

Two Unresolved Double Stars: HDS 1615 and CHR 138 Aa,Ab

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Abstract HDS 1615 (WDS 11193+4930) and CHR 138 Aa,Ab (WDS 16238+6142) were selected from the Washington Double Star Catalog because they had only one and two past observations, respectively. Each double star was observed using speckle interferometry in April 2014 with a 2.1m telescope at Kitt Peak National Observatory. We were unable to confirm the secondary for either double star. The separation and position angle of STF 2054 AB, which is part of the CHR 138 Aa,Ab system, was measured and compared to past observations.

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 (Genet et al. 2014).

After the observing run, students at the Army and Navy Academy, 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 years.



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

Discussion of HDS 1615

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 their nature. HDS 1615 (WDS 11193+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 (PS3) was used to reduce the Kitt Peak observations of HDS 1615, resulting in the autocorrelation logram shown in Figure 2 (Rowe and Genet 2015). The pink target 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.

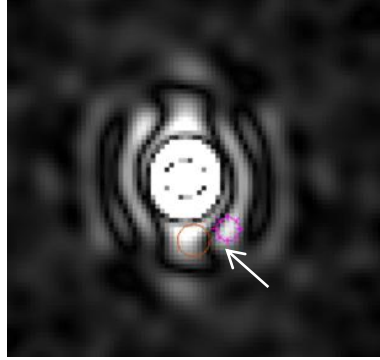


Figure 2: The autocorellogram of HDS 1615 created with PlateSolve 3.

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 of HDS 1615 was not perceptible with the 2.1-meter telescope using our instrumentation.

Discussion of CHR 138 Aa,Ab

CHR 138 Aa,Ab (WDS 16238+6142) has two past measurements. However, it is part of a well observed system STF 2054 AB. The system was discovered in 1835 and has had 135 measurements. In 1986, the Center for High Angular Resolution Astronomy (CHARA) at Georgia State University (McAlister et al. 1985) first reported an additional component to the AB system, CHR 138 Aa,Ab. 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.

CHR 138 Aa,Ab		
EPOCH	Position Angle	Separation
1986	174	0.20
1990	154	0.20

Table 1: The two past measurements of CHR 138 Aa,Ab.

The autocorrelogram 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 other star in the autocorrelogram was the secondary in STF 2054 AB. The separation and position angle are shown in Table 2 with a comparison to the most recent measurement.

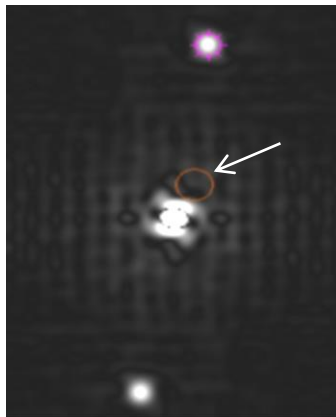


Figure 3: The autocorellogram of CHR 138 Aa,Ab and STF 2054 AB created with PlateSolve 3.

STF 2054 AB		
EPOCH	Position Angle	Separation
2013	350	1.00"
2014	350	0.93"

Table 2: A 2013 measurement of STF 2054 AB compared to the present study.

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