Globular cluster system of nearby Spiral galaxy NGC 1097

Level: MSc

Supervisor: Dr. Adebusola B. Alabi

Co-supervisor: Prof. Ilani Loubser

Institution: NWU

Contact: abbgstar@gmail.com

Project Background

Globular clusters (GCs) are some of the oldest stellar systems in the Universe. They have been found in all types of galaxies, in numbers usually proportional to the host halo mass. The Milky Way has ∼160 GCs while the more massive elliptical galaxy, NGC 4876 (M87), has ∼15000 GCs. They provide invaluable clues on their host galaxies' assembly and star formation histories, constraints on the epoch of reionisations, central black hole mass, and distribution of dark matter in present-day galaxies.

Our understanding of globular cluster systems (GCS) in Spiral galaxies beyond the Local Group is, however, far behind that of elliptical galaxies due to the abundance of internal dust-laden, complicated structures which obscures the GCs and makes separating bona fide GCs from foreground stars, background galaxies, and young stellar clusters very challenging. While most of the scaling relations between the GCS and properties of interest in the host galaxies, e.g., central black hole mass, halo mass, etc., are well established for elliptical galaxies, it is generally not clear if Spirals fall on these relations.

Project Description, Data and Prospects

To directly address the issues that have hitherto made the study of GCs in Spiral galaxies challenging i.e., internal extinction and potential confusion of GCs with stars and young star clusters in their galactic disks, we have started a campaign to incorporate mid-infrared and *HST* imaging into our GC photometric analysis. We have recently obtained wide-field Subaru/Suprime-Cam g,r, i broadband and [OIII] narrowband deep imaging of NGC 1097. These multi-band imaging will be combined with archival 3.6 and 4.5 μm *Spitzer*/IRAC imaging as well as archival *HST* imaging available for the central galaxy region for an unprecedented study of the GCS of NGC 1097.

The student will learn how to use industry-standard photometry analysis software, e.g., `SExtractor`, GALFIT, IMFIT, `ds9`, IRAF. Coding in Python (or a similar programming language) is necessary.

We aim to publish the results from this pilot study in a Journal and could easily expand this work into a PhD project, depending on interest.