

## Exercise Sheet #2

Submit by Tuesday 23-03-2021

**Exercise 1. - Galaxy Classification:** Go to the STScI Digitalized Sky Survey ([https://archive.stsci.edu/cgi-bin/dss\\_form](https://archive.stsci.edu/cgi-bin/dss_form) and retrieve blue, red, and infrared images (10x10 arcmin<sup>2</sup>) for the following galaxies: M 100, NGC 4486, NGC 1300, IC 5152. Insert the name of the galaxy into the form and click on ‘get coordinates’. Select then POSS2/UKSTU Blue (Red or IR) and choose the size of the image as well as the file format GIF. Finally, click on ‘retrieve image’.

- (a) What do you reckon is the morphological type of these galaxies based on the Hubble classification scheme? (10 points)
- (b) What differences can you recognize between the blue, red, and infrared images? (10 points)
- (c) Briefly discuss how what you see correlates with the physical properties of the morphological type you chose. (10 points)

**Exercise 2. - M 100 and composition of galaxies:** Let’s now consider only M 100. This galaxy lies at  $\sim 15.9$  Mpc from the Sun (Cappellari et al. 2011) and its integrated apparent magnitude is  $V = 9.79$  mag (de Vaucouleurs & Longo 1988).

- (a) What is roughly the diameter of M 100 in pc, estimated from the blue image (POSS2/UKSTU Blue)? Do you think that this is the true radius of this galaxy? Explain. (10 points)
- (b) Calculate the absolute integrated magnitude of M 100. (10 points)
- (c) Imagine that M 100 is composed solely of Sun-like stars (absolute magnitude in the  $V$ -band  $M_{V\odot} = 4.8$  mag). Neglecting the extinction, how many stars would be present in the galaxy? How many stars would M 100 contain if it was composed only of stars similar to Barnard’s star (absolute magnitude in the  $V$ -band  $M_V = 13.21$  mag, spec. type M5 V)? (10 points)

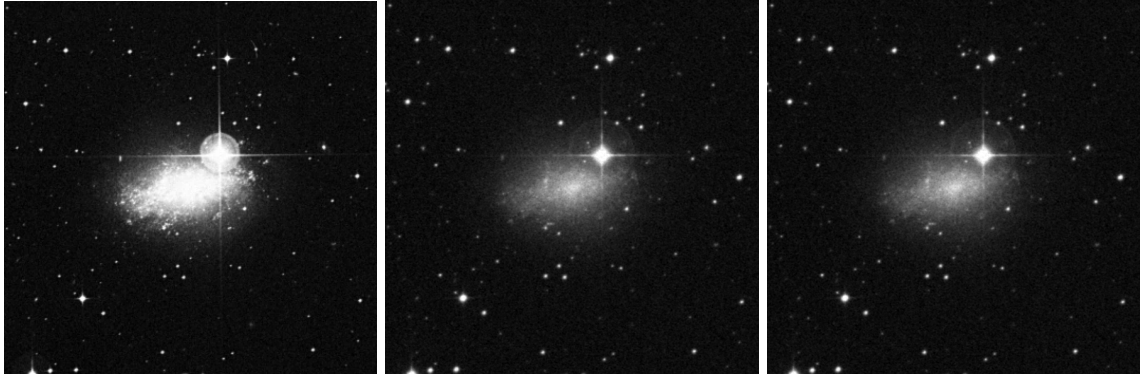


Figure 1: IC5152

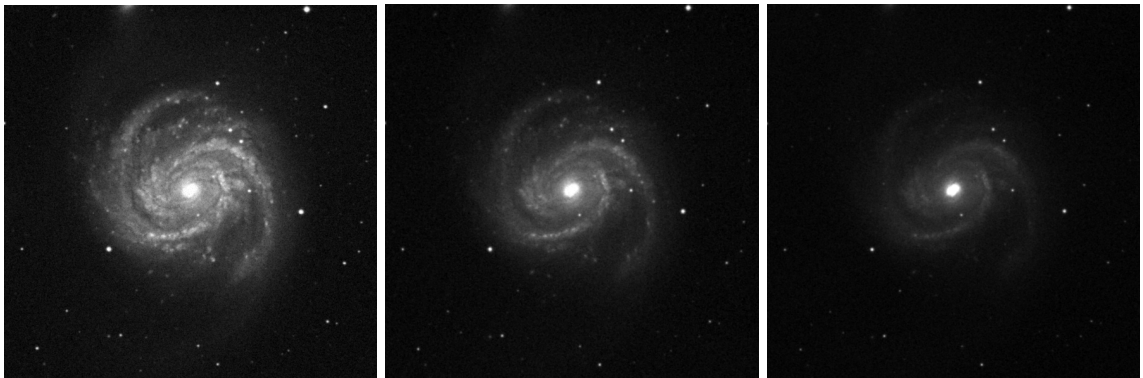


Figure 2: M100

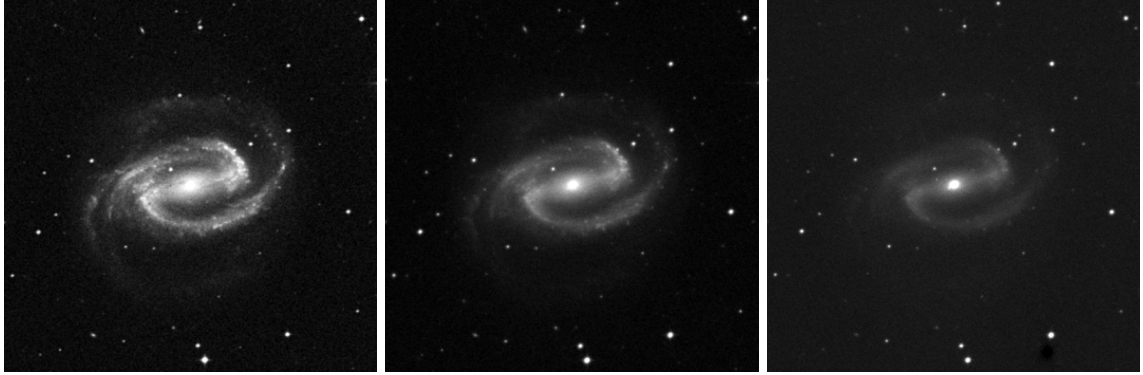


Figure 3: NGC1300

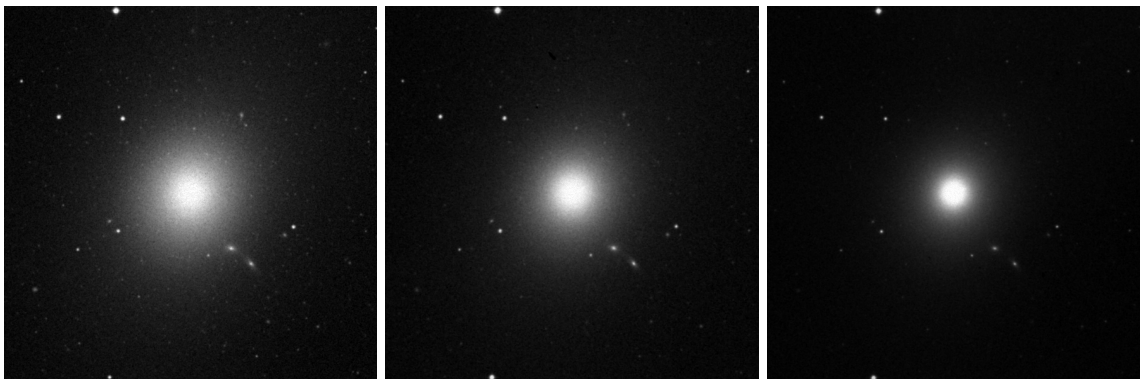


Figure 4: NGC4486



Figure 5: —



Figure 6: —

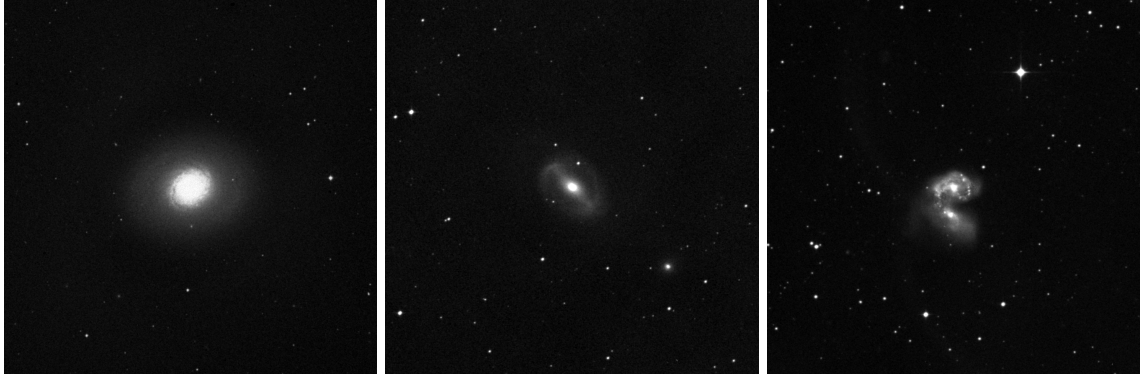


Figure 7: M94, NGC 1512, NGC 4038