ICRAR & ICRAR-Pawsey Summer Studentships 2016 - 2017
Project Proposal

Project Details	
Project Title	**Novel Techniques to Measure the CMB Dipole**
Primary Supervisor	**Nicholas Seymour**
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Additional Supervisors & Contact Details	Guillaume Drouart Guillaume.drouart@curtin.edu.au
Additional Resources Required	None
Student Location for project	Curtin
Project Description	The Cosmic Microwave Background is the relic of radiation from the period of recombination (when electrons first bound to protons) around 300,000 years after the Big Bang. This radiation is extremely uniform in all directions with minute fluctuations caused by the gravitational collapse of structure in the early Universe as seen in the famous CMB fluctuation maps. However, this signal is only revealed once the movement of our own Galaxy (around 600km/s) is correctly accounted for. This motion causes a dominant dipole signal to be superimosed upon the CMB map. It is assumed that all of the measued dipole is due to the motion of the Milky Way. This assumption can be tested by large area surveys (greater than half the sky) which are sensitive to large numbers of sources (many times greater than a million). This project will investigate whether the aprroximate one billion objects in NASA's all-sjy mid-infrared *WISE* survey can measure this dipole using novel selection criteria. This project will also confirm the previous results from large area surveys and estimate the strength of this signal from upcoming radio surveys.
Student Attributes	
Academic Background	Physics Undergraduate, some astronomy useful
Computing Skills	Some programming skills useful, plus willingness to learn. Python preferred, but other languages can be used.
Training Requirement	
Project Timeline	
Week 1	Background reading and getting familiar with coding

Week 2	Commence writing code to obtain and analyse data
Week 3	Refine code and test selection criteria
Week 4	Scale code to perform all-sky analysis over New Year break
Week 5	Analyse all-sky results
Week 6	Analyse all-sky results
Week 7	Refine fitting of results
Week 8	Test code on past radio surveys
Week 9	Make predictions for future radio surveys
Week 10	Write up results
	Final Presentation