

Speckle Interferometry of WDS 11196+4930 and 16238+6142

Christopher Salisbury¹, Elijah Countryman¹, Caleb Morris¹, and Grady Boyce²

1. Army and Navy Academy, Carlsbad, CA
2. Boyce Research Initiatives and Educational Foundation, San Diego, CA

Abstract WDS 11193+4930 and 16238+6142 Aa (CHR 138) were selected from the WDS catalog and measured by speckle interferometry in 2014 with the 2.1m telescope at Kitt Peak National Observatory. For WDS 11193+4930, we were unable to confirm the secondary reported by Hipparcos. This was also the case for WDS 16238+6142 Aa, although we easily measured the AB component.

Introduction

In April 2014, a team of professional and amateur astronomers collaborated on an eight-night observational run at Kitt Peak National Observatory to obtain speckle interferometry observations of closely spaced double stars. The observing run has been described by Genet et al. (2014).

After the observing run, the authors, who included the students shown in Figure 1, selected pairs for reduction and analysis. The selection criteria were based on locating pairs with relatively few observations that lacked any published measurements within the last twenty-five years.



Figure 1: Army and Navy Academy cadets Capt. Elijah Countryman, Sgt. 1st Class Caleb Morris (rear), and Lt. Col. Christopher Salisbury, the Academy's Battalion Commander.

WDS 11196+4930

In the early 1990's, the Hipparcos astrometric space telescope discovered many new candidate binary stars containing separation values less than one arc second. Follow-up speckle interferometry observations from the ground can confirm these discoveries and help to establish the nature of these discoveries. WDS 11196+4930 has only one reported previous observation, the initial observation by Hipparcos with a position angle of 7.0° and a separation of $0.156''$.

PlateSolve 3.0 (Rowe and Genet 2015) was used to reduce the Kitt Peak observations of WDS 11196+4930, resulting in the autocorellogram shown in Figure 2. The pink target (similar in shape to a ship's wheel) displays the predicted position based on the single measurement in 1991, while the orange circle displays where PS3's automatic solution suggested the star might be located.

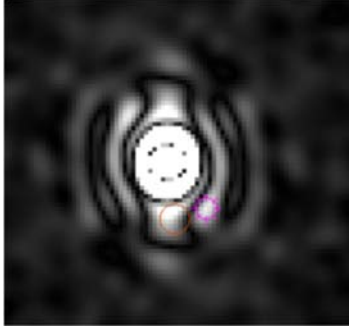


Figure2: WDS 11196+4930 PlateSolve 3 autocorrellogram.

In an attempt to locate a secondary star, the brightness and Gaussian filters within PS3 were adjusted. However, no secondary star was discernable. We concluded that, at the time of the Kitt Peak observations, a secondary star for WDS 11196+4930 was not perceptible with the 2.1-meter telescope with our instrumentation.

CHR 138

CHR 138 Aa (WDS 16238+6142) has many past measurements. The primary double star (AB) was discovered by Struve in 1835 (STF 2054) and has had one hundred and thirty-five measurements in the years since.

In 1986, the Center for High Angular Resolution Astronomy (CHARA) at Georgia State University (McAlister et al) first reported an additional component to the AB system, CHR 138 (WDS 16238+6142 Aa). A second observation with the Kitt Peak 4-m telescope was reported by McAlister and Hartkopf (1992). The two past observations are summarized in Table 1.

WDS 16238+6142Aa		
EPOCH	Position Angle	Separation
1986	174	0.20
1990	154	0.20

Table 1: The two past measurements of WDS 16238+6142Aa.

The autocorrellogram from the PS3 reduction, is shown in Figure 3. Despite adjustments in image brightness and the application of Gaussian filters in PS3, a secondary component in the vicinity of the orange "estimate" circle and within 0.2" of the primary star could not be found. We did, however, conclude that the lower secondary in the autocorrellogram was the AB component of WDS 16238+6142 (STF 2054) with results as shown in Table 2.

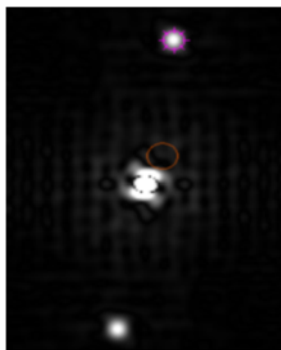


Figure 3: Autocorrellogram of WDS 16238+6142Aa.

WDS 16238+6142AB		
EPOCH	Position Angle	Separation
2013	350	1.00"
2014	350	0.93"

Table 2: WDS 2013 measurement of 16238+6142 AB with Kitt Peak 2014 data.

Acknowledgements

We thank Kitt Peak National Observatory for the use of their 2.1-m telescope and the members of the 2014 observing run. We utilized Dave Rowe's Plate Solve 3 program for speckle reduction. Data was extracted from the Washington Double Star Catalog maintained by the U.S. Naval Observatory. Brian Mason, at the U.S. Naval Observatory, provided past observational data. We thank external reviewers Russell Genet, Richard Harshaw, and Vera Wallen.

References

- Hartkopf, W.I., McAlister, H.A., & Franz, O.G. 1992. *Astronomical Journal*, 104..810H.
- McAlister, H.1985. High angular resolution measurements of stellar properties. *Annual Review of Astronomy and Astrophysics* 23, 59.
- McAlister, H.A., Hartkopf, W.I., Sowell, J.R., Dombrowski, E.G., & Franz, O.G. 1989. *Astronomical Journal*, 97..510M.
- Rowe, D. and Genet, R. 2015. Submitted to the *Journal of Double Star Observations*.