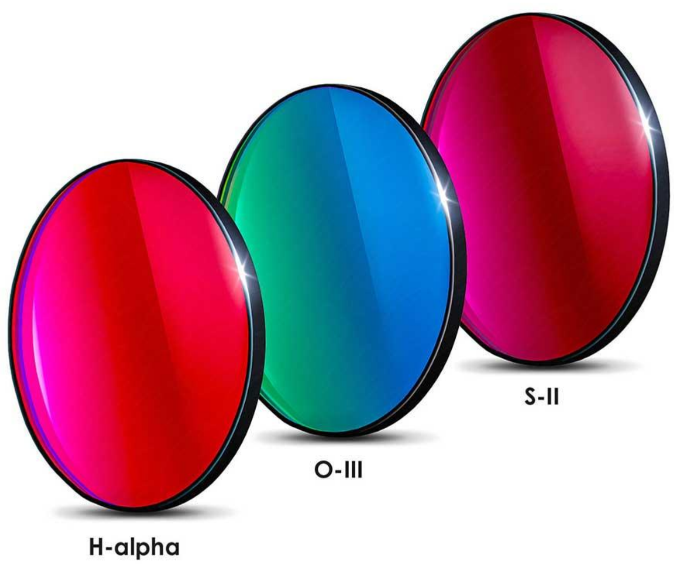
# BAADER ULTRA NARROWBAND FILTERS
## UNDER THE SKY

CMOS OPTIMIZED WITH LIFE-COAT™ with frontside REFLEX-BLOCKER™



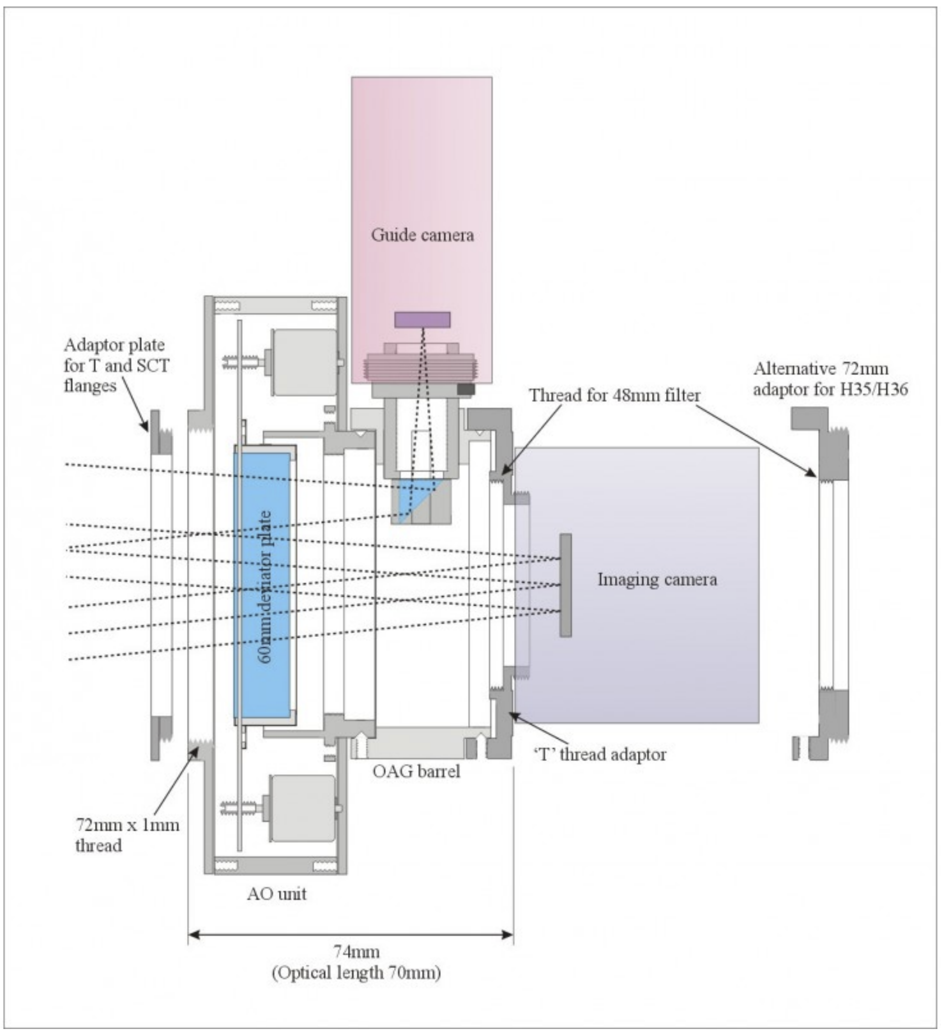

NB 36 mm

## Introduction

My name is Francesco di Biase and I have spent part of my free time doing astronomical photography since 2010. I currently own a small observatory with a sliding roof under a suburban sky (19.40 SQM). Inside it I have two stations dedicated to DeepSky imaging, one of which is equipped with a 10Micron GM2000HPS2 mount and a 12" GSO RC Telescope that I use at full focal length with a KAI 4022 CCD sensor. On this equipment I was given the opportunity to try the new Baader Ultra Narrowband filters 36mm unmounted version.

## Background

Due to the sampling in combination with the F / 8 focal ratio, I need to shoot narrowband lights with 1800 seconds for each sub exposure. In order to get the best possible result I use a StarlightXpress Active Optics (AOLF) guiding system. Neglecting details on the specific technology, the presence of the glass deflector element in the light path, positioned before the filter, remains relevant, as shown in the following image.



## Technical description setup

- GSO Ritchey-Chrétien 12” F/8 2435mm
- Mount 10Micron GM2000 HPS2 Ultraportable
- CCD camera Moravian G2-4000 (KAI-4022) 2056×2062 px 7.4 micron 15.2×15.2 mm
- StarlightXpress AO-LF Active Optics with ASI174MM mini guide camera
- Sampling about 0.62”/pixel in Binning 1x1

## Target choice

The subject selection and its framing was motivated by the possible criticality of the shot due to the presence of a bright star. Considering the calendar, it was easy to choose the western part of the Veil Nebula, in the constellation of Cygnus, placing the star 52 Cyg in the center of the field (Mag 4.22). The catalog number corresponds to the area of the nebula **NGC 6960.**

Astrometric data:

RA center: 20h45m39s.8

DEC center: +30°43′12″

Pixel scale: 0.619 arcsec/pixel

Orientation: 179.746 degrees

Field radius: 0.249 degrees

## Information shooting

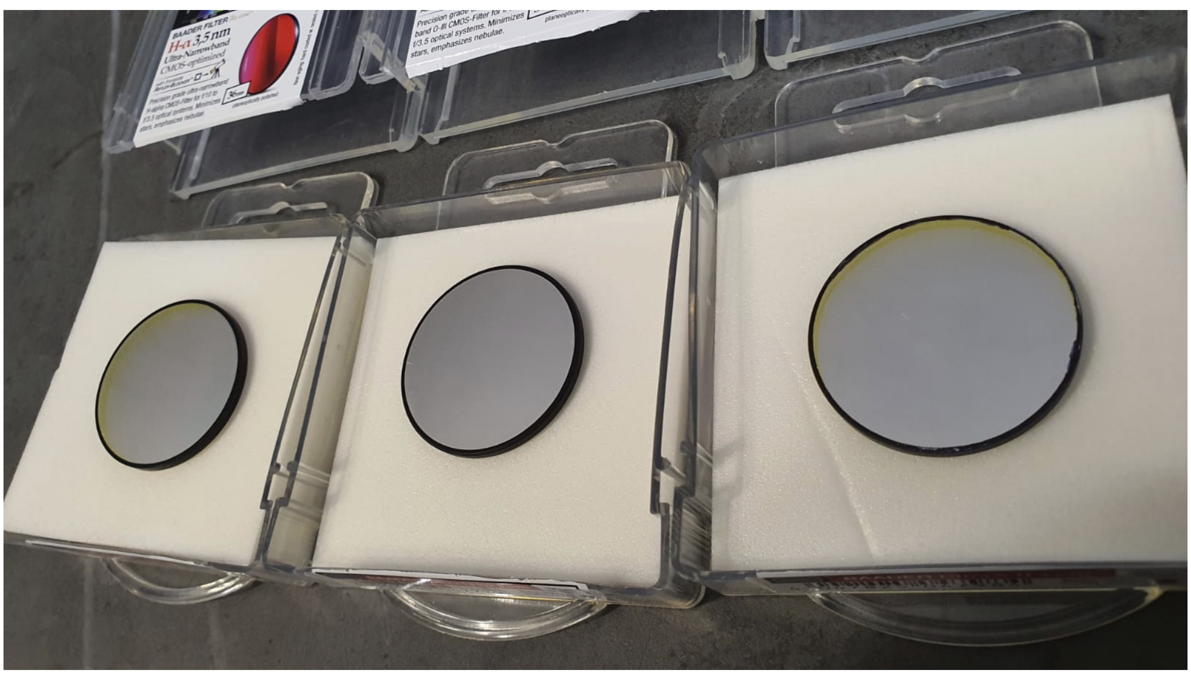
The shooting for the test were carried out from 23 August to 27 October, in similar conditions of transparency, seeing and light pollution, for a total of 13 nights:

- 23 and 30 August
- 2-13-14-23-24-25- 26-28-29-30 September
- 27 October

# First impressions

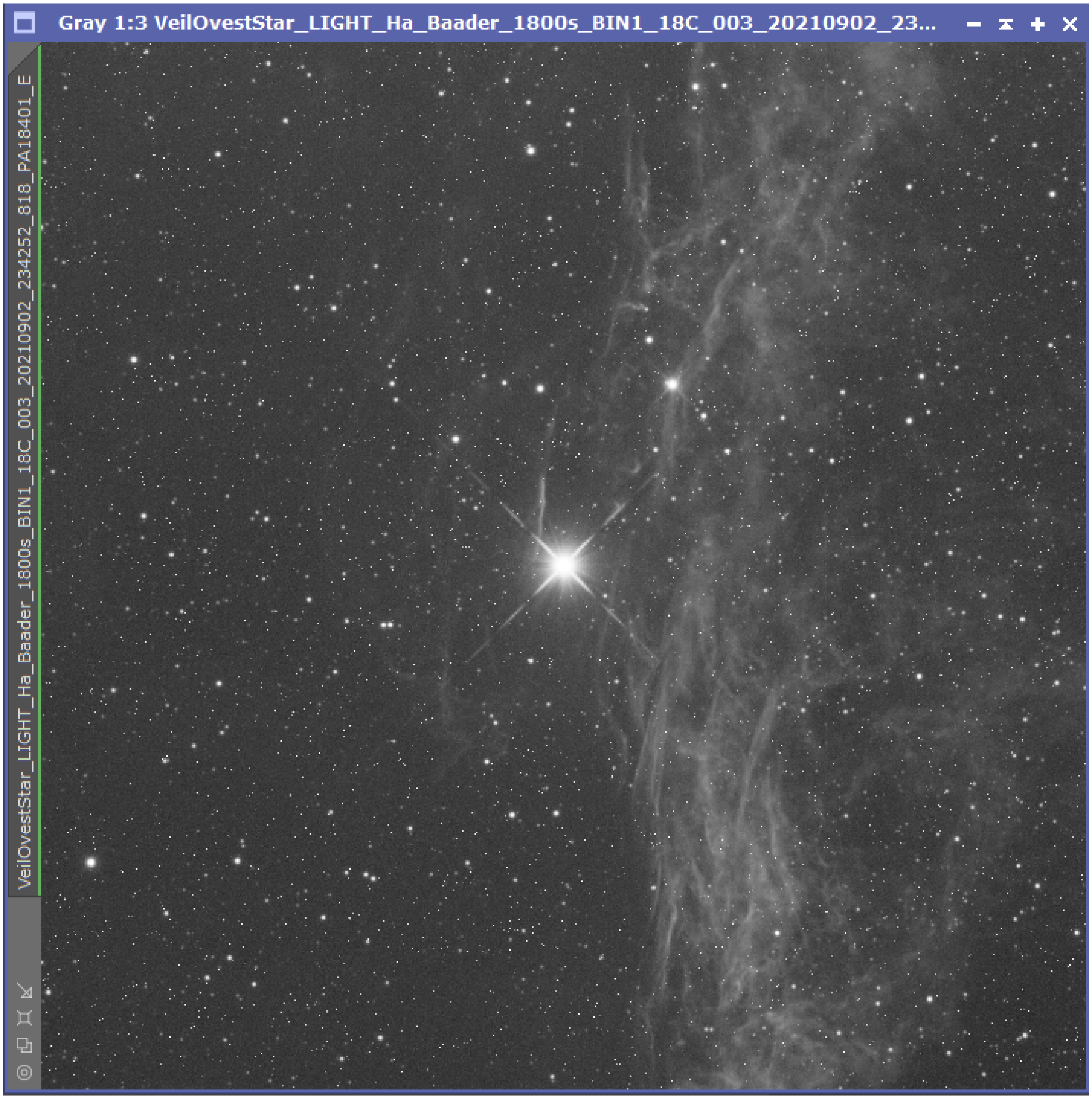
The filters arrived in the classic Baader case, with sturdy and very practical stackable drawers. My version, 36mm unmounted, has a perimeter edge free of chips thanks to the manufacturing carried out individually on the filters already cut and not on larger glasses cutted after the treatments, as happens in some cases with other brands. The edge is painted black, with a slight front overlap in the part that goes towards the telescope, useful both as direction indication and to avoid artifacts.


The Ha and OIII filters here have a more even edge than the SII filter. The external front edge of the SII filter has some smudges, as shown in the following image. This imperfection was detected also on the other SII filter which was sent to me later for comparison.



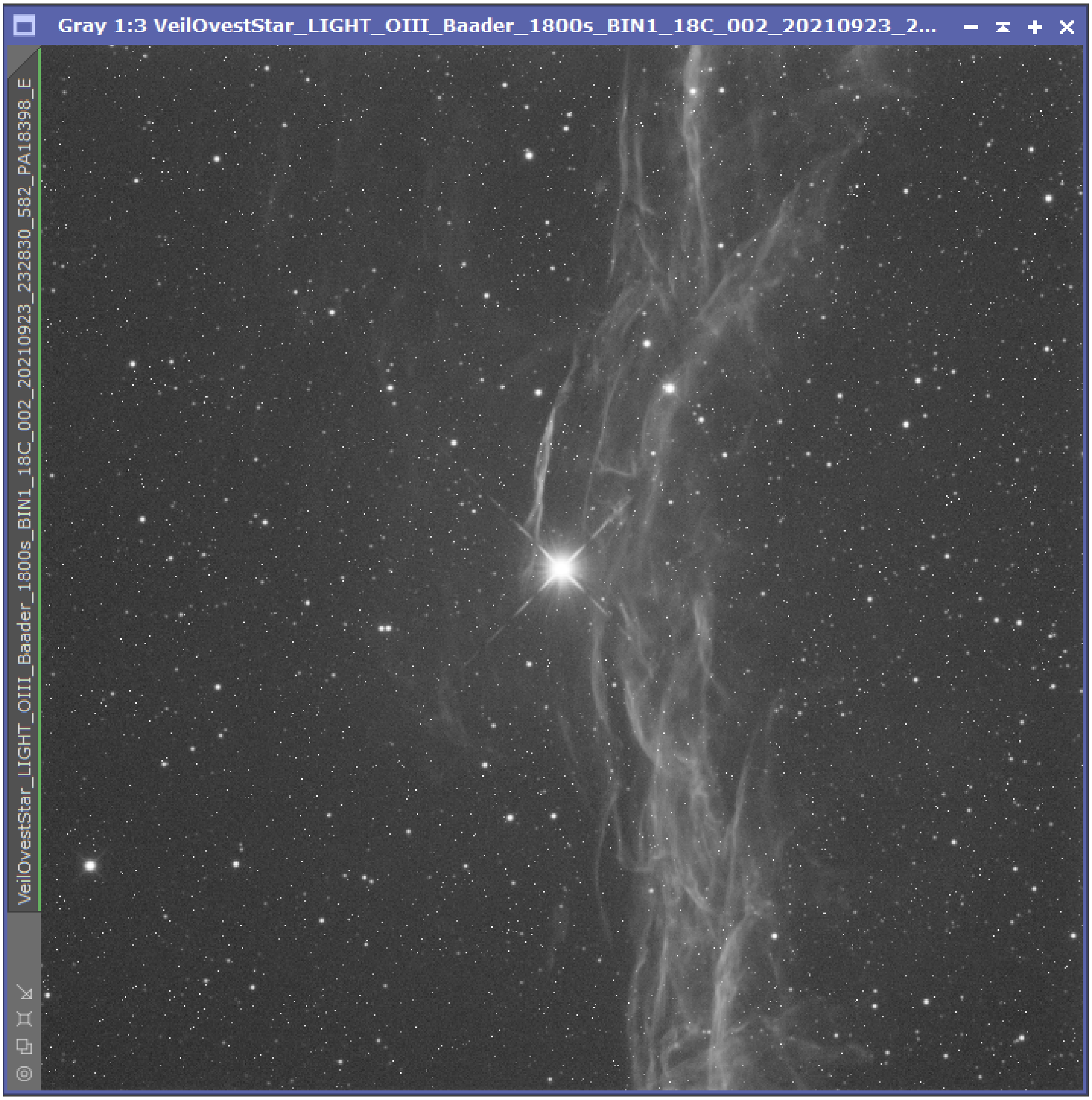
## Sky test

### 3.5 nm H-alpha filter - 1800 second uncalibrated single light - Auto STF



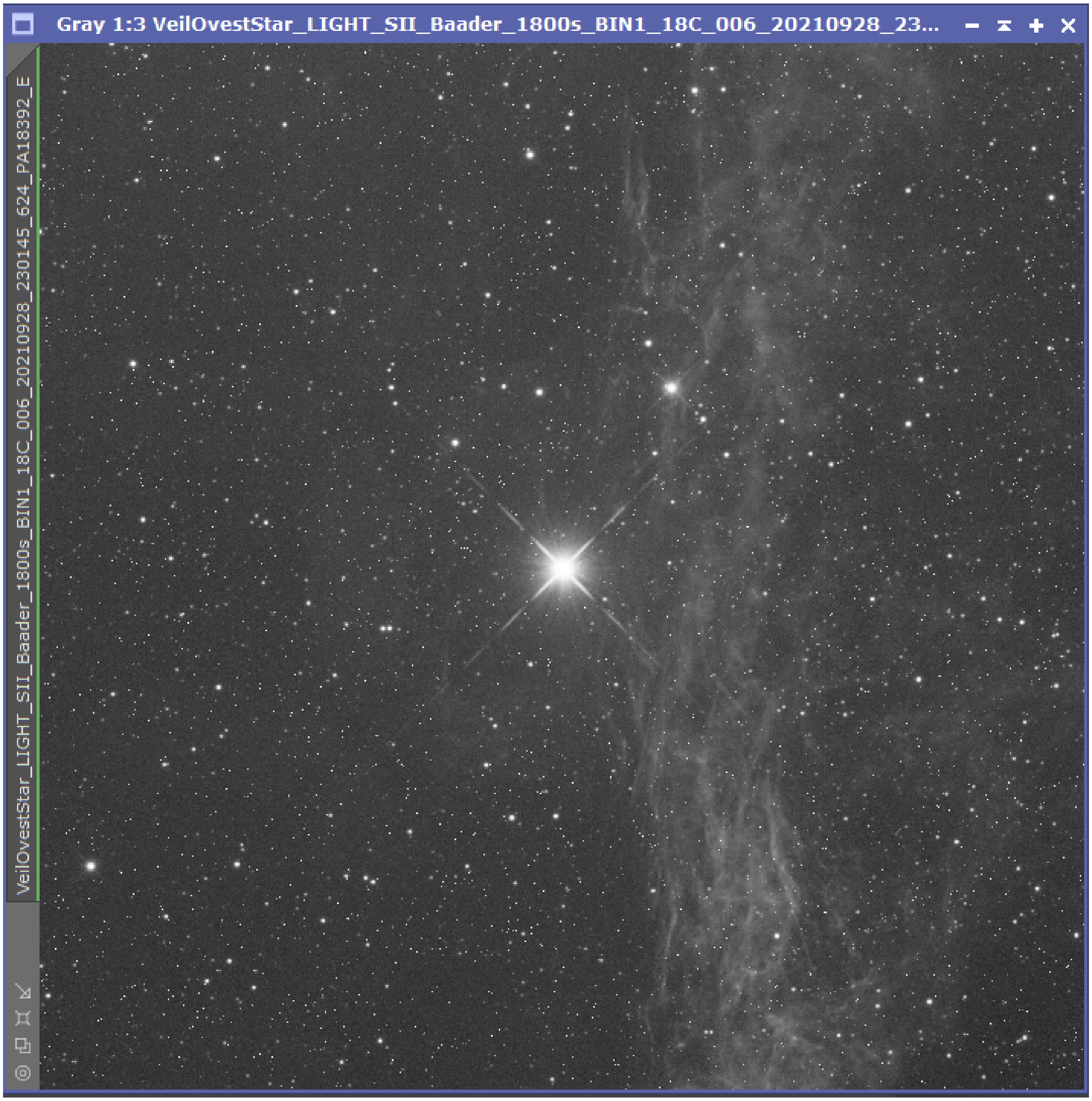

The result in terms of stellar diameter is in my opinion very good, measured in an average FWHM of 2.07 arc seconds. The narrow passband guarantees the absence of gradients (delta about 30 ADU) with a sky background of only 630 ADU and well-engraved micro details, fully satisfying expectations. The central star has a good diffraction pattern despite the bulky brightness. However, a reflection is almost imperceptibly present, due to its size at the distance in which the deflecting glass of the active optics is located, the presence of the reflection remains irrelevant on this filter, even after integration, with ADU values almost in line with the sky background.

### OIII filter 4 nm - single 1800 second uncalibrated light - Auto STF



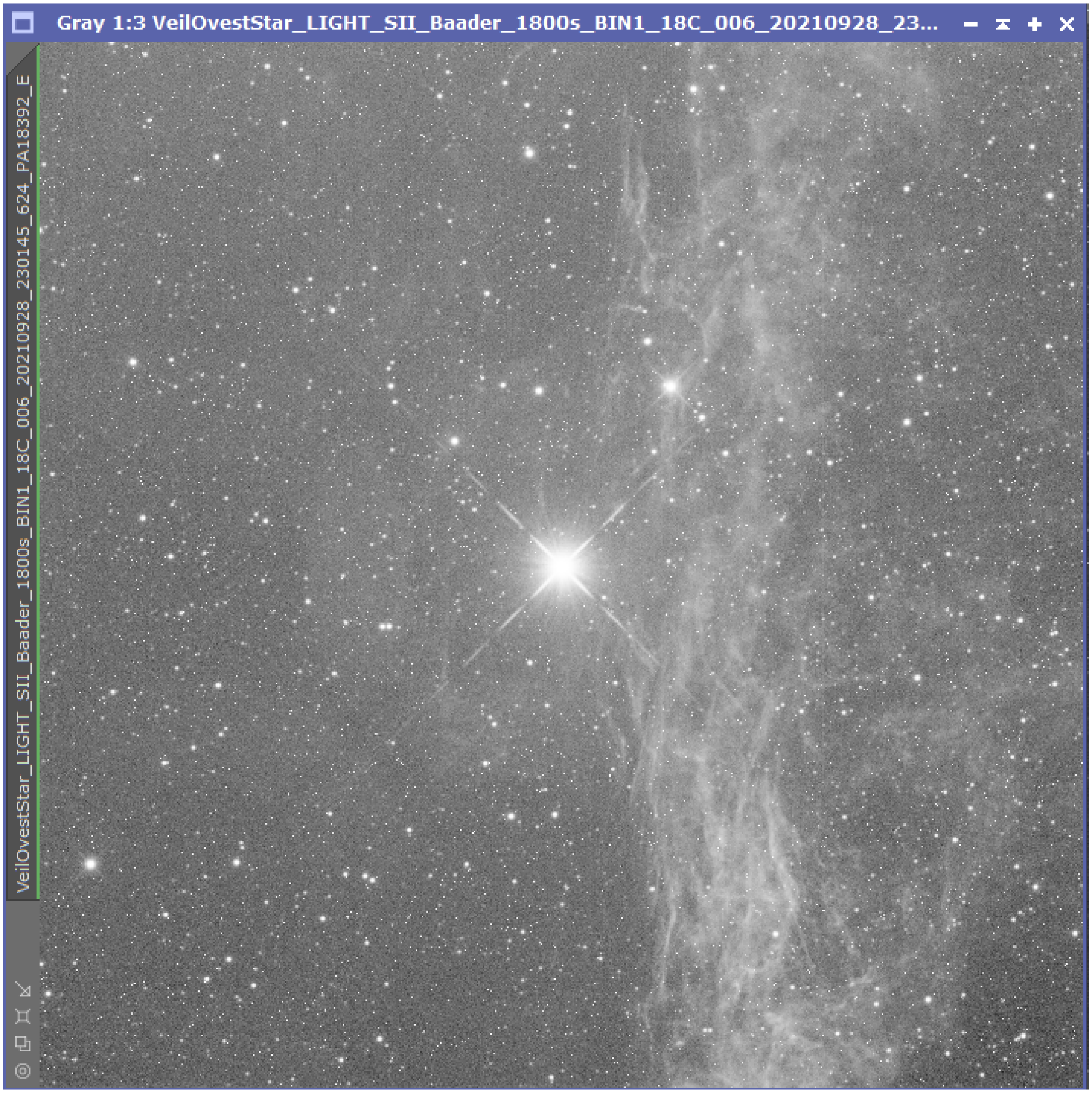

The average FWHM is 2.19 arc seconds, also here a good result. The sky background, as is typical in this wavelength, has a slightly higher value, with an estimated value of 945 ADU, and an additive linear gradient barely perceptible visually (delta about 79 ADU). Also in this case, the reflection of the main star on the surface of the deflector glass of the active optics is almost imperceptible.

### SII filter 4 nm - single 1800 second uncalibrated light - Auto STF



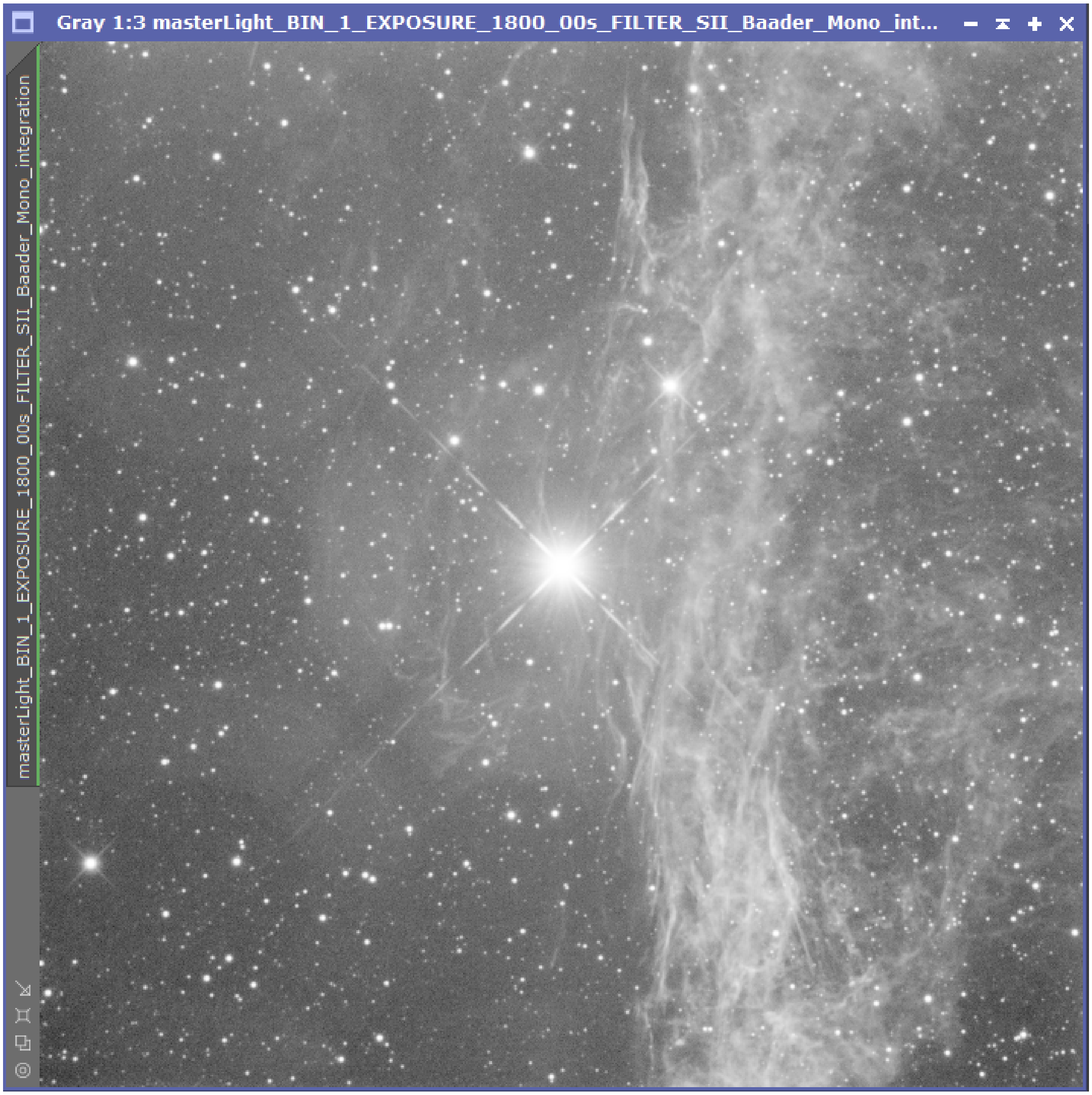

The average FWHM value is 1.80 arc seconds, very good and in line with expectations, considering the wavelength of the passband. Sky background measured in about 620 ADU, also in this case the gradient is very low, similar to the result of the H-alpha filter, with a delta of about 30 ADU. The diffraction figure of the main star is in line with the other two filters, but in this case the visibility of the reflection on the deflecting glass of the active optics is more accentuated, better visible even in the case of boost of the auto stretch, which is not occurs with H-alpha and OIII filters.

### SII 4 nm filter - single 1800 second uncalibrated light - Auto STF Boosted




In this case, secondary reflections are also perceived in the direction of the corners, even more explicit in the integration, as shown in the following screenshot.

## SII filter 4 nm - Master light Integration - Auto STF Boostedclearly




The structures of the primary reflex and secondary reflexes are visible over the whole field. Comparative tests with the inversion of the filter itself and with another identical Baader Ultra Narrowband SII filter, tested later, confirm the result. Further comparative tests were carried out on a filter of another well-known European brand, with a passband of 12nm and produced a slightly worse result, confirming the criticality of the specific optical train, therefore the presence of the deflecting glass element of the active optics, extensively described above. Probably this condition could reproduce with the presence of an intermediate lens system, such as a flattener or a focal reducer. However, this deduction is not supported by the empirical evidence in this test.

# Clarifications and conclusions

## Clarifications

The shots were made in evenings with conditions similar to each other in terms of transparency and the presence of light pollution. The single frames analyzed for the measurements in fact all have approximately the same shooting time, therefore the same height with respect to the horizon. I preferred this mode instead of shooting everything the same night bearing in mind that between the first and last shot, at best, there would have been at least over 1 hour of difference and the conditions could have changed anyway.

This approach corresponds to my usual modus operandi, and allows me to optimize the integration on the individual channels over several nights, contributing to the achievement of the best final result.

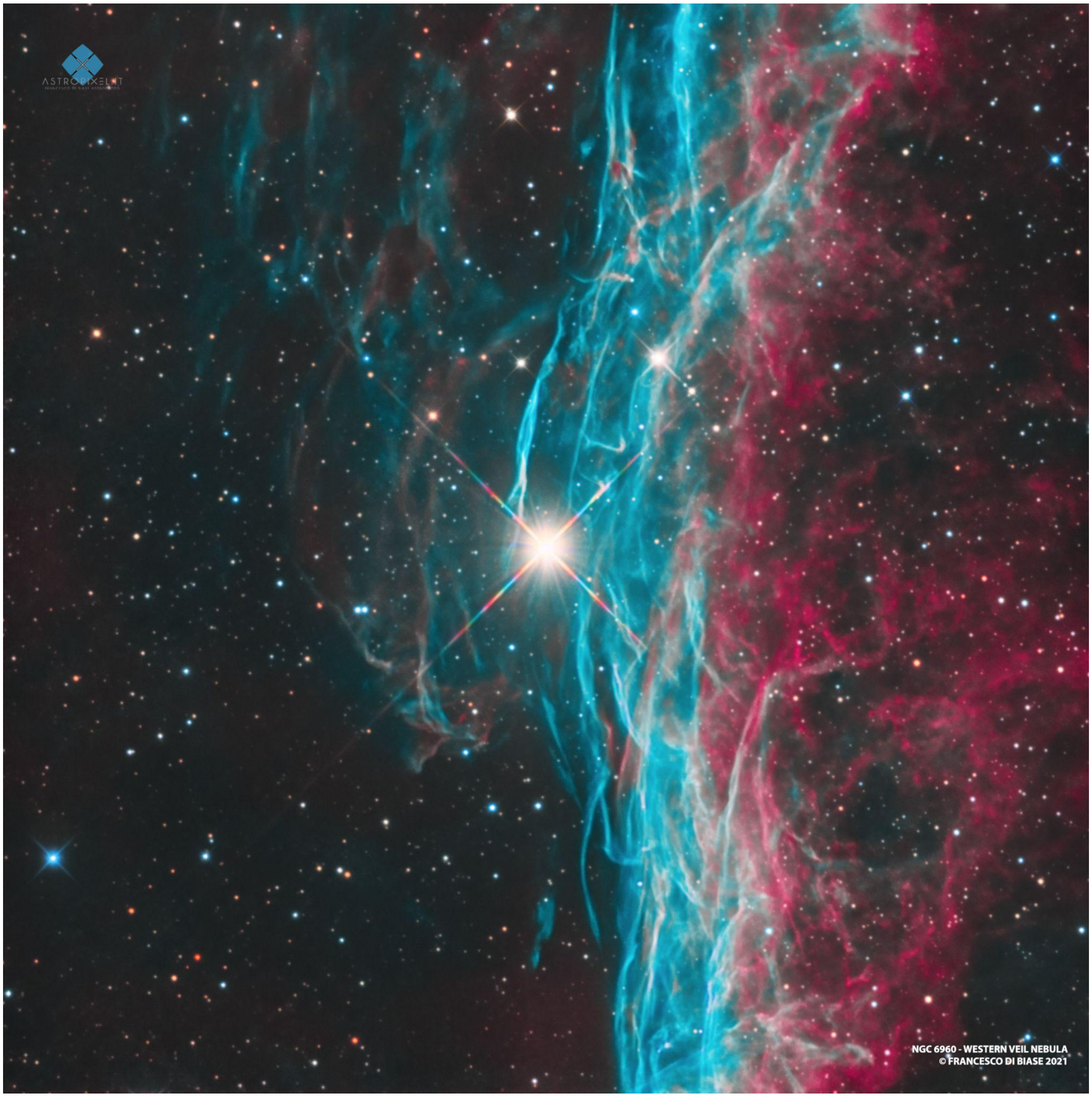
It would have been easier to shoot another subject, avoiding the presence of particularly bright stars in the field, but the main objective was to evaluate the performance in the worst situation.

## Conclusions

My general opinion on performance, supported by the tests carried out and my experience with other high-end products, is fully positive. I believe that they can be equated with the most famous brands, with the advantage of a cheaper price.

Of course, as soon as I need them, I will seriously consider using these filters for my setup.

## Final result




Elaboration with Narrowband Bicolor technique Ha:OIII:OIII, with RGB stars, obtained from a total of 25 hours of integration. The star reflections in the master light with the SII filter effectively makes the data unusable for the Hubble Palette color combination SHO (SII: H-alpha: OIII), if not with a marked "cleaning" intervention that risks trespassing in other topics of discussion about processing.