

# ASTC02 - Practical Astronomy

## Lab Report 2

### Globular Cluster

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Deadline: December 4th 2017, noon

The goal of this practical is to measure the radial density profile of a globular cluster. Your write-up should be about two pages long plus any tables and images.

#### Problem 1.1

10 Points

- (a) Collect all observations that you took as well as the archival data from this summer. You can find all files at `rein003.utsc.utoronto.ca`.
- (b) Make a list of all observations that you are planning to use. State:
  - who took the images
  - the date and time
  - the telescope and instrument used
  - the observing conditions
  - any unusual occurrences.
  - is it a regular frame, a dark frame or a flat field.

#### Problem 1.2

10 Points

- (a) For this lab report you may focus on one colour channel (i.e. red). This makes the analysis easier, especially if you get rid of the other channels immediately after importing the files.
- (b) First, stack all dark frames. Then, stack all flat fields that you took. You do not need to align the individual frames for either of those two.
- (c) Use your stacked dark and flat field to correct the actual observations of the star cluster that you took. Include one uncorrected and one corrected frame in your report.
- (d) After you've corrected the individual frames, align them with the help of a bright star in your frame and stack them up. This gets rid of the slow drift of the telescope. Include the stacked frame in your report too.

#### Problem 1.3

10 Points

- (a) To calibrate your radial density profile properly, measure the background sky brightness in your image. For that calculate the average brightness in a dark area of the frame, close to the cluster.
- (b) Calibrate your image with the help of a bright star in your image. Look up the brightness of that star in the V-band online or in Stellarium. Make sure the star you're using did not saturate the pixels in your frame. If so, choose a dimmer star.

- (c) Calculate the brightness of the entire cluster. To do that, sum up all pixels that correspond to the cluster. Take into account your measurement of the background brightness and calibrate it with the calibration star from above.
- (d) Measure the radial density profile of the star cluster. Fit it to a Plummer model. By looking up the literature value for the distance to your cluster, try to estimate the cluster's total mass by assuming that each star in the cluster is Sun-like. Compare it to the literature value.