

Measurement of Two Long Neglected Southern Multiple Stars

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Abstract: This paper presents the results of a 2014 program of photographic measurements of two multiple star systems (one a double, one a triple) not studied since their initial measurement in 1900. The images were obtained using a Meade DSI CCD camera in conjunction with an equatorially mounted 150mm F8 refractor. Image processing was carried out using Losse's REDUC software. Both stars have seen significant movement since the first measures.

Introduction

These latest results are part of an ongoing program commenced in 2008 by the Double Star Section of the Astronomical Association of Queensland. The two target systems, HD 202 in Vela and HD 204AB in Pyxis, were selected from the Washington Double Star Catalog (WDSC) and were observed in Queensland from a latitude of approximately 27° S.

Method

An equatorially mounted 150mm f/8 refractor fitted with a 2x Barlow lens was used to obtain repeated images of the target pairs with a Meade DSI camera. The images were analyzed using the astrometric double star program REDUC (Losse, 2008). Approximately 10 stacked images of each target were taken per night for seven nights and the results averaged to obtain measures of separation and position angle with sufficient confidence.

Full details of the method are given in Napier-Munn and Jenkinson (2009). Some recent work on the errors inherent in the method is described in Napier-Munn and Jenkinson (2014). As proficiency has grown in the use of this equipment with the 150mm refractor,

close doubles with considerable magnitude difference between the components have been successfully measured.

Results

Results for HD 202 and HD 204AB are given in Tables 1 and 2, respectively. For both of the systems (HDO 204 consists of three components) the WDSC information is first reproduced, showing the epoch 2000 position, magnitudes, separation, PA, and the last recorded measurement. The new measurements are then given in tabular form, including the mean and standard deviation and 95% confidence limits. Any uncertainties between the images and the last recorded measurements are discussed. Finally a conclusion is given as to whether any movement of the component stars has occurred in PA or separation, based on the P-value for the t-test comparing the new mean values with the cataloged value ($P < 0.05$ is considered as evidence for a change). Figures 1 and 2 are images of each system.

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Table 1. Measures for HDO 202 in Vela

HDO202 Vela	RA. 08 33.0	DEC. -45 45
MAG. 6.46 & 10.9	PA. 225.0°	SEP. 15.0" (1900)

Date	No. images	PA°	Sep"
17 Jan 2014	10	221.62	26.841
18 Jan 2014	10	221.50	26.910
19 Jan 2014	10	221.77	27.004
04 Feb 2014	10	221.43	26.955
08 Feb 2014	10	221.60	26.975
09 Feb 2014	10	221.76	27.004
10 Feb 2014	10	221.60	26.977
Mean		221.611	26.952
Standard deviation		0.124	0.059
95% CI +/-		0.115	0.054
P(t) movement		0.000	0.000

Comments on HDO 202

Significant movement has occurred since the last measure. Possible third component fainter than "B" at approximately 270°. Further observation may be warranted.

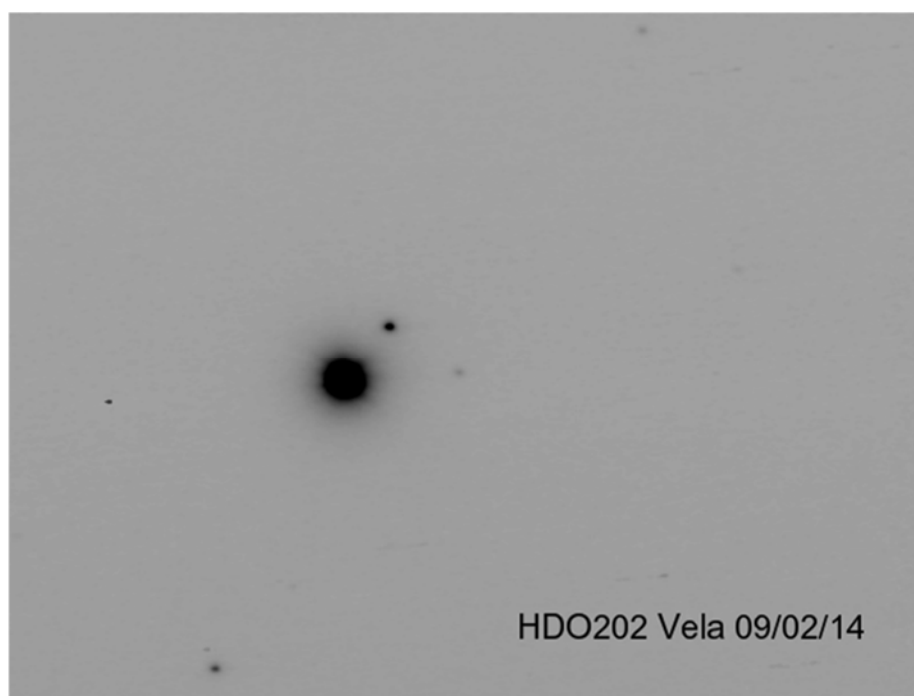


Figure 1. Image of HDO 202 taken by the authors.

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Table 2. Measures for HDO 204AB in Pyxis

Date	No. images	PA°	Sep"
17 Jan 2014*	10	323.21	15.528
01 Feb 2014	10	326.57	15.572
03 Feb 2014	10	325.97	15.431
04 Feb 2014	10	326.12	15.706
08 Feb 2014	10	326.34	15.995
09 Feb 2014	10	326.19	15.947
11 Feb 2014	10	326.23	15.879
Mean		326.236	15.755
Standard deviation		0.204	0.224
95% CI +/-		0.214	0.235
P(t) movement		0.000	0.000

Comments on HDO 204AB

* Undetermined anomaly with 17 Jan. position angle – results excluded from calculation of mean. The 114 year interval has seen significant change in position of the “B” component.

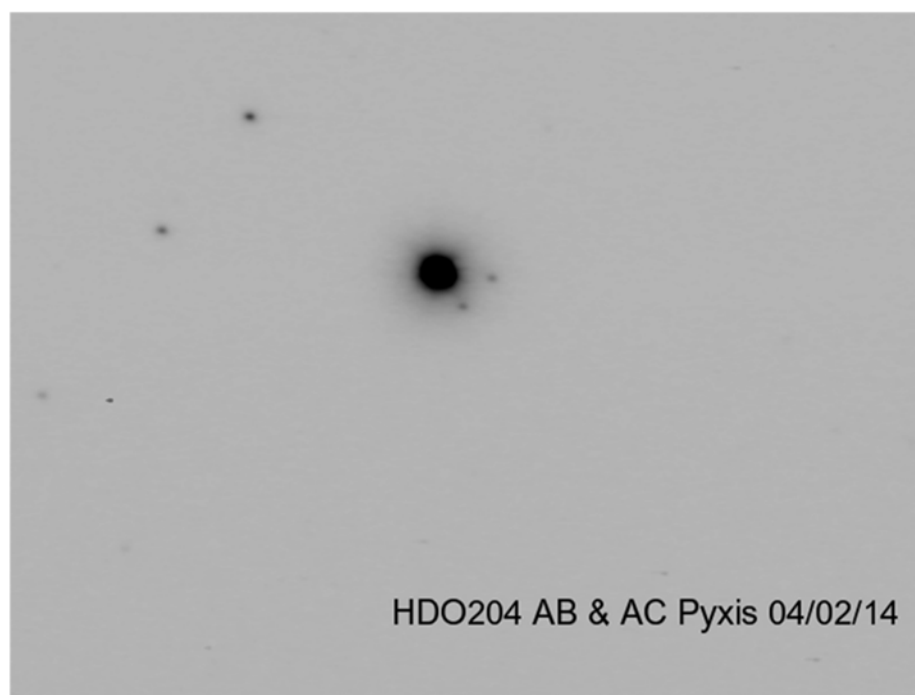


Figure 2. Image of HDO 204AB taken by the authors.

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