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Is HLD 32 A (= WDS 18028-2705 A)
an unresolved binary candidate?

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Abstract: The double star HLD 32 = WDS18028-2705 was studied by the LIADA group in 2002 using BVJHK photometry, astrometric measures, and proper motions from the literature. According to this study, HLD 32 is a physical pair. Their members have very similar spectral distribution (F6V and F7V) but a flux ratio of about +0.85 magnitudes. One strong explanation is the possible binary nature of primary component.

HLD 32 is a system located at 18h 02m 45s and −27° 04' 42" in the constellation Sagittarius composed of components with magnitudes 8.37 and 9.2 and separated by 5.0". This system was first measured in 1881 by S.W. Burnham. It has been measured 15 times. Figure 1 is a DSS image of this system.

Relative motion was calculated using historical measures from the WDS in addition to LIADA's measures (Rica Romero, 2005a), correcting theta values for precession and proper motions. The results were $\Delta\mu(\alpha)$ = +3" yr⁻¹ and $\Delta\mu(\delta)$ = -2" yr⁻¹.

Spectral types and luminosity class were obtained using BVJHK optical-infrared photometry and proper motions from Tycho-2 and 2MASS catalogs (Rica Romero, 2005b). The spectral types were corrected by reddening using Schlegel et al. (1999) and F. Paresce (1984) galactic interstellar maps. The cosecant law was used to correct the galactic extinction for distance. HLD 32 is located at galactic longitude of 3.5° and galactic latitude of −2.3°, so it is in the galactic plane. A value of E(B-V) = 0.07 was obtained. Photometric distances were corrected by reddening. Astrophysical data for HLD 32 are given in Tables 1 and 2.

Several professional methods were used to conclude that HLD 32 is a binary system and so a physical pair (Rica Romero, 2005a). HLD 32 is composed by stars with F6V and F7V spectral types with Δ(V-Mv)= +0.63. The flux ratios were ΔV= +0.83, ΔJ= +0.89, ΔH=+0.80, and ΔK= +0.88, indicating that the spectral distribution is nearly the same for both components.

Since HLD 32 is a physical pair then both components must be located at the same distance, but the distance modulus differs by 0.63 magnitude. This dif-

ference could be caused by errors in observational data or in our study. But there is another, more interesting explanation. If the primary were composed of two components, then its distance modulus would be up to 0.75 magnitude smaller than that for the bounded secondary. So, is the primary component an unresolved pair? This is very probable, since last studies indicate that more than 50% of stars belong to multiple stellar systems.
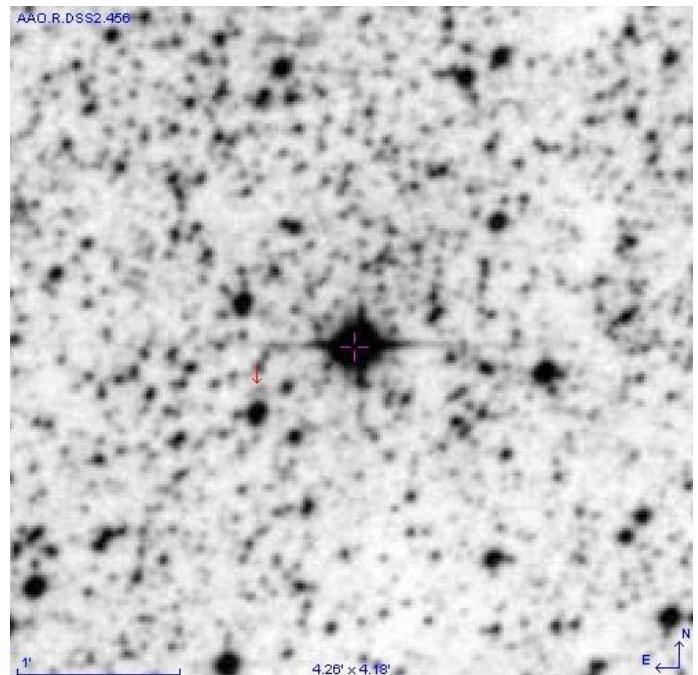

Figure 1: Photographic plate of HLD 32 from Digitized Sky Survey II taken in 1991.682. HLD 32 is located in a crowded region of the Milky Way in Sagittarius.

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Those interested in this study can request from me more detailed information about this investigation.

In order to confirm the possible binary nature of HLD 32 A, the help of amateurs and professionals is needed. Those interested in it, could try to split HLD 32 A using telescopes with big apertures. Speckle interferometery and the study of radial velocity could be the best way to confirm the nature of this star. So, if there is any professional interested in this project, please feel free to include this star in your observational program. I would like to know the positive or negative results obtained. You can contact me at frica0@terra.es.

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	Primary	Secondary
V	8.37 a)	9.2 d)
B-V a)	0.55	
K b)	6.91	7.79
J-H b)	0.26	0.35
H-K b)	0.06	-0.02
Mv c)	+3.6	+3.8
V-Mv c)	4.56	5.19
$(\mu(\alpha),\mu(\delta))^a$	(-0.060 , +0.010) ″/yr	
Sp c)	F6V f)	F7V

Table 1. WDS 18028-2705 = HLD 32 AB. Astrophysical data

Note: a) Tycho-2 catalogue; b) 2MASS catalogue; c) This work; spectral type and distance modulus are corrected by reddening; d) Inferred by WDS historical photometry; f) In literature A is F7V

RA:	18h 02m 45s0
DEC:	-27° 04 42"
(l , b) galatic coordinate:	(+3.5° , -2.3°)
(θ / ρ, epoch):	101.2° / 5.05", 1998.212
($\Delta\mu(\alpha)$, $\Delta\mu(\delta)$) :	(+0.003 , -0.002) "/yr
Δ(V-Mv):	+0.63
E(B-V):	+0.07
Distance:	95 pc

Table 2: Data for binary WDS 18028-2705 = HLD 32 AB