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

Project Details	
Project Title	**A Multiwavelength Search for Black Holes in Nearby Dwarf Galaxies**
Primary Supervisor	**Roberto Soria & Richard Plotkin**
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Additional Supervisors & Contact Details	
Additional Resources Required	
Student Location for project	Curtin
Project Description	Dwarf galaxies in the local Universe can be thought of as analogues to young galaxies in the early Universe. Excitingly, some nearby dwarf galaxies have been discovered to host relatively small supermassive black holes (~million Solar masses) in their nuclei, thereby providing some empirical constraints on how the first generation of supermassive black holes may have formed. It has also been suggested that some dwarf galaxies (especially with low abundances of metals) contain larger/more luminous populations of stellar mass black holes in X-ray binary systems (~10 Solar masses) than may be expected, perhaps providing a substantial source of photons for the epoch of reionisation in the early Universe. In this ICRAR scholarship project, the student will analyse X-ray observations of three nearby dwarf galaxies, using data from NASA's Chandra X-ray satellite, and she/he will determine if they contain nuclear supermassive black holes or off nuclear X-ray binaries. Time permitting, the student will incorporate radio data (from the Very Large Array) and optical data (from the Hubble Space Telescope) to characterise these sources' multiwavelength properties, and to help constrain the nature of X-ray populations in dwarf galaxies. We anticipate that the X-ray analysis will be included in a refereed publication, with the student as a co-author, pending satisfactory completion of the project.

Student Attributes	
Academic Background	Introductory astronomy courses.
Computing Skills	Basic computer literacy. Will require using linux (can be learned as part of project). Prior programming experience helpful but not required. Other computer skills will be taught as part of the project.
Training Requirement	
Project Timeline	
Week 1	Literature review, introduction to galaxy/black hole evolution, dwarf galaxies, supermassive black holes, and X-ray binaries
Week 2	Literature review (con't), familiarise with linux and basics of X-ray astronomy.
Week 3	Learn Chandra X-ray analysis and data analysis software
Week 4	Continue learning and begin X-ray analysis on three dwarf galaxies
Week 5	Continue analysis
Week 6	Continue analysis
Week 7	Continue analysis and start examining other multi wavelength data if time
Week 8	Interpret results
Week 9	Interpret results
Week 10	Prepare final presentation and summary
	Final Presentation