Blue Clumpy Galaxies Found Within z = 0.4

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Abstract

Galaxy Zoo 2 participants found galaxies in the nearby universe with clumpy features. The galaxies appeared to be blue spirals with clumpy pockets of potentially high star-forming regions in the disk. The FERENGI code will be used to determine if these galaxies are similar to galaxies found at higher redshifts.
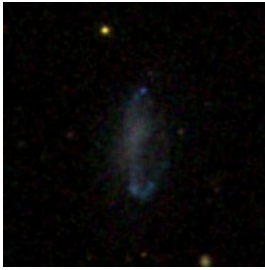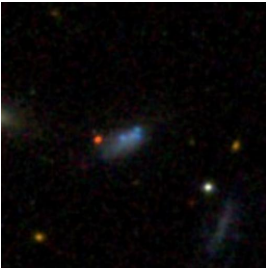
1 Introduction
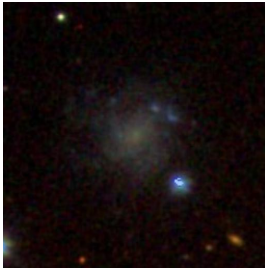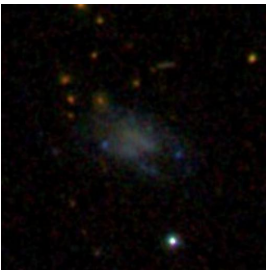
In order for Galaxy Zoo 2[1] to consider a galaxy clumpy, certain weighted voting fraction thresholds needed to be met. There needed to be a weighted voting fraction of 0.50 or higher met for the specific "Is this galaxy clumpy?" galaxy feature question. A weighted fraction was then implemented to be 0.50 or higher for the "how clumpy" question participants were asked if they answered that the galaxy was clumpy. The number of people who voted "clumpy" for a specific galaxy was also weighted and needed to be at least 20. After the set containing all the clumpy ga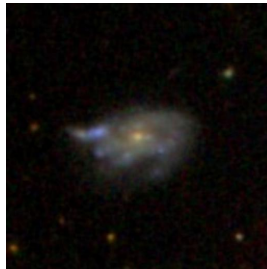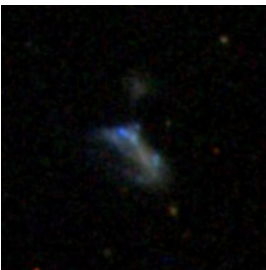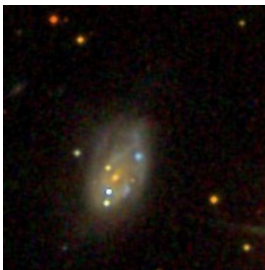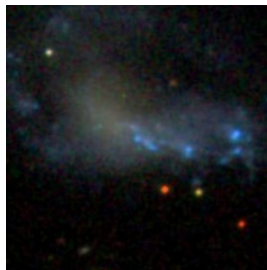laxies was completed, it was then determined that it needed to be analyzed further. The goal of this research project is to determine if these galaxies are similar to galaxies found at higher redshift and to determine if they can be used to help our understanding of disk formation.

2 Determining the Sample

Initially, the sample was a set containing 145 galaxies within stripe 82 that fell under two different clumpy categories. The first category appears to be blue spiral galaxies with clumpy areas of high star formation rates in the disk. The second category appears to be merging red elliptical galaxies. This paper focuses on the first category. In order to determine where to cut the sample, a color figure of u-r was produced. It was assumed that there would be a distinct color separation between the blue galaxies and the red galaxies. There seemed to be a strong separation between two distributions at a u-r value of 2.5. The blue clumpy sample was then reduced to 67 galaxies using this u-r value. After looking at fits images and JPEGs of the galaxies, contamination was found between the two samples. Each galaxy was then looked at by eye in order to determine which category it belongs to. The blue clumpy spiral galaxies category was then reduced to 35 galaxies. The redshift of each galaxy was determined using the DR12 navigate tool of the SDSS website. A redshift cut was implemented and only galaxies with a red shift value of 0.04 or less were accepted. After the redshift cut, only 25 galaxies remained. It was decided that only galaxies that had multiple clumps and had multiple spectra (i.e. two or more clumps) were going to be used in the sample. This brought the sample down to a size of 15 galaxies. This was the final sample and the images of the galaxies can be found in the Sample section.

3 Sample

Table 1: This is a table of the images of the galaxies in the sample labeled with the SDSS object name.[2]

SDSS J001931.07-003606.1	SDSS J003147.57+003330.5	SDSS J004533.61-010611.4
SDSS J013003.50+004435.9	SDSS J013307.38+001032.9	SDSS J015359.18-004500.9
SDSS J021859.76-003605.2	SDSS J022336.09+001328.5	SDSS J024048.06+010617.1
SDSS J025511.56-001047.8	SDSS J030104.46-004442.7	SDSS J031028.14+010551.6
SDSS J031606.15-002619.4	SDSS J205052.05-001926.0	SDSS J232423.14-000628.1

Acknowledgments

References

[1] K. W. Willett and et all, "Galaxy Zoo 2: detailed morphological classifications for 304,122 galaxies from the Sloan Digital Sky Survey," Aug. 2013.

[2] D. J. Eisenstein, D. H. Weinberg, E. Agol, H. Aihara, C. Allende Prieto, S. F. Anderson, J. A. Arns, É. Aubourg, S. Bailey, E. Balbinot, and et al., "SDSS-III: Massive Spectroscopic Surveys of the Distant Universe, the Milky Way, and Extra-Solar Planetary Systems," vol. 142, p. 72, Sept. 2011.