PROPERTIES OF ISOLATED GALAXIES IN THE AMIGA CATALOGUE

M. K. Kinyumu, N. K. Kimani, R. L. Nyenge

Department of Physics, Kenyatta University, Nairobi-Kenya

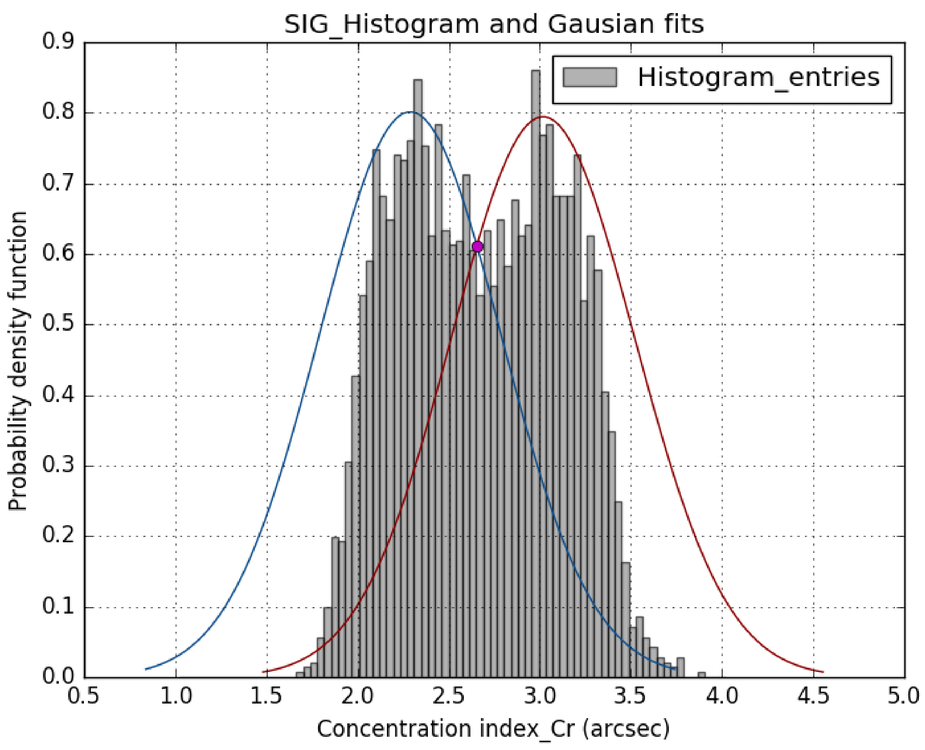
Introduction

- The research focuses on the study of isolated (low density environment) galaxies to understand the effect of environment on the galaxy formation and evolution process.

- Isolated galaxies by our definition are assumed to have not experienced the influence of their environment for ~ 3 Gyrs (Verdes-Montenegro et al., 2005), have no neighbor within a line of sight velocity distance $\nabla v \leq 500$ kms^{-1} and 1 Mpc field radius (Argudo-Fernández et al., 2015).

- The archival data for this analysis is part of the Analysis of the interstellar Medium of Isolated Galaxies (AMIGA) catalogue (Argudo-Fernández et al., 2015). The sample was selected from Sloan Digital Sky Survey, data release sixteen (SDSS - DR 16). The catalogue consists of 3702 Singly Isolated Galaxies (SIG), 1240 Isolates Pairs (SIP) and 315 Isolated Triplates (SIT).

Galaxy Classification

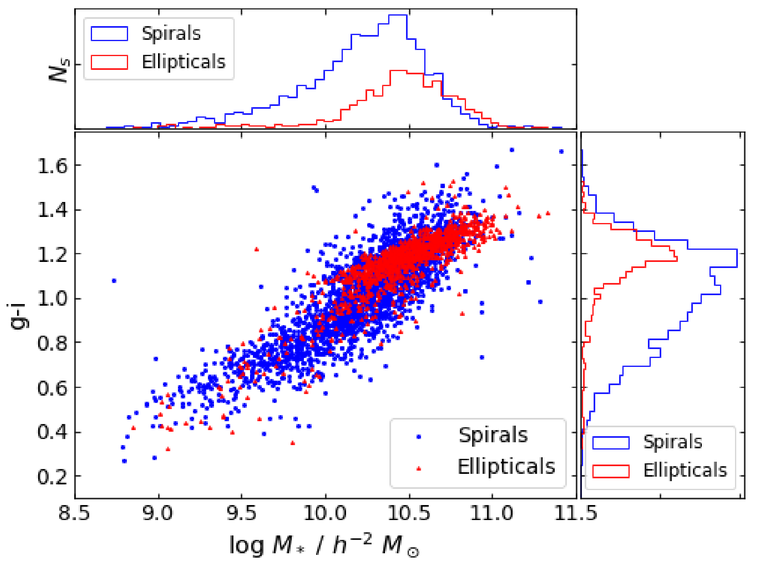


- Concentration Index, $C_{r,\,i}$ is derived as the ratio of R_{90} / R_{50} r-band petrosian magnitudes.

- The sample is well classified in to early type and late type by C_r of 2.65 as shown in the graph above. This value is a good approximation of the most commonly used C_r, 2.6 in SDSS.

- The derived values of C_r are compared to results of visual classifications from the Galaxy Zoo (Lintott et al., 2010). Our classification was 68% and 90% complete with 6% and 43% contamination from the other class for spiral and elliptical galaxies respectively.

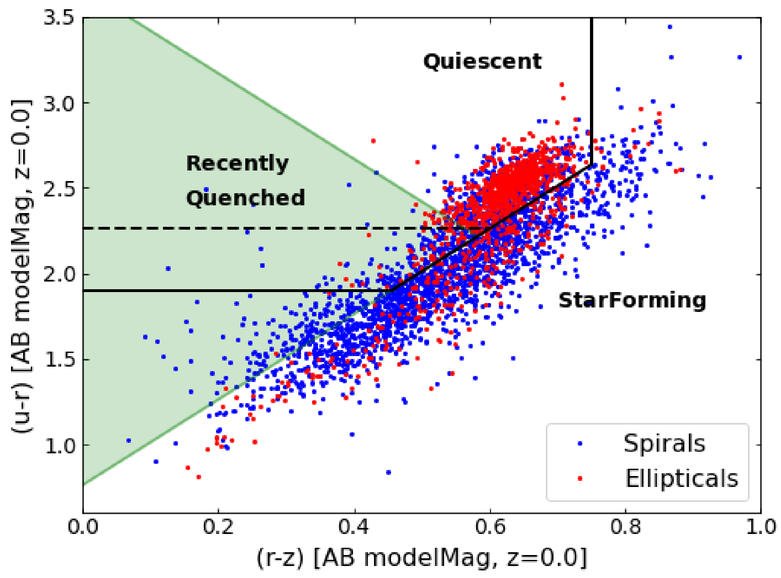
Colour and Stellar Mass Analysis



- Galaxies become red with increase in mass. Ellipticals are highly populate on the redder and high mass side with most of them having stellar masses of greater than 10^{10} (McIntosh et al., 2014).

- The population of the spiral galaxies is biased towards low masses and bluer colours.

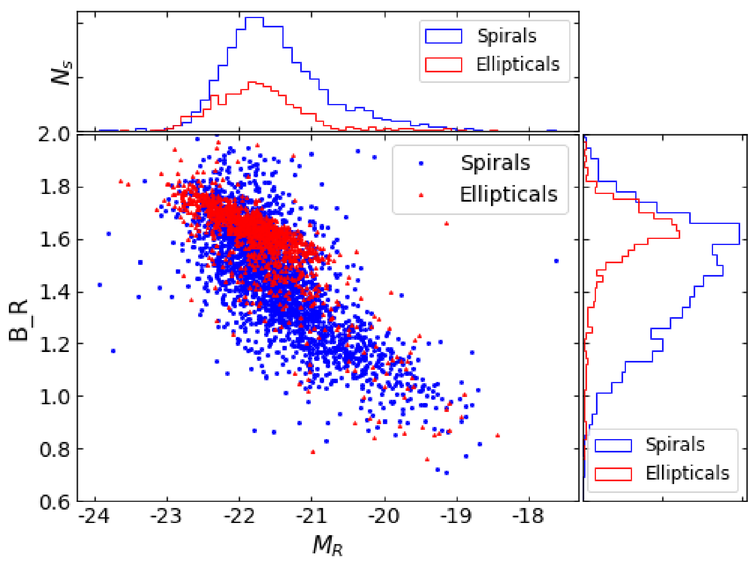
Colour_Colour Analysis



- The dotted line is the separation of quiescent galaxies by Holden et al. (2012, H12), with the lower solid line being the extended line by McIntosh et al. (2014) to include the recently quenched ellipticals (RQEs).

- The H12 distinguishes the quiescent red early type galaxies (ETGs) from the blue star forming late type galaxies (LTGs) well. Ellipticals dominant the quiescent while spirals are distributed in the star forming region.

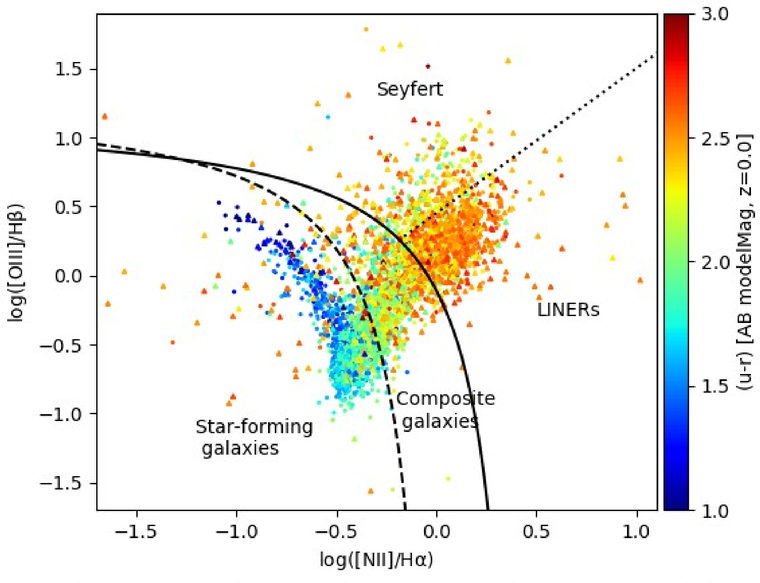
Colour-Magnitude Relation



- The blue dot symbols represents spiral galaxies and the red dot symbols represents elliptical galaxies.

- Galaxies become redder with increase in luminosity . The colour magnitude relation for spirals seem stepper than for ellipticals. Elliptical galaxies are on the redder and more luminous side of the diagram, the spiral galaxies dominate the blue and less luminous side.

Emission-line Diagnostics



- Star forming galaxies are bluer while redder galaxies have AGN emissions. This is as expected since most blue galaxies are spirals and red ellipticals.

- Elliptical galaxies are mainly the quiescents and predominantly populate the AGN region, with LINERs emissions.

- The galaxies in the composite region (Green Valley) are in transition from star forming to quiescent nature.