SAAO Proposed MSc Project – 2022

Young massive star clusters in circumnuclear starbust rings

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Potential co-supervisor: Petri Vaisanen (SAAO)

Project description:
Circumnuclear starburst rings also known as nuclear rings are usually found in barred spiral galaxies that constitute a majority of normal spirals in the local Universe. These rings preferentially form after inflowing molecular gas spiral into the circumnuclear regions. Because of their intense nuclear starbursts, they mostly dominate the entire star formation activity of the host galaxy, conducive to the formation of young massive star clusters (YMCs). With ages as young as 10 Myr and masses above 10^5 solar masses, these compact star clusters are therefore vital tools to get a clearer picture of star formation and evolution in extreme environments.

This project aims to investigate the star cluster formation and evolution mechanisms by studying YMC population of starburst ring galaxies (SRGs). High-resolution multiband observations from the world-class Hubble Space Telescope (HST) such as the image shown on the left panel of Fig.1 will be analysed to derive the physical properties (e.g. ages and masses) of the star cluster population and to draw useful diagnostics (e.g. CMD, cluster mass functions similar to that shown in the right panel of Fig. 1). These will ultimately help in assessing the influence of the host environment on the residing YMCs, an active hot topic in this research field.

Special requirements: Basic knowledge of Python (or similar programming tool) is required and a desire to learn how to use new astronomy software.

The student is encouraged to get in touch over e-mail to discuss the project with the supervisor.

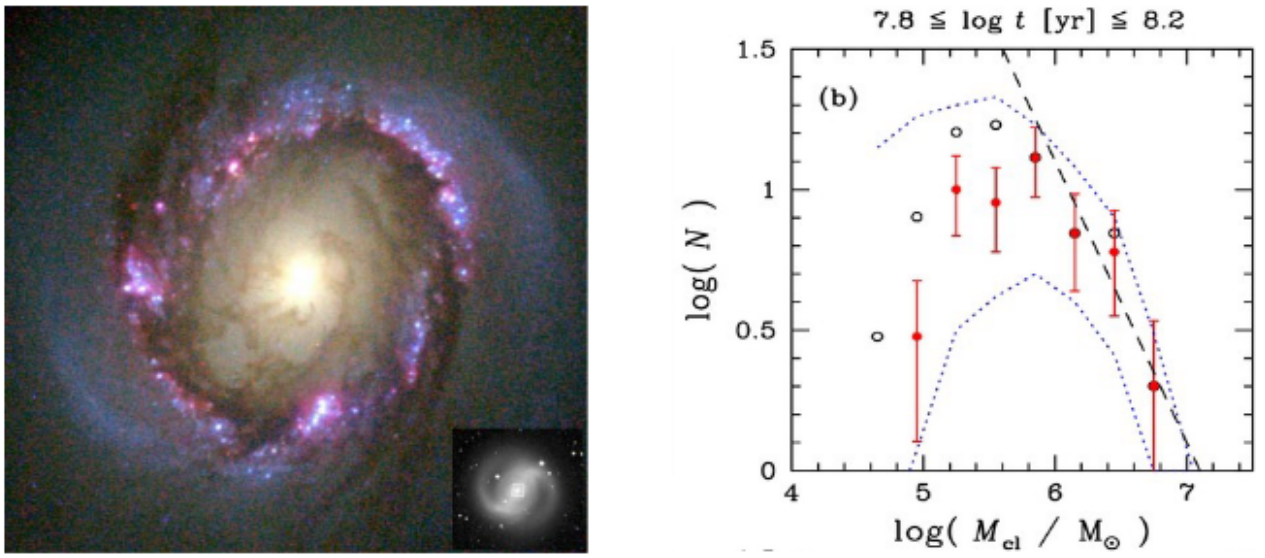

Fig.1 *Left:* HST color composite images of a barred spiral galaxy (inset) with a well-defined nuclear ring (Image by Benedict & NASA). *Right:* Cluster mass function of a SRG's nuclear ring: the observed lognormal distribution suggests an extremely rapid star cluster disruption.