

A New Double Star from an Asteroidal Occultation: TYC 7444-01434-1

Dave Herald, Murrumbateman, NSW Australia
DRHerald@bigpond.net.au

John Talbot, RASNZ Occsec, New Zealand
john.talbot@xtra.co.nz

Steve Kerr, Rockhampton, QLD, Australia
srkak@optusnet.com.au

*International Occultation Timing Association (IOTA)
RASNZ Occultation Section*

Abstract: An occultation of TYC 7444-01434-1 by the asteroid (481) Emita on August 15, 2013 showed this star to be a double star with a separation of about 31 mas.

Observation

On August 15, 2013 Steve Kerr observed the asteroid (481) Emita occult the star TYC 7444-01434-1 from Rockhampton, QLD, Australia. The observation was made with equipment in Table 1.

Video was analyzed and light curves produced by the observer using Tangra V1.4 [1] 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 10.5 (V), and has a corresponding expected apparent diameter of less than 0.1 mas. The expected magnitude drop at occultation was 2.5 magnitudes with an expected maximum duration of 10.7 sec and 1 sigma error in central time of ± 5 sec.

The star is not listed in the Fourth Interferometric

Catalog, nor in the Washington Double Star Catalog.

The light curve (Figure 1) obtained from the occultation shows clear steps that are characteristic of an ABAB double star occultation event.

The observations were analyzed in the standard manner described by Herald [3]. The plot in Figure 2 below shows one possible solution along with the predicted path as a dotted line

There is a large range of possible shape limits for an ellipse approximation of Emita ranging from 1.09 to 1.30 and diameters from 98 to 121 km are found at MPC LCDB [4]. This impacts the accuracy of possible solutions. No entries for 3D shapes were found in the DAMIT or ISAM databases of asteroid shapes. The longer chord measured here is about 129 km and the

(Continued on page 109)

Table 1: Observer and Equipment

Observer	Telescope	Camera	Timing	Event
S. Kerr, QLD,AU	30 cm	Watec 120N+ video	GPS Time Inserted	Stepped D and R

A New Double Star from an Asteroidal Occultation: TYC 7444-01434-1

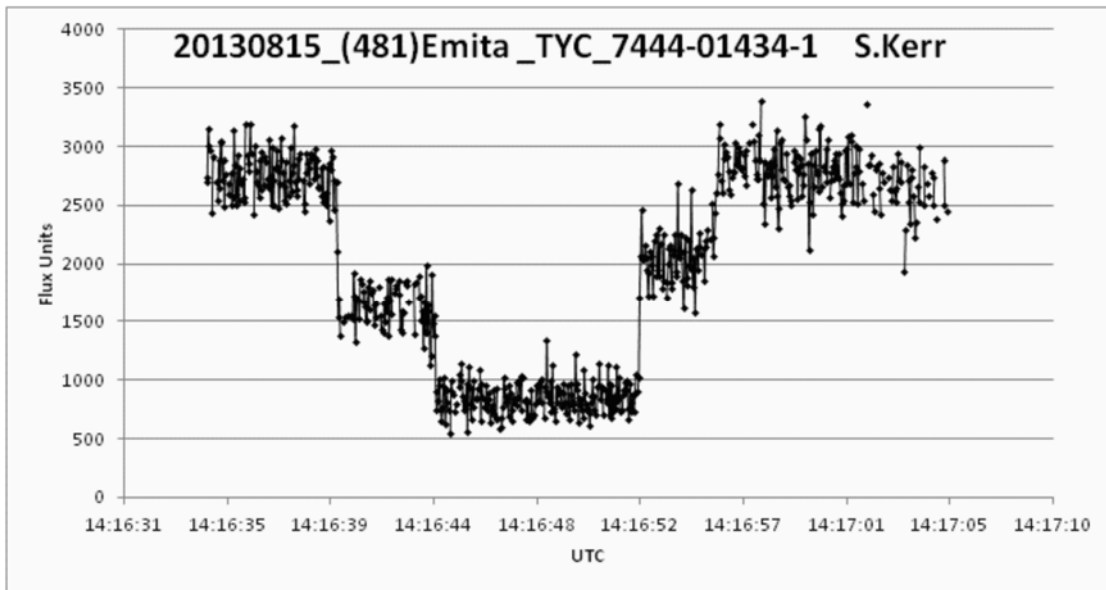


Figure 1: Steve Kerr's Light curve from Tangra analysis

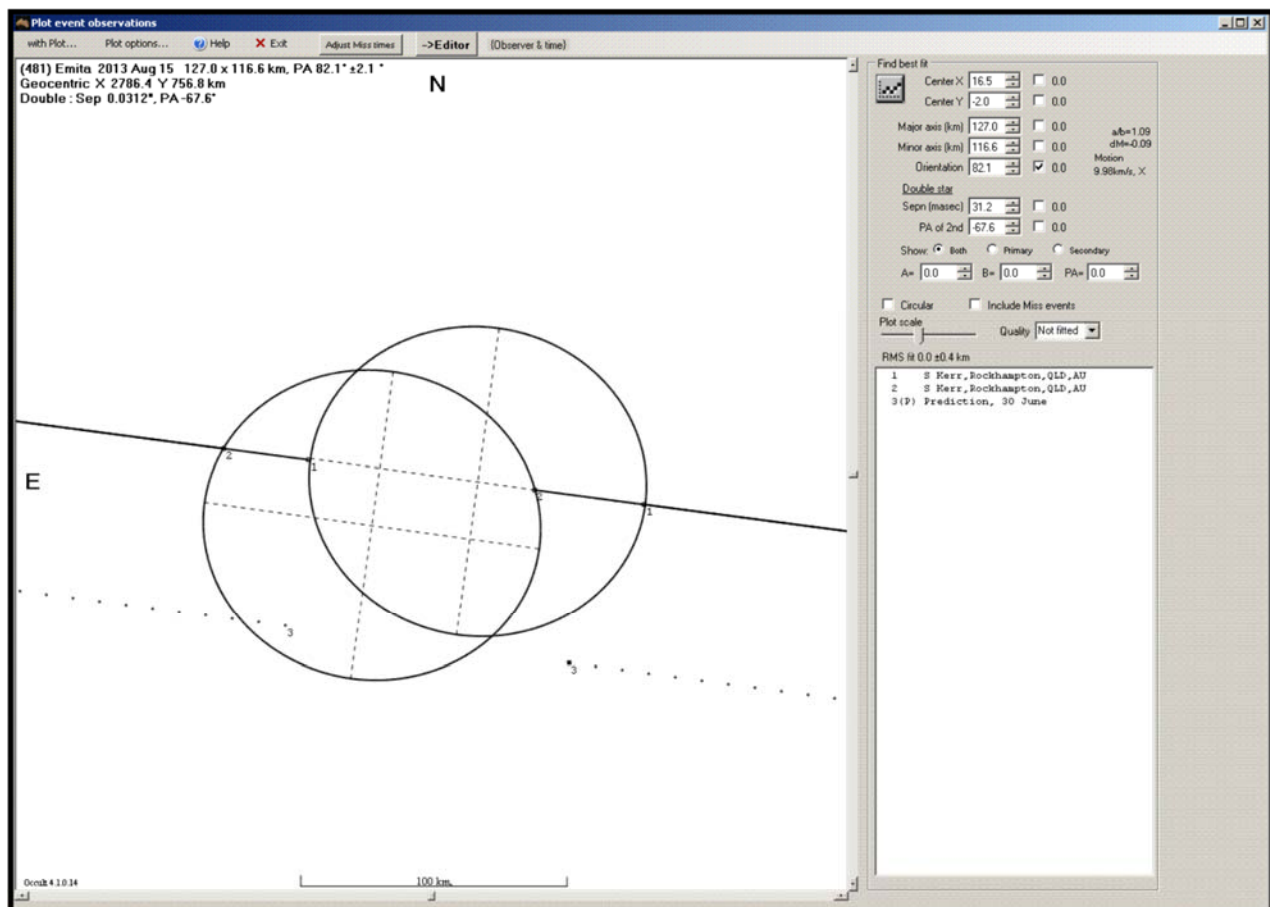


Figure 2. Plot of result and predicted times.

A New Double Star from an Asteroidal Occultation: TYC 7444-01434-1

(Continued from page 107)

shorter about 119 km.

For the rest of this analysis we have used an ellipse 129 km x 99 km (a/b=1.3) and examined the four possible solutions for PA and Separation. We have also used the plot with stars aligned as it is easier to see the vector of PA and Separation.

With only one observer we get 4 known points and are trying to fit 7 parameters (see Figure 2) Even when fixing the size and shape parameters, there are four possible solutions shown in Figure 3.

Examination of the star in Google Sky shows a hint of double diffraction spikes that sometimes indicate a double star. The star image is much larger than the

measured separation. The double star characteristics are:

Star	TYC 7444-01434-1 = UCAC2 17843758 = UCAC4 284-205625 = GSC O000673
Coord. (J2000)	RA 20h 03m 37.24s DEC -33° 15' 15.57"
Spectral type	(none found)
Mag A	11.02 ± 0.5 (V)
Mag B	11.54 ± 0.5 (V)
Separation	31 mas ± 10.0 mas
Position Angle	Ambiguous 290° ± 10° or 235° ± 10°
Epoch	2013.6210 (Besselian)

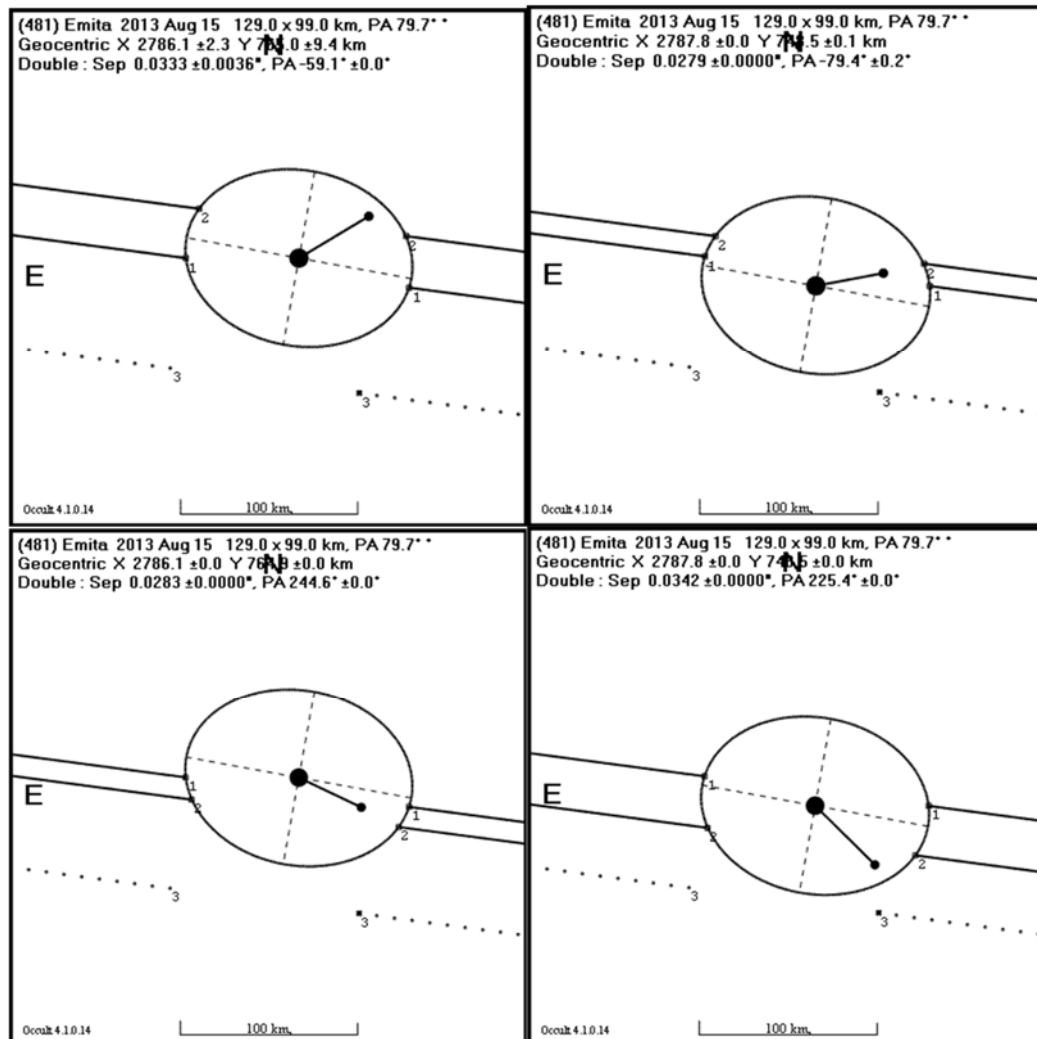


Figure 3. Offset centers for the two stars for the observation.

A New Double Star from an Asteroidal Occultation: TYC 7444-01434-1

References

1. Tangra Software by H. Pavlov [http://
www.hristopavlov.net/Tangra/Tangra.html](http://www.hristopavlov.net/Tangra/Tangra.html)
2. Occult 4 Software by D. Herald [http://www.lunar-
occultations.com/iota/occult4.htm](http://www.lunar-occultations.com/iota/occult4.htm)
3. Herald, D. "New double stars from asteroidal occultations, 1971 – 2008", JDSO, 6, 88-96.
4. Minor Planet Information Centre [http://
www.minorplanet.info/PHP/lcdbsummaryquery.php](http://www.minorplanet.info/PHP/lcdbsummaryquery.php)

