

ICRAR & ICRAR-iVEC Summer Studentships 2014 - 2015 Project Proposal

Project Details	
Project Title	New solutions for pulsar searching in the SKA era
Primary Supervisor	Richard Dodson
Contact Details	ICRAR/UWA: 08 6488 7842
Additional Supervisors & Contact Details	Ramesh Bhat, ICRAR/Curtin: 08 9266 9176
Additional Resources Required	Computer Cluster with a Software Correlator
Student Location for project	UWA
Project Description	<p>We will investigate new methods for searching for pulsars and transients with the next generation of instruments, such as the forthcoming Square Kilometre Array (SKA). The SKA will be the dominant instrument for the next century, and all astronomers will want to use it. However, whilst it is well known how to detect pulsars and transients sources with single dishes and it is well known how to make images from arrays of telescopes by combining the signals, it is not yet known is how we can best search for pulsating sources in the data from the many telescopes in an array.</p> <p>We will use some data from the pathfinders and demonstrators, such as GMRT and the LBA, to explore the current ideas. The project will entail: understanding how radio arrays work, understanding pulsar signals, forming beams from arrays for detecting pulsating sources both incoherently and coherently. The results will drive forward how future astronomers will use SKA for the search for pulsars.</p>
Student Attributes	
Academic Background	<p>What is required is an understanding of signals and computers.</p> <p>A background in Physics, Computing or Engineering would provide this.</p>
Computing Skills	The student will need to use and add (in a limited extent) to existing software (c & c++) and process astronomical data to search for pulsar signals.
Training Requirement	The student will be trained in: radio interferometry, pulsar timing and radio array data correlation.

Project Timeline	
Week 1	Introduction to the problems
Week 2	Correlating data from many telescopes
Week 3	Combining data in the time domain: incoherently
Week 4	Pulsar timing
Week 5	Understanding the methods for coherent analysis
Week 6	Combining data in the time domain: coherently
Week 7	Combining data in the time domain: coherently
Week 8	Combining data in the time domain: advanced methods
Week 9	Combining data in the time domain: advanced methods
Week 10	Preparation of project results
	Final Presentation