UNIVERSITY OF HAWAII • INSTITUTE FOR ASTRONOMY
RESEARCH PROPOSAL – OBSERVING TIME REQUEST

Author* : Daichi Hiramatsu

E-mail* : dhiramat@hawaii.edu

Institution/Dept*,† : UH

Author† : Corey Mutnik

E-mail† : cmutnik@hawaii.edu

Abstract

TELESCOPE TIME REQUESTED

COLLABORATORS

Name	Institution	E-mail	Program(s)
Jeff	UH		
Marielle	UH		
Connor	IfA		
JT	IfA		

1   SCIENTIFIC JUSTIFICATION

1.1   Immediate Objective

Using various data reduction techniques, we will measure the size, shape, and age of the spiral arms located on the Milky Way galaxy. To determine the size and shape of particular spiral arms, variable star distributions must be spatially mapped. The number distribution of variable stars will give insight into the age of our galaxy.

- Distance Equation with reference

- Determine deviation of variable stars from model

- Variations arise from non-gravitational effects

- Figure out dark matter distribution

- include - Plot of known var star distributions in spiral arms

- possibly make figures below, side by side

Subtraction of gri data will cause transient objects to emerge. Distinct light curves will lead to the identification of variable stars. Variable stars comprise under 1% of the total number of observable stars Allen et al. (2016), making it possible to analyze all of the data collected by the gri project.

A H-R Diagram of pulsating variable stars is shown by Figure 2 Turner et al. (2012).

1.2 Scientific Rationale

Of the different types of variable stars, we will focus on RR Lyrae, Type 1 Cephedis, and Type 2 Cephedis. These pulsating variables have well established absolute magnitudes B. et al. (2012). From this the luminosity is known, permitting the distance to each star to be calculated using Period-Luminosity (PL) relationship.

RR Lyrae have short periods, 0.05-1.2 days, and are generally classified as stars with spectral type A. On average, absolute magnitudes of RR Lyrae stars fall between 0.6-0.7 Tsujimoto et al. (1998). Figure 1 shows the PL relationship for variable stars classified as RR Lyrae Ngeow et al. (1998).

[DISCUSS Type 1 Cephedis, and Type 2 Cephedis] [DISCUSS DIFFERENCE IN ALL 3 VAR TYPE'S LIGHT CURVES - POSSIBLY SHOW EXAMPLES]
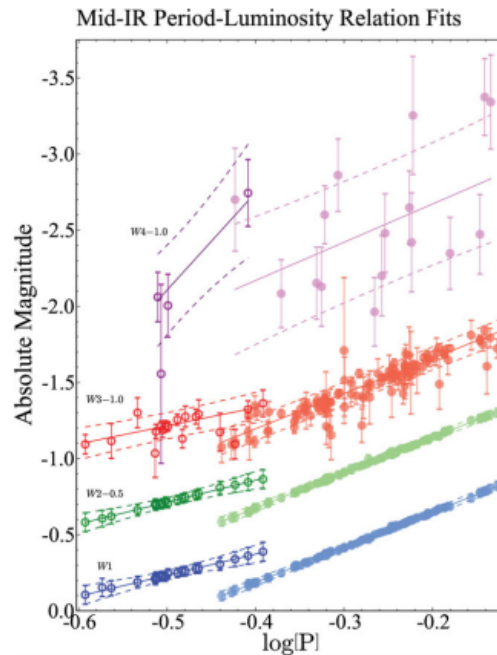

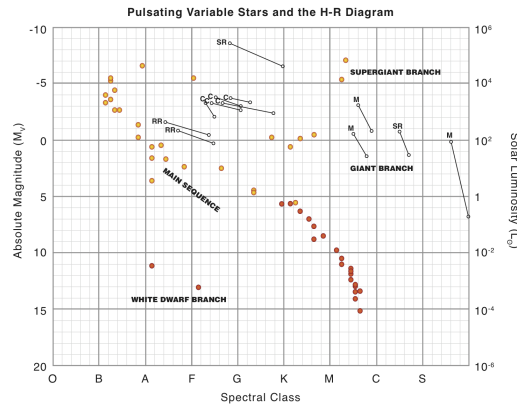Figure 1: *Period-Luminosity relationship of RR Lyrae variable stars.*

Figure 2: *HR-Diagram: Pulsating Variable Stars.*

References

Allen, S. et al., 2016. (n.d.). The Classification of Stellar Spectra. Retrieved February 15, 2016, from $http : //www.star.ucl.ac.uk/ pac/sp$

B. et al., 2012. Types of Variables — AAVSO. Retrieved February 16, 2016, from https://www.aavso.org/types-variables

Ngeow, C. et al., 2013. "Distance Determination From The Cepheid And RR Lyrae Period-Luminosity Relations". *Proc. IAU* 9.S301: 123-128. Web. 18 Feb. 2016.

Tsujimoto et al., 1998. The Absolute Magnitude of RR Lyrae Stars Derived from the [ITAL]Hipparcos[/ITAL] Catalogue. *The Astrophysical Journal, 492*(1). Retrieved February 15, 2016.

Turner, R. et al., 2012. H-R Diagram Education Materials — AAVSO. Retrieved February 14, 2016, from https://www.aavso.org/hr-diagram-education-materials

TECHNICAL JUSTIFICATION