Orbital Period of the Eclipsing Binary Star V396 Peg

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Abstract

This looks at the orbital period of the eclipsing binary star V396 Peg taken in filter V by PROMPT 8 telescope at the Cerro Tololo Inter-American Observatory (CTIO). We then use photometric calculations to get the apparent magnitude of the eclipsing binary star by comparing with the magnitude of the reference star. The apparent magnitudes is then used to plot a light curve and from this analysis we found that V396 Peg eclipsing binary star has the orbital period of about 0.33 days or 8.02 hours.

Introduction

A Binary star system is a star system in which two stars orbit around a common center of gravity. There are generally 3 types of eclipsing binary systems: 1) Detached binary system, 2) Semi-detached Binary System and 3) Contact Binary System.

V396 Peg is a W Ursae Majoris type variable star (W UMa) which at coordinate RA 23h 32m 32.5s and Dec +10° 33' 19.5" is a Contact Binary System. This is another famous eclipsing binary which is the prototype of its class of eclipsing binaries where two stars are actually in contact and share a common envelope. Such system may have its physical characteristics, orbital period that changes over time along with the system evolution. By studying orbital period, it can lead to calculating the system's mass, orbital velocity, and separation.

Method

1. Take images by PROMPT 8 telescope at the Cerro Tololo Inter-American Observatory (CTIO) in filter V. Exposure length 60 seconds every 30 minutes.
2. Perform analysis of V396 Peg with two reference stars, and get the magnitude of the reference star from the GSC 2.3 catalog .
3. Use photometric calculations in order to ascertain the apparent magnitude of V396 Peg in order to compare with the magnitude of the reference star from the equation:

$$m_1 - m_2 = -2.5 \log (f_1 / f_2)$$

   When m_1 Is the apparent magnitude of V396 Peg.

   m_2 Is the apparent magnitude of the reference star.

   f_1 Is the intensity of V396 Peg.

   f_2 Is the intensity of the reference star.

4. Create a light curve by plotting magnitude vs. JD observed. Here we have multiple data sets which are not connected. We can connect the light curve by off-setting the JD with JD object - JD of closest primary eclipse (From the ephemerid equation: 2452500.1643+Ex0.3422861 [1]).

5. Analysis of the light curve shows the orbital period of V396 Peg eclipsing binary star by measuring the time between two primary eclipses.

Results

In order to discover the orbital period of eclipsing binary star V396 Peg, our data is taken through photometric calculations. This process elucidates the apparent magnitude of V396 Peg in order that we may compare with the magnitude of the reference star and create a light curve. We then determined the x-axis is the time in a day and the y-axis is the magnitude of eclipsing binary star.
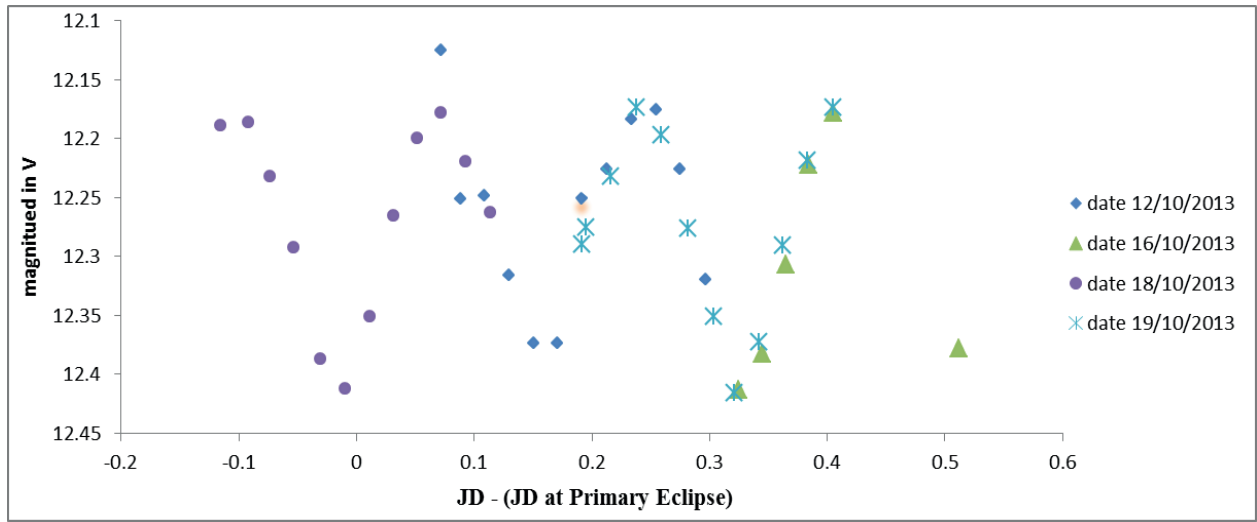

Figure1: light curve of V396 Peg in filter V

Discussion

From the light curve we found that V396 Peg has the orbital period of about 0.33 days or 8.02 hours. We have also found that the light curve has primary and secondary eclipse. The apparent magnitude during primary eclipse is about 12.45 and the apparent magnitude during secondary eclipse is about 12.39.

Conclusion

This is a study of the orbital period of the eclipsing binary star V396 Peg. We found that the eclipsing star V396 Peg has the orbital period of about 0.33 days or 8.02 hours.

Acknowledgments

References

1. Krakow website, http://www.as.up.krakow.pl/minicalc/PEGV396.HTM

2. Boonruksar Soonthornthum. (2550).Astrophysics. National Astronomical Research Institute of Thailand. Chiangmai. Page 328-349