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

Project Details

Project Title	**How can such a massive star cluster form in interacting galaxies ?**
Primary Supervisor	**Kenji Bekki**
Primary Supervisor Availability	**Between Nov 2018 and March 2019**
Contact Details	kenji.bekki@uwa.edu.au
Additional Supervisors & Contact Details	No others
Additional Resources Required	Students will be able to use my own GPU clusters (Magellan and Pleiades). Only laptop PC from students is required for data analysis.
Pawsey Centre Hardware Use	N/A
Software Required	Student Desktop Requirements: • Data analysis software (e.g., Mathmatica, Matlab) Pawsey Centre software installations required: • N/A.
Student Location for project	ICRAR-UWA
Project Description	The Galaxy is currently forming just one star a year. However, the Galaxy is not forming a massive star cluster (known as ``globular cluster''; GC) consisting of 10^6 stars – a long-standing mystery. The formation sites of such GCs candidates are found to be interacting galaxies. In this project, summer students will try to discuss why such massive GCs can be formed preferentially in interacting galaxies based on the results of computer simulations of GC formation. Firstly, students numerically investigate the possible formation sites of massive molecular clouds from where GCs can be formed. Then, students investigate how a huge number of stars can form from massive molecular clouds. Structure, kinematics, and chemical abundances of the simulated star clusters will be analyzed in detail. Comparison with observations will be briefly made.

Student Attributes

Academic Background	Basic knowledge of astronomy and physics. Some skills to use software for data analysis.
Computing Skills	This is not essential, but, if students are familiar with any programming with either C, Fortran, or python, it would be great.
Training Requirement	Basic physical processes of galaxy formation and evolution will be learned by students. Data analysis of astrophysical simulations will be learned too.

Project Timeline

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Week 1	**Pawsey training (or inductions and project introduction)**
Week 2	Basic analytical work on the formation of molecular clouds in galaxies

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Week 3	Performance of computer simulations of interacting galaxies	
Week 4	The same above Week 3	
Week 5	Data analysis from the simulations from Week 3-4 (structures)	
Week 6	The same as Week 5 (but for chemical abundances)	
Week 7	The same as Week 5 (but for stellar kinematics)	
Week 8	Discussion of the results from Week 6-7	
Week 9	Writing a report (if possible for a paper)	
Week 10	**Final Presentation and Reporting**	

The Antenna
(interacting galaxy)

Star-forming
molecular gas
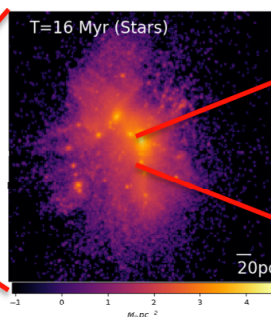
M15
(globular cluster)

~10 kpc

~100 pc
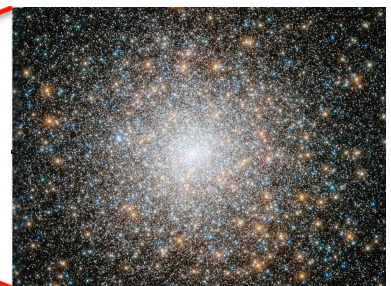
~1 pc

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Computer simulations (this project)