

Proposed MSc Project 2025

SC2RG Survey: investigating blue stellar clumps in a sample of Collisional Ring Galaxies

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Student will be expected to register at UCT or UWC.

Background: Collisional ring galaxies (CRGs) are peculiar objects that form through the head-on collision between a small galaxy companion and the rotation axis of a larger disk galaxy. The intense starburst episodes happening in these interacting systems trigger the formation of complexes of young massive star clusters (YMCs) also known as blue stellar clumps. With their ages as young as 10 Myr and their masses above $\sim 10^5 M_{\odot}$, these compact sources represent the most massive and extreme form of star formation (SF) in nearby galaxies. They are thus useful tools to trace SF history of their host galaxy. This will ultimately help for fine-tuning the general theory of SF in the local universe.

Project description: This research project aims to investigate the influence of the host environment on the star cluster formation and evolution mechanisms by studying YMCs and blue stellar clumps of a representative sample of CRGs (see Fig. 1). High-resolution multiband HST observations will be analysed to derive the photometric and physical properties of the cluster population. Follow-up SALT spectroscopic observations of bright star-forming regions will also be conducted to study how the local SF and the physical conditions of the ionized gas were affected by the drop-through collision. This project is unique in a way that there are only a handful of YMC studies hosted by CRGs to date.

Special requirements: Basic (python) programming skills and a desire to learn how to use new astronomy software.

References: Madore et al. 2009, ApJS, 181, 572 • Pellerin et al. 2010, AJ, 139, 1369 • Peterson et al. 2009, MNRAS, 400, 1208 • Randriamanakoto et al. 2022, MNRAS, 513, 4232

If you are interested, you should get in touch for further details and to discuss the project.

Figure 1: HST false color images of a sample of collisional ring galaxies.

