

# Study of STF 1396 AC

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## Abstract

On the last issue of “Bollettino delle Stelle Doppie” (n. 21, pag. 22) I wrote about STF 1396 AC who got a single measure by Schiaparelli in the last century, and a WDS note indicating a suspected error. In this article I’ll try to study the system in deeper detail.

STF 1396 AC isn’t a double simple to measure: how can be seen in figure 1, the C star is completely hidden in the light of the primary resulting very difficult to identify it.

In the screenshot, built using the Aladin software (1), are displayed different images from some sky surveys. The arrows indicates where come components should be, B in the lower end, C in the upper corner. A is in the center.

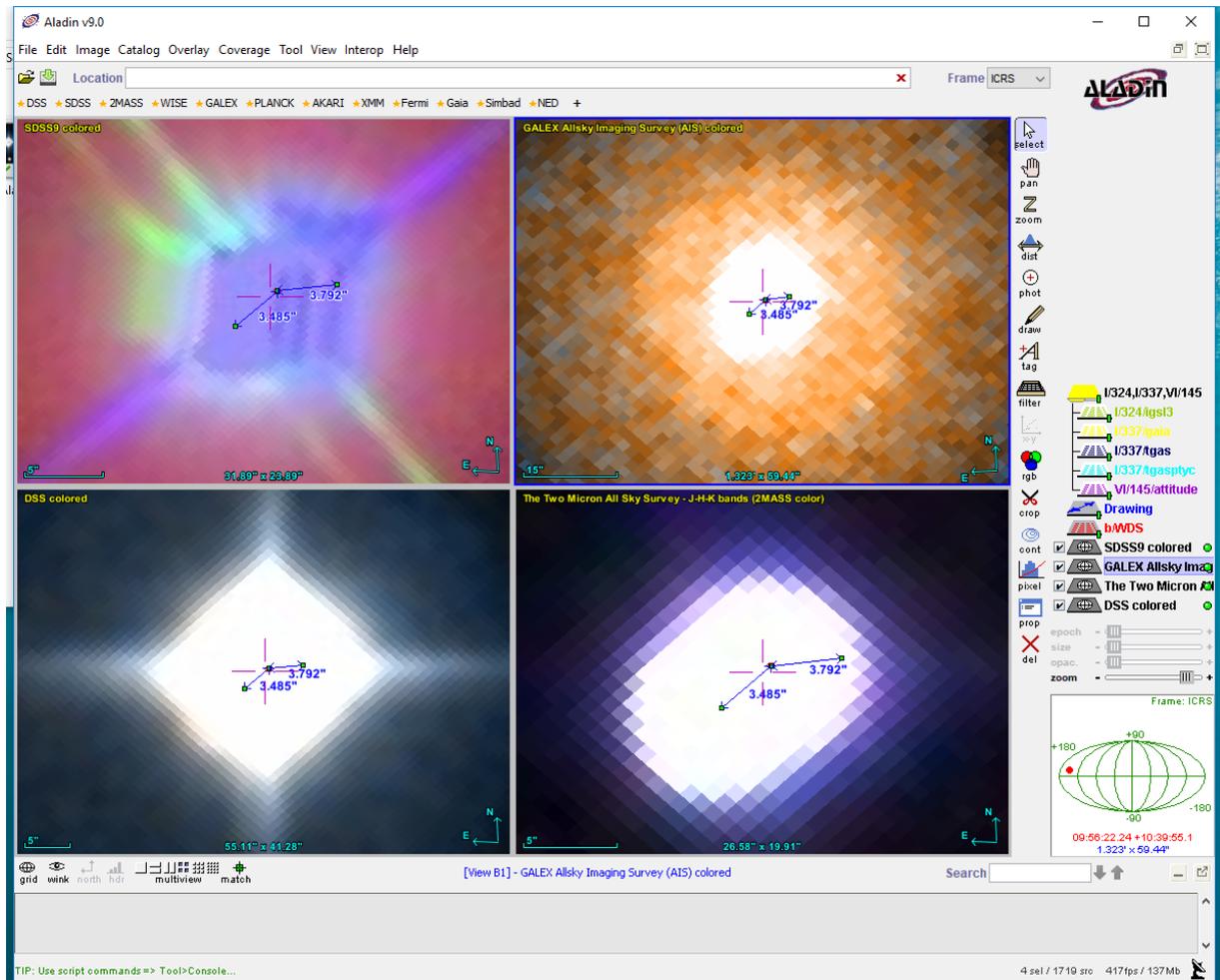


Fig 1. Aladin image

At this point it is useful to remember the WDS notes:

In the note, written in italian, we can read these words:

discov_num	notes	refcode
STF1396	AC. Schiaparelli's value for rho is apparently a typographical error, as it is identical (3".778) to his AB measure. His C component may be a 13th magnitude star located 90 deg, 58" from AB, although the magnitude difference would appear to make the necessary quadrant flip unlikely.	Sp_1909

C = poco si vede (barely visible)

$\delta$  = AB pres'a poco (pressappoco = about, more or less)

and he reported the position angle measure only. It is now clear that Schiaparelli didn't measured the separation but he estimated it, limiting his study to indicate the same distance from AB, more or less (pres'a poco). Are these the years were the famous italian astronomer suffer of sight problems and the difficulty of perceiving component C should have convinced him to abandon the measure.

Laster, in Milan, in Brera publication volume #46 of 1909 (figure 3) are written in besselian epoch 1895.275 these data:

**AB** PA = 131.90 Sep. = 3.778

**AC** PA = 275.55 Sep. = 3.778

These are the same measures in the WDS, showed in figure 3 and searchable online at the URL:  
<http://stelledoppie.goaction.it/index2.php?menu=22&iddoppia=45420>

I was able to recover the original Schiaparelli's annotation. Let's read them in figure 2.

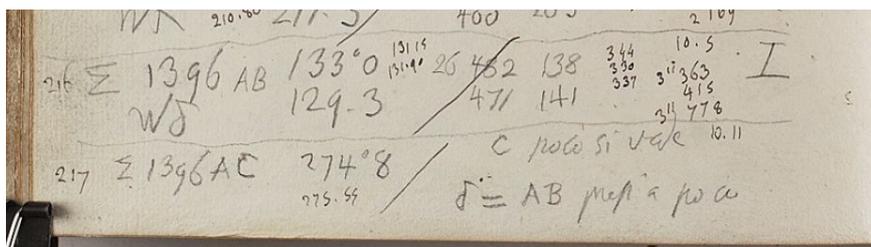


Fig 2. Schiaparelli's original annotations taken at the eyepiece

WDS 09564+1040 STF1396AC

stelledoppie.goaction.it/index2.php?iddoppia=45420

Stelle Doppie

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## 09564+1040 STF1396AC

09<sup>h</sup> 56<sup>m</sup> 22.21<sup>s</sup> +10° 39' 55.5" P.A. 276 SEP 3.8 MAG 8.79,11.1 SP A0 DIST. 595.24 PC (1941.67 L.Y.)

Coord 2000	09564+1040	Discov num	STF1396	Comp	AC	Coord arcsec 2000	09 56 22.21 +10 39 55.5
Date first	1895	Date last	1895	Obs	1		
Pa first	276	Pa last	276	P.A. Now (θ)	276°		
Sep first	3.8	Sep last	3.8	Sep. Now (ρ)	3.8"		
Mag pri	8.79	Mag sec	11.1	delta mag (ΔM)	2.31	Spectral class	A0 (white)
Pri motion ra	-004	Sec motion ra					
Pri motion dec	-007	Sec motion dec					

Notes N X (See Notes, Dubious double)

### 09564+1040 SYSTEM COMPONENTS

SHOW NAME	SAO	COORD_2000	DISCOV#	COMP	FIRST	LAST	OBS	PA	SEP	MAG1	MAG2	D_MAG	ORB	CURRENT
Show	98852	09564+1040	STF1396	AB	1829	2009	26	130	4.0	8.79	10.42	1.63		
Show	98852	09564+1040	STF1396	AC	1895	1895	1	276	3.8	8.79	11.10	2.31		<===

Triple system  
3 visible stars in this system

### OTHER CATALOGS AND DESIGNATIONS

Constellation	Leo	SAO	98852	HIP	48731	Tycho2	0832-00875-1
HD	86059	BD	BD+11 2128	Distance	595.24	Distance ly	1941.67
last precise pa	275.6	last precise sep	3.78				

Fig 3. WDS data of STF 1396 AC (from Stelle Doppie website)

Now, if we look deeper in the SDSS image of this area and we superimpose recent data from the GAIA mission, we obtain something close to figure 4.

Things are becoming more complicated. We can notice that what is supposed to be the C component moved from north-east to south-west and component B is now slightly off. In the figure, table on the bottom reflects GAIA sequence A,B,C + WDS.

Using RhoThetaRAA (2) software developed by amateur astronomer Alejandro Garro, I calculated separations and position angles and I was able to compare the Aladin measurement using the “dist” tool, coupled with WDS data taken by Stelle Doppie (3) web site (table 1).

Coppia		WDS	Calcolato	Misurato
AB	$\rho$	3,95	3,95	3,93
	$\theta$	129,5	130,2	130,1
AC	$\rho$	3,78	1,546	1,535
	$\theta$	275,6	162,3	162,2

Table 1. Separation and position angle

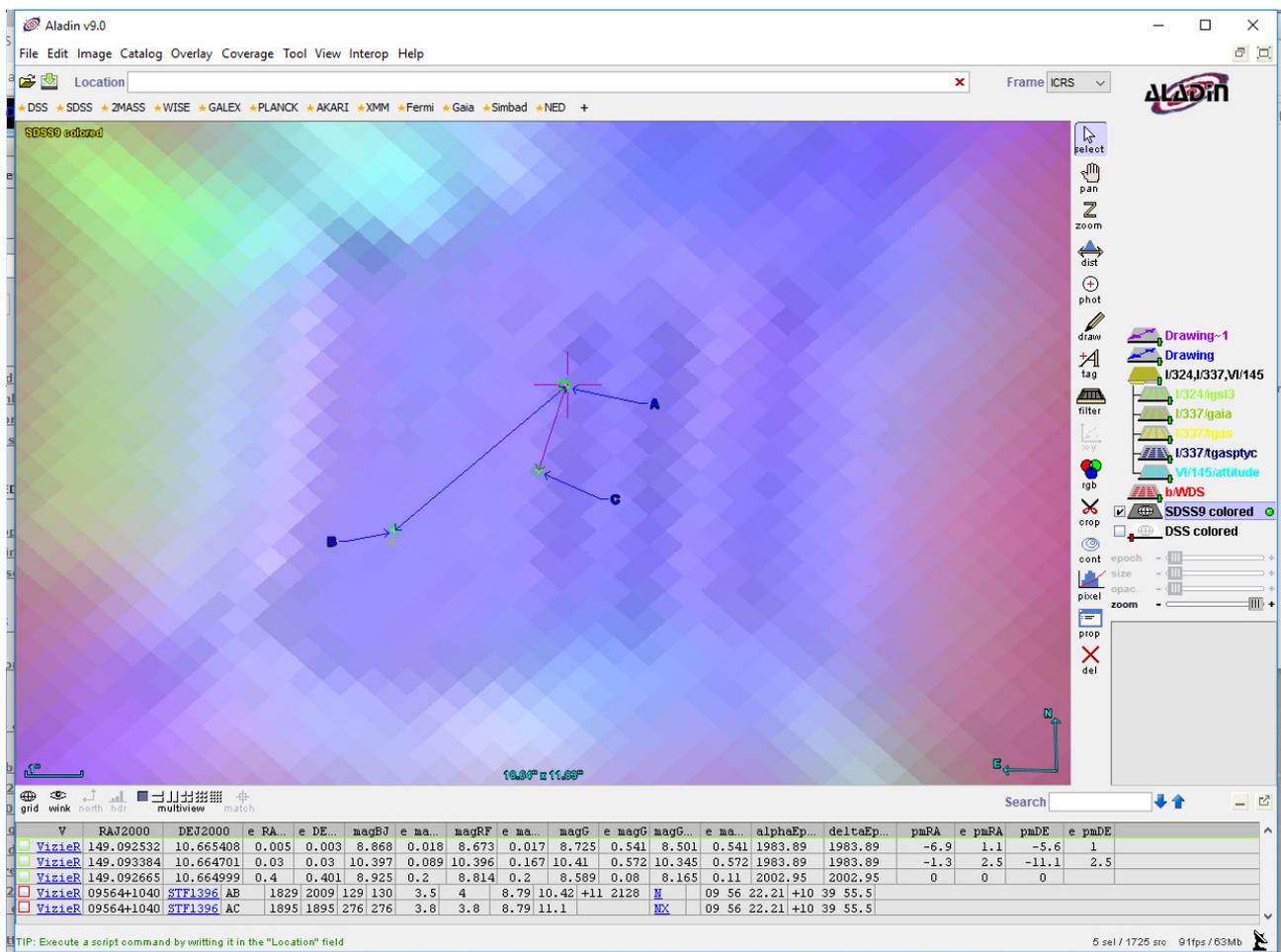


Fig 4. Aladin loaded with GAIA data

The AB couple was measured quite recently (2009) with a good number of measures (26): separation and position angle measured by me and calculated using GAIA data are in good accordance with the latest published measures.

What is surprising are magnitudes:

Gaia	WDS
A = 8,868	8,79
B = 10,397	10,42
C = 8,925	11,10

There's a markable difference in C even if considering the WDS is using V band and GAIA some other bands like BJ: a difference not easily explicable with data at my disposal. It could be a catalog error and actually C being visually faint, or B could be the fainter in the system and Schiaparelli make a mistake confusing B with C.

In conclusion, in my opinion the WDS notes should be changed reporting that C separation was not measured but estimated only by Schiaparelli. Again, C is not an error at all and it is not lost, but simply a star very difficult to see that changed his position over time. Thank to GAIA sensors we were able to detect it once again.

A visual observation is required to finally solve this enigma, and amateur astronomer's measures with telescopes able to resolve the double coupled with high dynamic range sensors.

## Acknowledgements

Thank you to Raffaello Braga for providing me the scans of the original annotation and publication. Credits to my good friend Giampiero Locatelli for peer reviewing this article.

This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

## References

- (1) Aladin : <http://aladin.u-strasbg.fr/>
- (2) RhoTethaRAA : Alejandro Garro (private communication)
- (3) Stelle Doppie : <http://stelledoppie.goaction.it/>

Gianluca Sordiglioni lives in Milan, Italy. He is Fundraiser in Chief at the Grigioni Foundation for Parkinson's disease, a scientific research institution. He teaches data analysis and databases at the Master in Fundraising, University of Bologna, at Forlì campus. Author of Stelle Doppie web site, he observes and measures doubles from his backyard.