Interpretation of Real Astronomical Data with the Galaxy Zoo Project

Introduction:

Modern astronomy relies on a plethora of data coming from surveys. Survey come in multiple types with different science objectives providing the survey. An astronomer who wants to learn how many stars are nearby may look at images of the sky taken at two different times to find which ones moved in the sky (as only nearby stars have large motion through the sky). An astronomer wishing to learn about the structure of the Milky Way Galaxy may image the plane of the Galaxy, especially near the center to learn that there is a bar there.

One of the largest surveys in modern astronomy is the Sloan Digital Sky Survey. It will image most of the northern hemisphere of sky in 5 different filters, and will be complete to a very faint magnitude. This survey has discovered hundreds of thousands of galaxies that were unknown. Further, after the discovery images are collected, spectra of galaxies, stars, and other objects in the survey is performed on all fields in the sky, resulting in a wealth of information that is incomprehensible to any single astronomer. The data on galaxies, in particular their classification, is useful to understanding how galaxies evolve with time since their formation after the Big Bang.

This led some astronomers to ask for help in the project, and they created a website that anyone can use to look at the images and make their best judgment. With thousands of people volunteering a few minutes of their time to the cause, the thousands of new galaxies can be classified and galaxy evolution is beginning to be understood.

The galaxy zoo webpage http://www.galaxyzoo.org starts with the following:

“The Galaxy Zoo files contain almost a quarter of a million galaxies which have been imaged with a camera attached to a robotic telescope (the Sloan Digital Sky Survey, no less). In order to understand how these galaxies — and our own — formed, we need your help to classify them according to their shapes — a task at which your brain is better than even the fastest computer.

More than 150,000 people have taken part in Galaxy Zoo so far, producing a wealth of valuable data and sending telescopes on Earth and in space chasing after their discoveries. Zoo 2 focuses on the nearest, brightest and most beautiful galaxies, so to begin exploring the Universe, click the ‘How To Take Part’ link above, or read ‘The Story So Far’ to find out what Galaxy Zoo has achieved to date.

Thanks for your help, and happy classifying.

The Galaxy Zoo team.”

In today's lab, your group will log into the galaxy zoo with the following information, classify a few galaxies, and answer the following questions.

User: gsulab
Password: astrolab

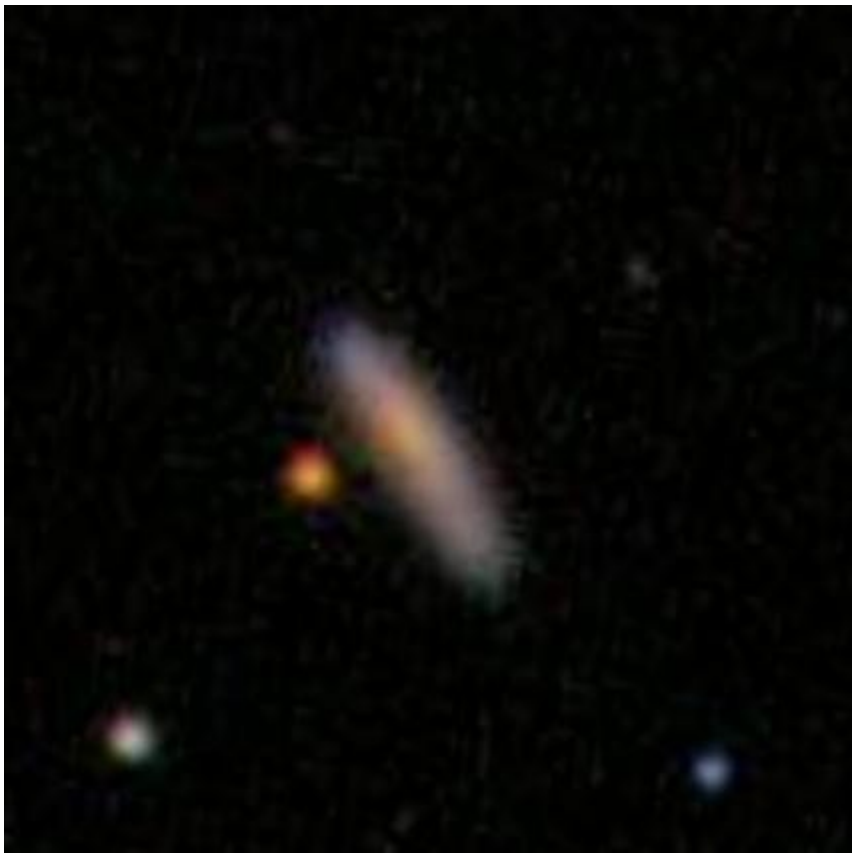
After you log in on galaxy zoo, Click on “Classify Galaxies”

Hello gsulab!

Where would you like to go?

- Classify galaxies →
- My Galaxies
- Logout

Example:



Is the galaxy simply smooth and rounded, with no sign of a disk?

Smooth

Features or disk

Star or artifact

This galaxy appears to have features or a disk – that means it is a spiral galaxy instead of an elliptical galaxy.

Could this be a disk viewed edge-on?


Yes

This one probably could be an edge on disk. (Yes)

Does the galaxy have a bulge at its centre? If so, what shape?


Rounded


Boxy


No bulge

This galaxy does not look like it has a bulge. (No bulge)

Is there anything odd?


Yes

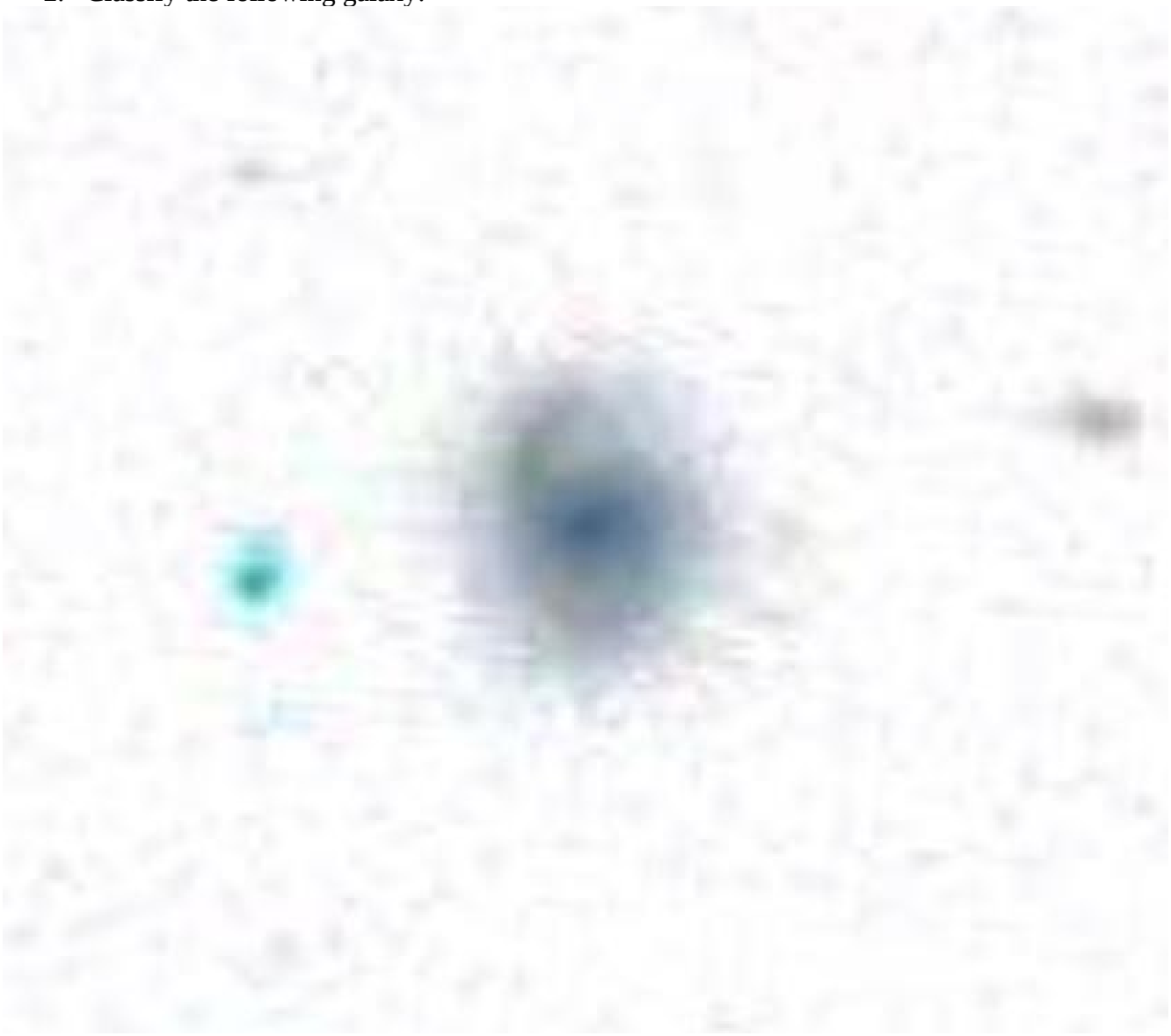

No

Nothing looks really weird. (No)

Lab questions:

1. Classify 25 galaxies on Galaxy Zoo.
   Instructor Signature that you completed this:_____

2. Classify the following galaxy:



Smooth, features/disk, none:_____

If Smooth: Circular, Elliptical, Cigar-shaped? _____ [End]

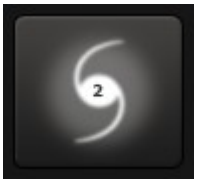
If there are features, Edge on disk? _____

If edge on, does it show a bulge?_____ [End]

If not edge-on, does it have a bar? _____

If not edge-on, does it show spiral structure? _____

If there is spiral structure, rate the structure:



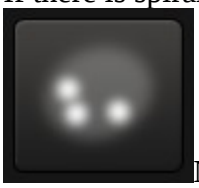
Tight

Medium

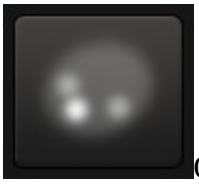
Loose

If there is spiral structure, how many arms are there? _____

If there is spiral structure, is there a bulge?


No bulge


Just noticeable


Obvious


Dominant

Finally, is there anything odd about this galaxy? _____