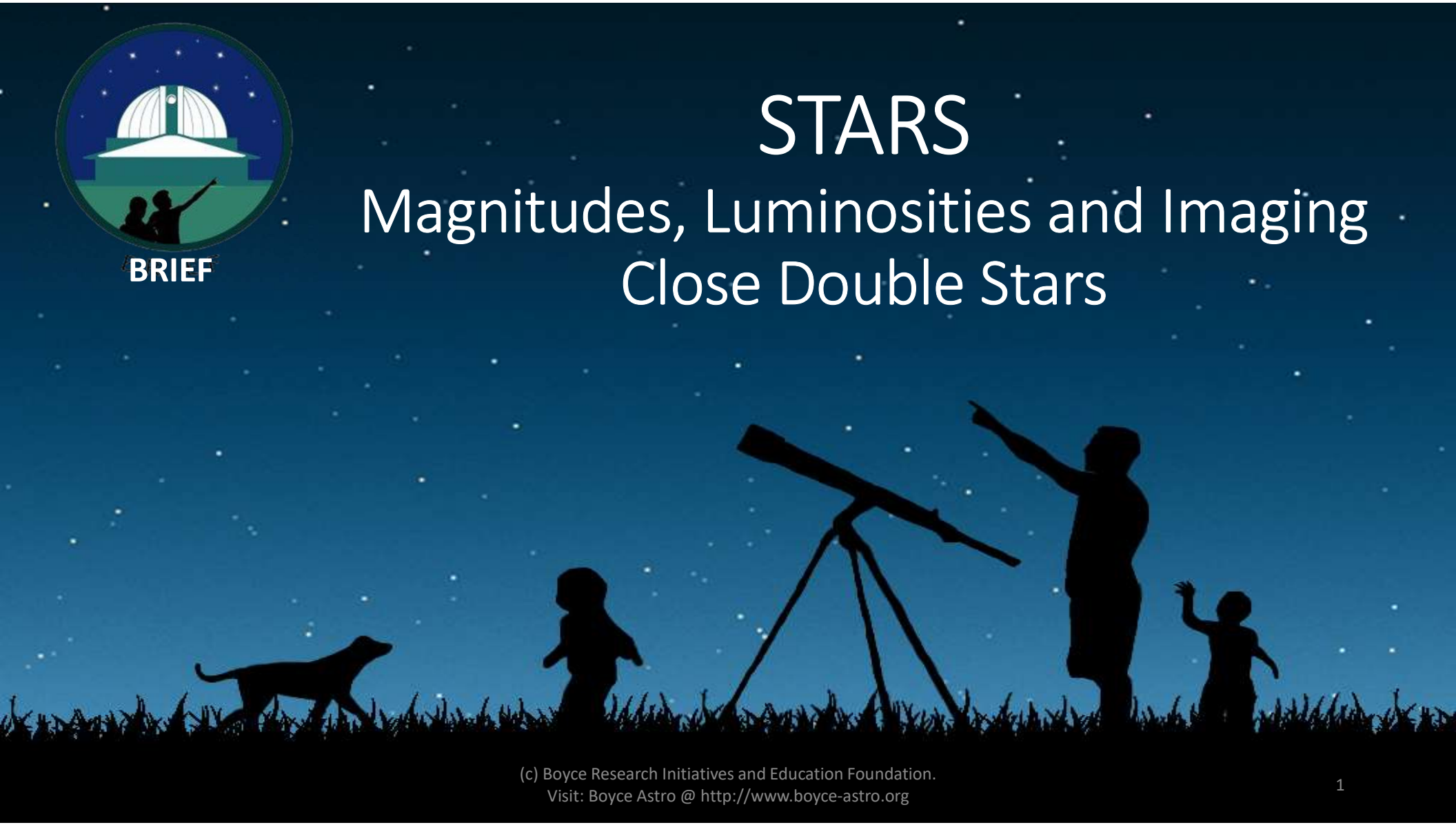
BRIEF

STARS

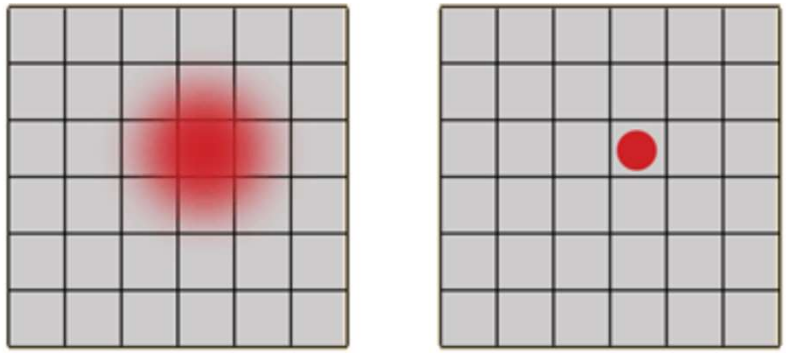
Magnitudes, Luminosities and Imaging Close Double Stars



Overview

There are times when it is hard to image two closely spaced Double Stars.

When this occurs, this presentation provides one method to try and use Filters combined with stellar type to create separation between the stars through the manipulation of their light distribution.



05247+3723 SYSTEM COMPONENTS

SHOW	NAME	SAO	COORD_2000	DISCOV#	COMP	FIRST	LAST	OBS	PA	SEP	MAG1	MAG2	D_MAG	ORB	CURRENT
Show	Sig Aur	57981	05247+3723	BU 888	AB	1880	1922	7	167	8.7	5.16	12.00	6.84		<===
Show		57981	05247+3723	BU 888	AC	1898	2014	6	336	26.8	5.16	13.40	8.24		
Show		57981	05247+3723	BU 888	CD	1898	2002	3	347	7.1	13.40	15.20	1.80		

Quadruple system
4 visible stars in this system

Points of Interest:

- The magnitude of the A star (MAG1 in line 1) is 5.16
- The magnitude of the B star (MAG2 in line 1) is 12.00
- Estimated differential magnitude of 6.84
- Given the last observed separation in 1922 of 8.7 arcseconds, this combination poses a significant threat to being able to image this system.
- Close separations with high differentials in brightness, make imaging stars, such as these, difficult.

The case of WDS 05247+3723 provides an excellent teaching opportunity. Given the following summary from Stelle Doppie, we then click on the link “GO TO SIMBAD”

The initial page on SIMBAD provides a list of nearby stars with reported magnitudes and spectral types. It is IMPORTANT to note that these magnitudes and spectral types are displayed as reported in published academic/scientific papers. The references are outlined and available on Simbad if you desire more information.

N	Identifier	dist(asec)	Otype	ICRS (J2000) RA	ICRS (J2000) DEC	Mag U	Mag B	Mag V	Mag R	Mag I	Sp type	#ref 1850 - 2017	#notes
1	* sig Aur	0.06	*	05 24 39.14261	+37 23 07.2494		6.479	5.007			K3III_CN+2	53	0
2	TYC 2415-707-1	378.65	*	05 24 58.915	+37 18 10.95		11.72	11.52			~	0	0

The A star of this system is reported in line #1. There are three important lines for this star: Sp Type, Mag V, and Mag B.

- Sp Type: reported as K3III (we'll break this down in a second)
- Mag V 5.007 (NOTE: V band is similar to G or Green)
- Mag B 6.479
- Keep in mind how the magnitude is decreasing as we move towards the Blue side of the spectrum.

Let's break this down……

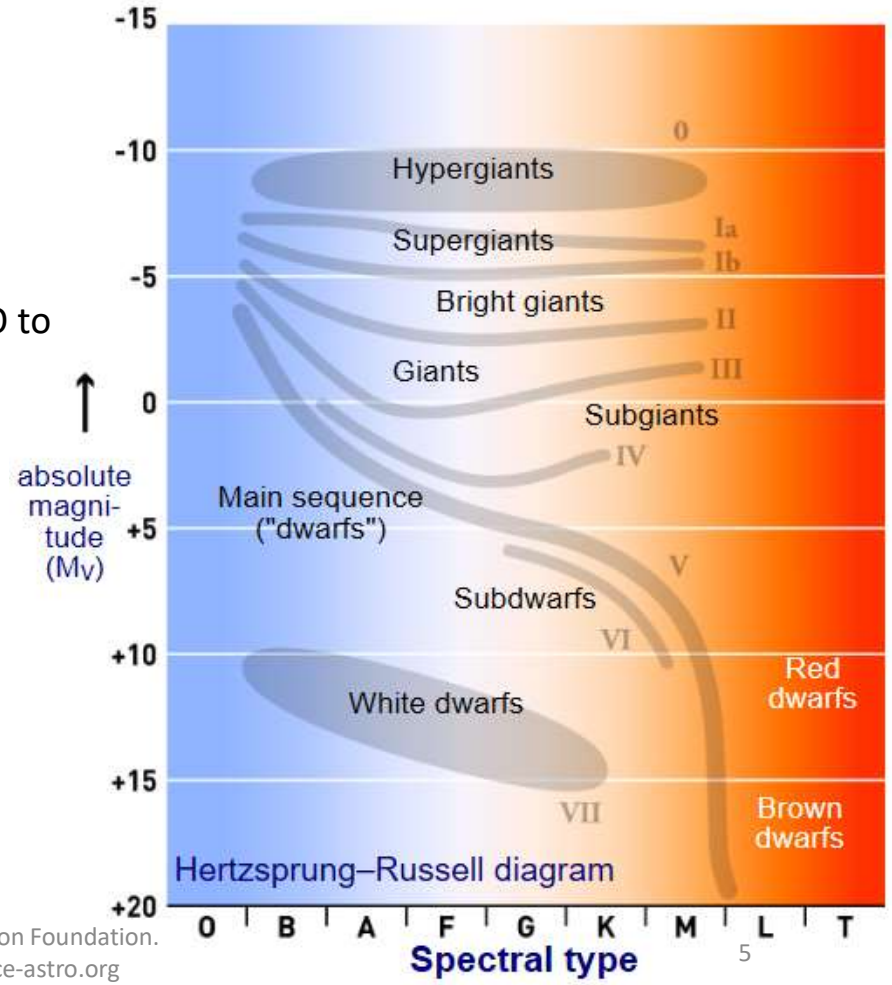
The A star is a Spectral Class K3III.

This HR Diagram has the colors superimposed on the graph.
Remember: Blue is Hot….Red is Cool.

Look at the bottom where it says: Spectral Type. The letters from O to T are from Hot to Cool.

Our star is a K star. Therefore, it is redder in color

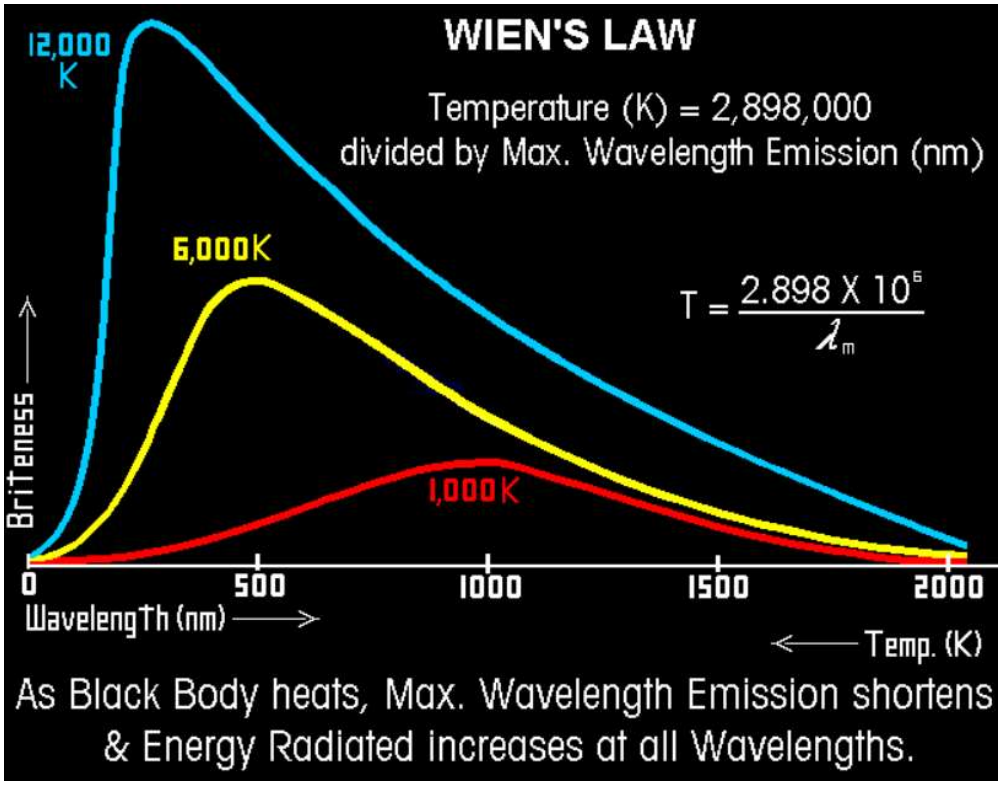
Sp type
K3III_CN+2



In the graph to the right, we see something called Wien's law. Basically, what this says is that the hotter an object is, the more light it puts off in the Blue….little less in Yellow….little in Red.

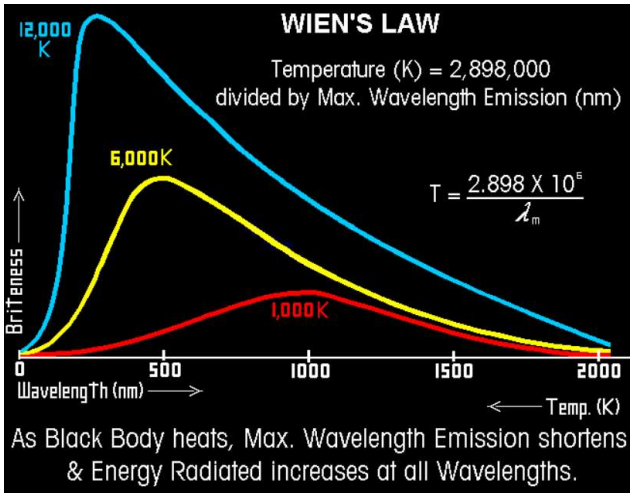
The hotter an object
- The bluer
- The less Red light is emanated

The cooler an object:
- The redder
- The less blue light is emanated.



With this understanding, and now knowing the star is a K3III star, use Wien's Law diagram below coupled with the HR diagram to understand the images to the right.

A K-class star will emanate more in the red than the blue. Image #1 was taken with a Red filter and Image #2 with a blue. As a result of the star emanating less light in the blue, we have a smaller radius for A which allows star B, at 8 arcseconds from the A, to be seen.



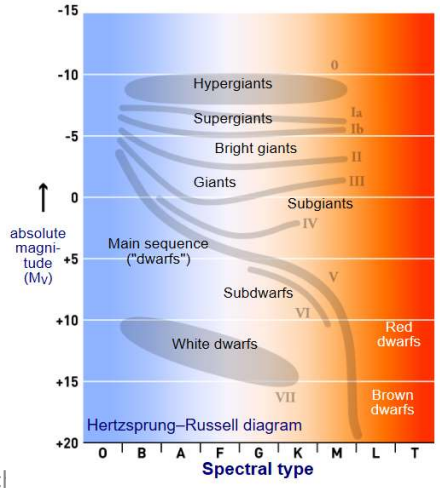


Image 1
Red Filter 120s
Star Radius 6.5"

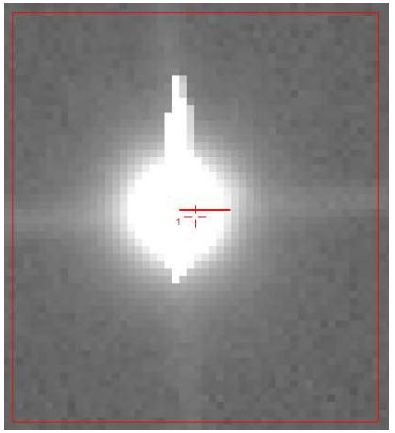
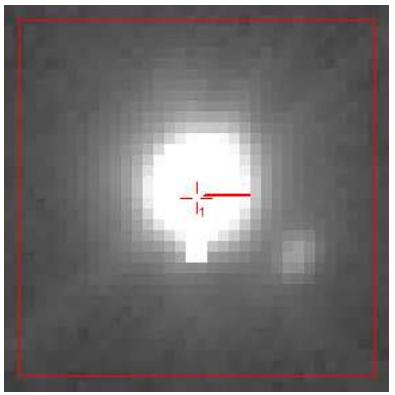
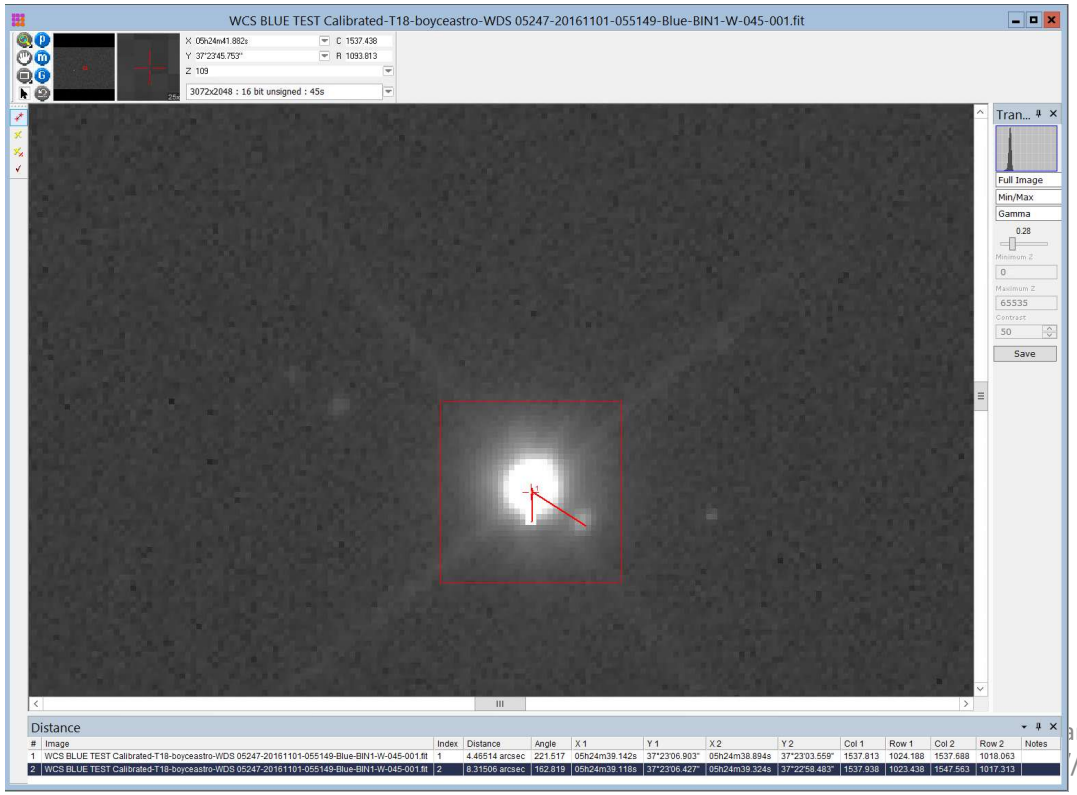


Image 2
Blue Filter 60s
Star Radius 3.5"

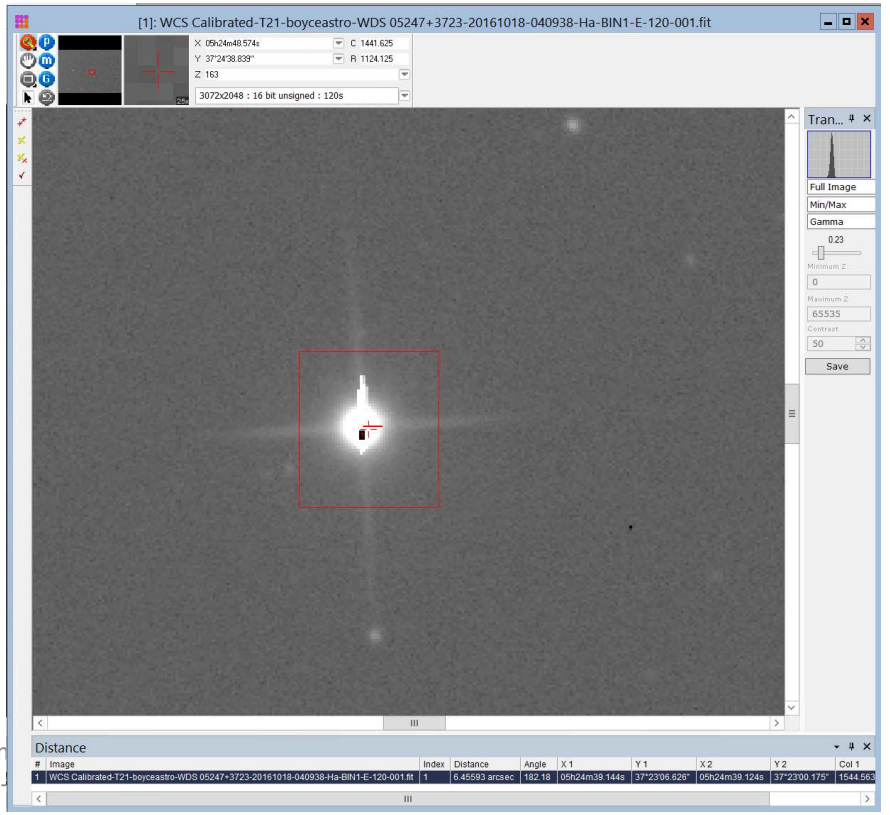


Here is a final comparison:

Successful Blue Filter



Unsuccessful Red/Ha Filter



Questions?