Independent Observing Project Description

ASTR:1070 (Stars, Galaxies, and the Universe) Lab

For your observing project, you will study an astronomical object in greater detail than we've done in class or in lab, taking on the role of an amateur astronomer. In science, we strive to explain how we collected our data and how we analyzed it as clearly as possible. This is so that other scientists can reperform our experiment and (hopefully!) confirm our results. We communicate how we collected the observations, analyzed the data, and arrived at a conclusion as part of a publication in scientific journals. Professional journals are "peer-reviewed", meaning they are vetted by other scientists for clarity and correctness. *A goal throughout your final project is to offer enough details that your work could be peer-reviewed – if a classmate looked at your paper or presentation, they should follow it closely enough to be able to reproduce your work.*

For your project, select an object from the list below. You will then examine observational data of that object taken with the Iowa Robotic Observatory. All data products are contained in the LabImage directory on the computers in your lab room, and supplemental materials are available online. You will then produce an astronomical data product (e.g. a tri-color image, a light curve, or animation) with the help of the online tutorials and other labs performed in class. You'll lastly make a calculation based on that data, and report your results to the class and your instructor.

Table 1: Potential Objects to be Studied --

Object Type	**Objects Within Type**	**Data Product (^ means requires all three)**	**Calculations Available Based on Type (* means requires additional literature search)**
Nebula	- Crab Nebula - Dumbbell Nebula	Stacked Tri-color Image	Size* Approximate Peak Temperature
Galaxy	- Whirlpool Galaxy - NGC 2903	Stacked Tri-color Image	Size* Approximate Peak Temperature Redshift* (Hubble's Law)
Variable Star	- AB Andromedae - BU Vulpeculae - XZ Andromedae	Light Curve	Total Brightness Change
Asteroid	- 40 Harmonia - 45 Eugenia - 6 Hebe	Animations^	Speed*,^

Table 2: Calculation Types --

CALCULATION TYPE	**RESOURCES**
SIZE	Angular Size lab / Small Angle Formula
APPROXIMATE PEAK TEMPERATURE	Wien's Law (21st Century Astronomy, 5.3 "Working It Out"), Image Analysis / Filters for the VAO
REDSHIFT	Astronomical Redshift Lab / Hubble's Law (21st Century Astronomy, 21.1 "Working It Out")
TOTAL BRIGHTNESS CHANGE	Magnitude Scale (21st Century Astronomy, 13.2 "Working It Out")
SPEED	Image Analysis II
ORBITAL PERIOD	Kepler's 3rd Law, JPL Minor Planet Database