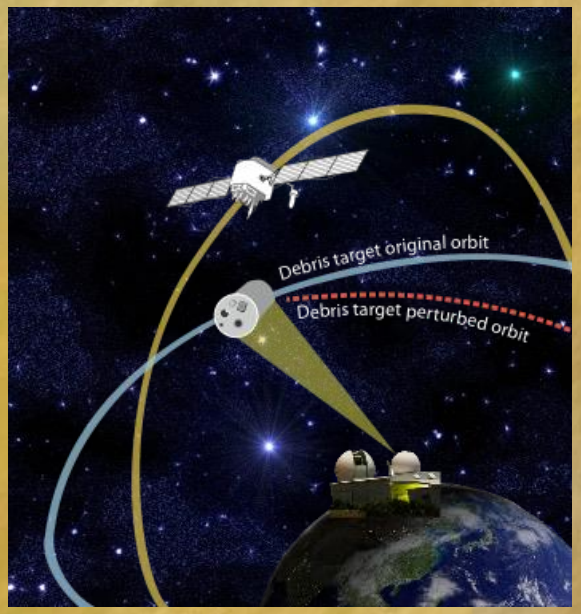
# Australian CubeSat activities

- QB50
  - University of Sydney
  - University of NSW
  - University of Adelaide / University of South Australia
- Defence Science and Technology Organisation (DSTO)
  - Buccaneer satellite



- Astronomy
  - Australian Space Eye (ANU, Macquarie University, AAO, UNSW, University of Sydney, University of Queensland, Swinburne University of Technology, University of Western Sydney, Cal Poly and Tyvak)
- Space Situational Awareness
  - UNSW
- Supporting Development of Nanosatellite Environmental Test Standards
  - ISO/CD/19683 Design qualification and acceptance tests of small-scale satellite and units seeking low-cost and fast delivery - passed
  - ISO/TC20/SC14 Space systems and operations - under development

# Space Environment Management CRC




**Partners**

- EOS Space Systems
- Lockheed Martin (USA)
- Optus
- ANU
- RMIT University
- NASA Ames Research Center
- National Institute of Information and Communications Technology (Japan)

**Research Programs**

- Program 1: **Tracking**
- Program 2: **Orbits**
- Program 3: **Collisions**
- Program 4: **Manoeuvre**

# BLUESat Off-World Robotics Group

The BLUEsat Off-World Robotics Group, part of UNSW's BLUEsat (Basic Low-Earth Orbit UNSW Experimental Satellite) group, provides undergraduate students with the opportunity to develop robotic systems for extra-terrestrial exploration.

In August 2015 the BLUEsat team of 4 undergraduate students from UNSW successfully tested their prototype off-world rover during the Arkaroola Mars Robot Challenge Expedition run by the Mars Society Australia. An undergraduate student team from the Indian Institute of Technology Bombay also attended the Expedition.

# Sabre Astronautics

- Predictive Groundstation Project “PIGI”
  - Model satellite performance
  - Diagnostics
  - Ergonomic Command Construction
- CubeSat Deorbit System
  - DragEN tether deployer
  - EDTSuite interactive software package for designing electrodynamic tethers for CubeSat missions
- Compact Microgravity Liquid Storage

# Efforts Toward Increasing Collaboration & Establishing UNISEC Global in Australia

- Promoting collaboration between Australian universities
- Working with existing professional and student groups
  - Australian Youth Aerospace Association (AYAA)
  - American Institute of Aeronautics and Astronautics (AIAA)
- Expanding collaboration between existing international organisations (UNISEC, IAF, APRSAF, etc)
- Hosting IAC 2017 in Adelaide
- Hosting 2018 Nanosatellite Conference in Canberra
- Establishing student design projects
- Currently discussing the establishment of a UNISEC chapter

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