

Finding the absolute magnitude and predicted maximum of MU Uma

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What is our target star?

- Our star is MU Uma
- It is a variable star of type RR Lyr
- An RR Lyrae variable is a periodic variable star used as a standard candle to measure extragalactic distances.
- MU Uma is 5920 light years away from Earth
- For comparison, the Sun is 0.00001581 light years away from the Earth!

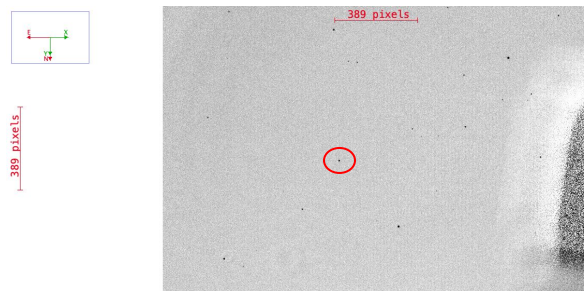


Fig 1: Image of our target star from AstrolmageJ

What methods did we use?

- Initial data was taken at the RIT Observatory using two different telescope filters
- We also consulted online databases for additional information about our star
- We then used the computer program AstrolmageJ to clean and analyze the data
- We wrote Python code to create light curves from our data

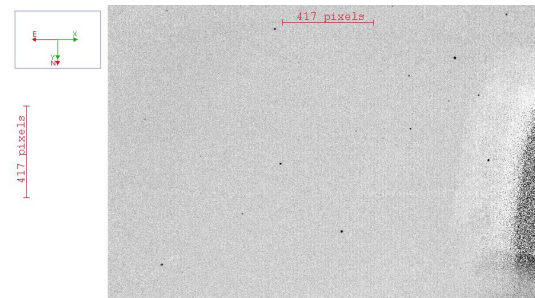


Figure 2: An example of a cleaned image of our star taken at the RIT Observatory in the B filter

Light Curves!

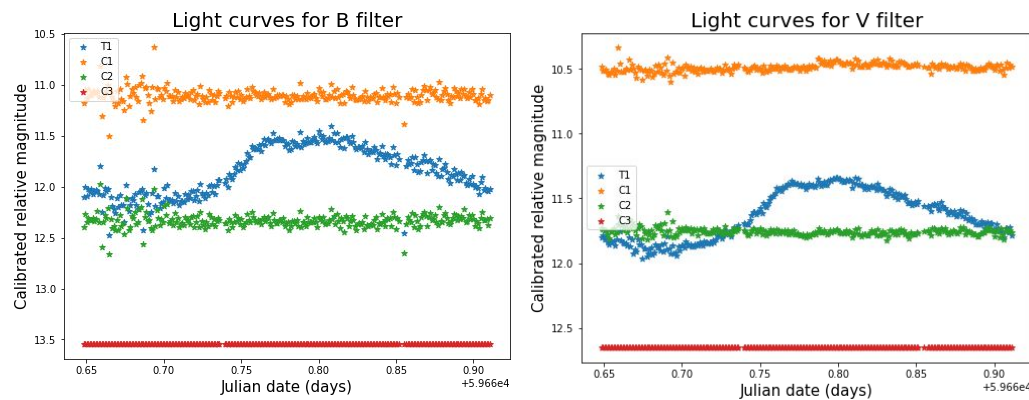


Figure 3: Light curves for both filters used to take data of our target star

Absolute Magnitude

- From our light curves, we found the apparent magnitude of target in both filters
- We took these apparent values and found the absolute magnitude using Equation 1
- We found the absolute magnitude to be approximately +0.5 across both filters
- This absolute magnitude falls in the typical range for an RR Lyr Star, which is +0.75

$$M = m - 5 \log_{10} d + 5$$

Equation 1: This is a modified version of the distance modulus formula, where M is the absolute magnitude, m is the apparent magnitude, and d is the distance in parsecs

Maximum prediction by epoch

- From GAIA, the epoch of MU Uma is 51305.72280 (Julian days)
- SIMBAD cites the period as approximately 0.267946 days
- We used the expression “date = epoch + n*period” to find the time on our night at which the maximum occurred
- We found that the predicted epoch was at $n=31182$, which is the date 59660.815 (Julian days)
- From our light curves, we found the maximum to occur at date 59660.80028 (Julian days)
- We compared our maximum to the TESS light curve, and we noticed that our data has the same shoulder pattern!

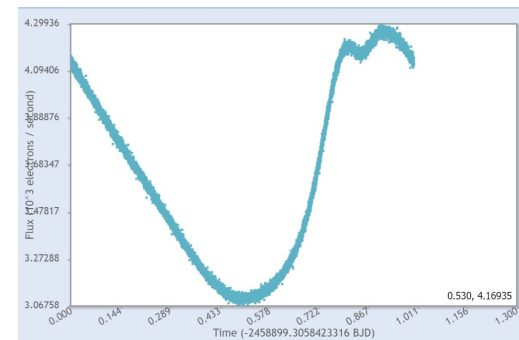


Figure 4: TESS light curve provided from MAST. As shown on the right hand side, the curve has a shoulder corresponding to a dip in the light from the star.