ICRAR & ICRAR-Pawsey Summer Studentships 2018-2019
Project Proposal

Project Details	
Project Title	**Accretion of planetary debris onto white dwarf stars**
Primary Supervisor	**Adela Kawka**
Primary Supervisor Availability	**I will be available from November through to February.**
Contact Details	(08) 92669665/adela.kawka@curtin.edu.au
Additional Supervisors & Contact Details	
Additional Resources Required	desktop computer
Pawsey Centre Hardware Use	N/A
Software Required	Student Desktop Requirements: Linux with Fortran and IRAF installed
Student Location for project	ICRAR-Curtin
Project Description	Many stars within our Galaxy host planets. Since the majority of stars end their lives as white dwarfs we want to know what happens to these planets once the star evolves and becomes a white dwarf. Up to now no planets have been found around white dwarfs however there is evidence that planets survive but as debris disks. Elements heavier than helium are expected to sink and disappear below the atmosphere of a white dwarf, leaving either a pure hydrogen or helium atmosphere. However, a significant fraction of white dwarfs shows the presence of heavy elements such as calcium, magnesium and iron which means that they must have been accreted from circumstellar material. The discovery of polluted white dwarfs with large infrared excess suggests that this environment is a debris disk composed of asteroidal/planetary material. The project will involve an analysis of mid- and high-resolution spectra of white dwarfs obtained with echelle spectrographs of the European Southern Observatory. These spectra will be fitted with model spectra to determine the white dwarf atmospheric properties such as the effective temperature, surface gravity and abundance of heavy elements. Finally, the measured abundance pattern will be used to determine the likely source of the accreted material.

Student Attributes	
Academic Background	Some understanding of stellar evolution and atomic physics.
Computing Skills	Experience with Linux and some programming skills.
Training Requirement	Spectral analysis: will have the understanding of how to extract stellar parameters from optical spectroscopy

Project Timeline	
Week 1	**Project Introduction, literature review**
Week 2	Data reduction using available pipelines
Week 3	Fitting of spectra with a pre-calculated grid of model

	spectra to determine the stellar effective temperature and surface gravity
Week 4	Identify suitable spectral lines that can be used to measure abundances
Week 5	Measure abundances of identified lines
Week 6	Measure abundances of identified lines
Week 7	Build an abundance pattern for the sample of white dwarfs and apply diffusion calculations
Week 8	Make a comparison of the measured abundances to abundance patterns of solar system objects and determine the likely accretion source
Week 9	Prepare presentation
Week 10	**Final Presentation and Reporting**