

A New Double Star from an Asteroidal Occultation: UCAC2 30429828

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Abstract: An occultation of UCAC2 30429828 by the asteroid (611) Valeria on 2013 August 15 showed this star to be a double star with a separation of 380 mas

Observation

On August 15, 2013, Chris Chad observed the asteroid (611) Valeria occult the star UCAC2 30429828 from Gunnedah, NSW, Australia. The observation was made with the equipment described in Table 1.

Video was analysed and light curves produced by the observer using Tangra V1.4 [3] software by Hristo Pavlov and results were analysed by Herald and Talbot using Occult4 [2] and Asteroidal Occultation Timing Analysis (AOTA) software by Dave Herald.

The star is of magnitude 12.01 (V), and has a corresponding expected apparent diameter of less than 0.1mas. The expected magnitude drop at occultation was 2.2 magnitudes with an expected maximum duration of 5 sec and 1 sigma error in central time of ± 5 sec.

The star is not listed in the Fourth Interferometric Catalogue, nor in the Washington Double Star catalog.

The light curve in Figure 1 obtained from the oc-

cultation shows two clear separate dips of similar duration (3.5 sec and 4.1 sec), but with differing magnitude drop (1.5 mag and 0.5 mag) that were both lower than the predicted (2.2). This is characteristic of a double star event. The possibility of a binary asteroid was considered; however the different light drops in the two occultation events excludes that as an explanation.

The observations were analysed in the standard manner described by Herald [1]. The plot in Figure 2 below shows a probable solution along with the predicted path as a dotted line.

With only one chord for each star, there are four possible solutions which give rise to very small uncertainty in separation and a small uncertainty in PA. Figure 3 shows the two most extreme solutions, where the two stars are on opposite sides of the observed path. The resultant PA and Separation for the 4 solutions are shown in Table 2.

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Table 1: Observers and Equipment

Observer	Telescope	Camera	Timing	Event
C. Chad, NSW,AU	25 cm	Samsung SCB-2000 Video	GPS time inserted	2 separate dips
J Broughton, QLD,AU	25 cm	Waterc 120N+ video	GPS Time Inserted	Miss
P. Anderson, QLD,AU	41 cm	Visual	Radio Time	Miss

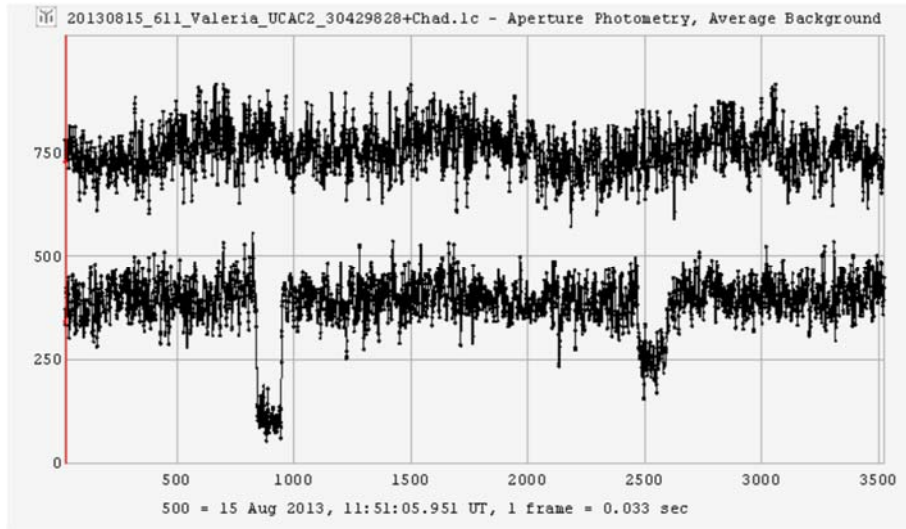


Figure 1. Chris Chad's Light curve together with a comparison star from Tangra analysis.

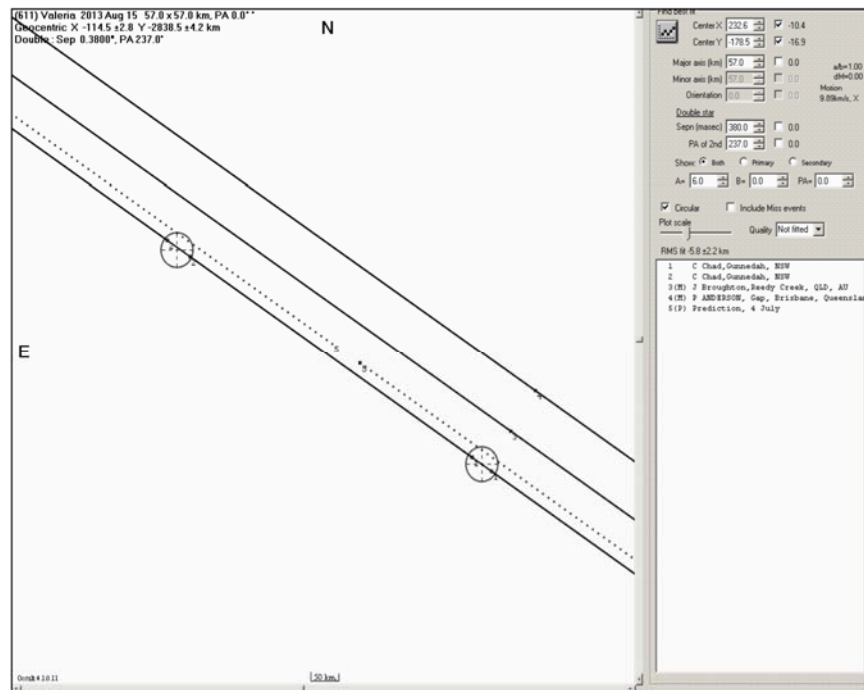


Figure 2. Plot of result and predicted times.

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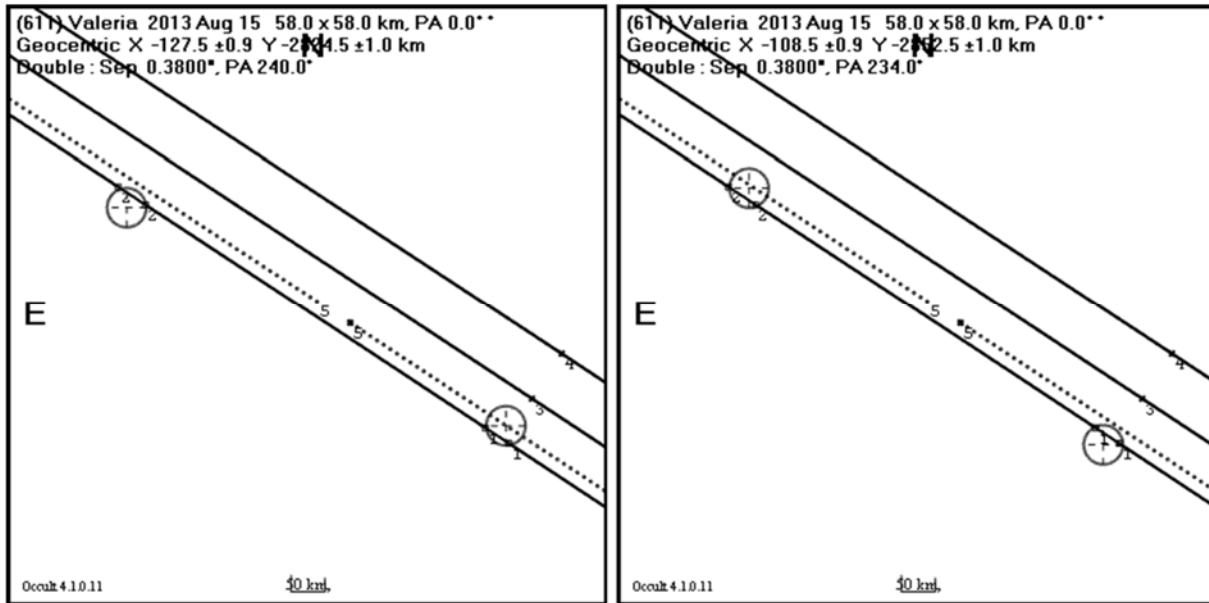


Figure 3. Plot showing offset shadows for the two stars with the two extreme possible solutions for the observation

Table 2. Four possible solutions for PA.

N	PA Deg	Separation mas
1	240	380
2	234	380
3	237	380
4	237	380

Examination of the star in Google Sky shows a very small distortion in the star shape compared to nearby stars of similar brightness. The star image is much larger than the measured separation. There are no obvious double diffraction spikes that sometimes indicate a double star.

The double star characteristics are:

Star UCAC2 30429828 = UCAC4
 429-099842 = GSC 5152-00921
 Coordinates (J2000) 19h 33m 16.3s, -04° 17' 33.3"
 Spectral type (none found)
 Mag A 12.44 ± 0.5 (V)
 Mag B 13.36 ± 0.5 (V)
 Separation 380 mas ± 1.0 mas
 Position Angle 237° ± 3°
 Epoch 2013.6210 (Besselian)

References

1. Herald, D. "New double stars from asteroidal occultations, 1971 – 2008", JDSO, **6**, 88-96.
2. Occult 4 Software by D. Herald <http://www.lunar-occultations.com/iota/occult4.htm>
3. Tangra Software by H. Pavlov <http://www.hristopavlov.net/Tangra/Tangra.html>