

Spectroscopic Binaries near the North Galactic Pole

Paper 9: HD 116378

R. F. Griffin *The Observatories, Madingley Road, Cambridge,
England CB3 0HA*

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Abstract. Photoelectric radial-velocity measurements show that HD 116378 is a spectroscopic binary with a period of 17.76 days. The visual companion star is not physically related to it.

Key words: radial velocities—spectroscopic binaries—stars, individual

HD 116378 is given in the Henry Draper Catalogue (Cannon & Pickering 1920) as a G5 star of visual magnitude 8.6. No MK classification or photoelectric magnitude has been found for it in the literature; but unpublished photometry in the Copenhagen system, obtained at Palomar Observatory and Kitt Peak National Observatory by G. A. Radford, L. Hansen and the author, indicates a *V* magnitude of 8.87 and shows the star to be a dwarf. The dwarf classification is supported by the size of the proper motion (Heckmann & Dieckvoss 1975), which amounts to a little more than 0.1 arcsec per annum and would correspond to an improbably high tangential velocity of about 200 km s^{-1} at the distance a giant star would need to have in order to appear the same magnitude as HD 116378.

There is a visual companion about 40 arcsec north-following HD 116378 and about 1.5 magnitudes fainter. The companion is separately listed in the AGK3 (Heckmann & Dieckvoss 1975) and shown to have a proper motion much smaller than that of HD 116378: the two stars are evidently unrelated to one another. The companion, like the primary, is attributed a spectral type of G5 in the AGK3; since it does not feature in the HD, the source of the classification is by no means apparent. An ugly possibility is that, since the companion is listed with the same BD number as the primary in the AGK3, the spectral type of the primary has simply been retrieved from the HD by some form of automated search procedure and ascribed to the companion too. It is, however, quite a plausible type, since the companion looks to be much the same colour as the primary and gives a radial-velocity trace of a similar character.

No radial velocity appears to have been published previously for HD 116378. In Table 1 are presented 32 photoelectrically determined velocities, all made with the original photoelectric spectrometer (Griffin 1967) at Cambridge except where

Table 1. Photoelectric radial-velocity measurements of HD 116378.

	Date	MJD	Velocity km s ⁻¹	Phase	(O - C) km s ⁻¹		
1972	Apr 5.06	41412.06	-28.9	0.227	+0.9		
1980	May 14.93	44373.93	-54.3	166.960	-0.4		
1981	Jan 17.25	44621.25	-56.6	180.883	+1.4		
	Mar 13.12	676.12	-53.4	183.972	-0.4		
	Apr 28.01	722.01	-40.0	186.555	+0.6		
	May 5.02	729.02	-54.9	.950	-0.1		
1982	Jan 10.24	44979.24	-47.2	201.035	-1.0		
		990.16	-47.9	.650	-0.2		
	Mar	4.13	45032.13	-48.7	204.013	+0.1	
		5.10	033.10	-42.0	.067	+0.5	
		6.03	034.03	-37.2	.120	-0.3	
		8.09	036.09	-29.2	.236	+0.3	
		13.06	041.06	-36.2	.515	+1.6	
		16.12	044.12	-50.7	.688	-0.2	
	Apr	15.02	074.02	-31.4	206.371	-1.2	
	May	4.03	093.03	-32.7	207.441	+0.6	
		7.03	096.03	-45.9	.610	-1.2	
		13.99	102.99	-49.3	208.002	+0.7	
		23.95	112.95	-40.8	.562	+0.3	
		25.97	114.97	-49.1	.676	+0.6	
		29.92	118.92	-58.8	.898	-1.2	
		June	29.93	149.93	-47.7	210.644	-0.4
		Nov	25.57*	298.57	-49.3	219.012	-0.4
		1983	Feb 3.51†	45368.51	-55.3	222.949	-0.4
				4.46†	369.46	-50.0	223.002
			23.08	388.08	-43.7	224.050	+0.8
	28.16		393.16	-28.8	.336	+0.5	
Mar	15.10		408.10	-33.4	225.177	-1.2	
Apr	16.01		440.01	-51.5	226.974	+1.3	
	24.03		448.03	-34.8	227.425	-2.3	
May	9.96		463.96	-28.1	228.322	+0.9	
	15.96		469.96	-48.4	.660	+0.1	

* Observed, in collaboration with Dr J. E. Gunn, with the 200-inch telescope (Griffin & Gunn 1974).

† Observed with the Dominion Astrophysical Observatory 48-inch telescope (Fletcher *et al.* 1982).

otherwise noted. The orbit computed from them is shown in Fig. 1 and has elements as follows:

$$\begin{aligned}
 P &= 17.7641 \pm 0.0019 \text{ days} & (T)_{201} &= \text{MJD } 44978.6 \pm 0.5 \\
 \gamma &= -42.7 \pm 0.2 \text{ km s}^{-1} & a_1 \sin i &= 3.57 \pm 0.07 \text{ Gm} \\
 K &= 14.7 \pm 0.3 \text{ km s}^{-1} & f(m) &= 0.0057 \pm 0.0004 M_{\odot} \\
 e &= 0.122 \pm 0.017 \\
 \omega &= 243 \pm 10 \text{ degrees} & \text{rms residual} &= 1.0 \text{ km s}^{-1}
 \end{aligned}$$

Four measurements, given in Table 2, have been made of the companion star. They do not strongly suggest that the velocity is other than constant; the best mean value, if the Palomar velocity is considered to be twice as accurate as the Cambridge measures at

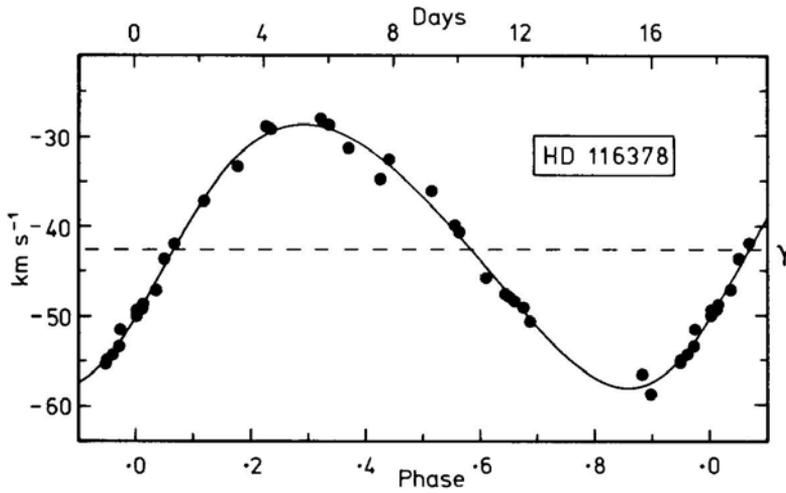


Figure 1. The computed radial-velocity curve of HD 116378, with the measured radial velocities plotted.

Table 2. Photoelectric radial-velocity measurements of AGK3 + 36° 1200.

Date	Velocity km s ⁻¹	Telescope inches
1980 May 14.93	+11.7:	36
1982 Mar 8.09	+8.7	36
May 25.97	+9.2	36
Nov 25.57	+11.3	200

this faint magnitude, is + 10.6 km s⁻¹. The large difference from the γ -velocity of HD 116378 confirms that the two stars are not physically related to one another.

References

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