

## Proposed MSc/PhD Project

### 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.*

**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. Depending on the student interests and performance, this project could be extended to analyse available JWST and SALT/RSS data of some targets to study YMCs with near-infrared flux excess and how the local SF and the physical conditions of the ionised gas were affected by the drop-through collision, respectively. This project is unique in a way that there are only a handful of YMC studies hosted by CRGs to date.

*The complexity of the project will be tailored depending on the degree level (MSc or PhD).*

**Special requirements:** With (python) scientific 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. 2019, MNRAS, 482, 2530

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

