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1) Baader Planetarium's Premium Color Filters

Overview

For a number of years Thomas Baader of Baader Planetarium in Germany have produced high quality visual and photographic accessories, including filters, for amateur astronomers. Here are reviews of some of the filters I have the opportunity to test. For these tests I used apochromatic refractors from different manufactures including a 105mm, 130mm, 175mm, and a 180mm, as well as a 14.5" reflector. These filters are available in the United States from Alpine Astronomical .

Baader Planetarium's Premium Color Filters

Color filters are a useful accessory to use when observing the planets as they help to enhance and bring out faint planetary detail. This is because they transmit only the wavelength of light of the filter and block the other wavelengths of light.

The Baader color filters are available in 1¼" format in the following colors: Red (610 nm longpass), Orange (570 nm longpass), Yellow (495 nm longpass), Green (500 nm bandpass), Bright Blue (470 nm bandpass), and Dark Blue (435 nm bandpass). The efficiencies of the three longpass filters (Red, Orange, and Yellow) are reported to peak at 98%, while the efficiencies of the three bandpass filters (Green, Blue, Dark Blue) are reported to achieve 70%.

Most color filters are listed by their Kodak Wratten (or W) number, such as Green (W58), and Red (W25). While the Baader color filters are not listed by the Wratten number they do appear to be similar to in terms of the wavelength of light that are transmitted.

For example a Baader Red would be comparable to a W25 Red, a Baader Orange would be comparable to a W21 Orange, a Baader Yellow would be comparable to a W12 Yellow, a Baader Green would be comparable to a W58 Green, a Baader Bright Blue would be comparable to a W80A Blue, and a Baader Dark Blue would be comparable to a W38A Dark Blue.

I began using color filters to observe the planets in the early-1970's, and since then noted that the quality of filters from different manufacturers was not consistent. For example some filters would show ghosting or more scattered light around a planet and have lower contrast then other filters. Or, if I tried to stack two filters together, such as a blue and a yellow filter, which would act as a green filter, the image sharpness would be lower.

I noticed too that while the image quality of color filters might be acceptable as long as the filters were threaded onto the barrel of an eyepiece (near the focal plane), it would degrade if the filter was threaded onto the front a high quality star diagonal or binocular viewer. So I began to wonder if there might be color filters available that would enhance fine planetary detail without sacrificing image quality of the telescope and eyepieces.

I have used accessories from Baader Planetarium in the past and felt the quality was high, so decided to purchase a set of their color filters (they are available individually from Alpine Astronomical as well). Since then I have had the opportunity to test them when observing the planets, including the 2005 opposition of Mars.

Based on my tests I feel that the quality of the Baader color filters are the highest I have seen in color filters I have used over the years. For example, the light transmission and contrast of the filters is higher than other filters I have used, which makes it easier to see fine planetary detail. Also, the Baader color filters have better sharpness and no ghosting compared to other filters, even when they are stacked together, or threaded onto the front a high quality star diagonal or binocular viewer. Here is a sketch of Mars that I made when a dust storm was visible. The Baader Red filter helped to enhance the surface features while a Baader Yellow helped to enhance the dust storm.

For these reasons the Baader Planetarium Color Filters are highly recommended.

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2) Baader Planetarium Moon & Skyglow (Neodymium) Filter

Baader Planetarium Moon & Skyglow (Neodymium) filter

Although this filter is recommended for use when observing galaxies, nebulae and star clusters as it reduces skyglow from light pollution and the Moon I have found it very useful for observing the planets as well. This is due to the fact that in addition to filtering out skyglow it boosts color contrast by isolating the Red, Green, and Blue regions of the spectrum. Because of this the filter works particularly well for Mars as it enhances both surface and atmospheric detail.

For example, isolating the Red region of the spectrum enhances surface detail, while isolating the Green enhances areas of frost and fogs on the surface, as well as polar features. Isolating the Blue region of the spectrum enhances atmospheric features such as clouds, limb hazes, equatorial cloud bands, and polar cloud hoods, and darkens reddish features. At the same time it retains the natural coloration of the planet's features. So I found myself using this filter often when observing and making a sketches of Mars.

I found this filter useful when observing Saturn and Jupiter as well. For example the filter helped to enhance bands and belts on Saturn, as well as the C-Ring or Crepe Ring in front of the globe. The same held true for Jupiter, including enhancing the Great Red Spot, Red Jr., and festoons.

As with the Baader Planetarium's color filters, the image sharpness and contrast remains high even when threaded onto the front of a binocular viewer. The Moon & Skyglow filters are available in both 1¼" and 2" sizes. Highly recommended.

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3) Baader Planetarium Semi-APO Filter

Baader Planetarium Semi-APO Filter

The Baader Semi-APO filter is designed to work with achromatic refractors to help cut out the violet fringe around the planets, Moon, and bright stars. However the filter has been used with other telescope types including apochromatic refractors, reflectors, and CAT's. The Semi-APO filter appears to be a combination of the Baader Fringe Killer filter and Moon & Skyglow filter. The Semi-APO filter is available in 1¼" sizes.

I tried it with my 130mm and 175mm apochromatic refractors when observing Mars and found that it worked very well. In performance it reminded me of the Moon & Skyglow filter, although it did not enhance the atmospheric detail as much. Like the Moon & Skyglow filter the natural coloration of Mars was maintained. Although I preferred the Moon & Skyglow filter as it enhanced the atmospheric detail more, I have heard from other observers who prefer the Semi-APO filter. Either way, highly recommended.

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4) Baader Planetarium Contrast-Booster Filter

Baader Planetarium Contrast-Booster Filter

The Baader Contrast-Booster is based on the Moon & Skyglow filter and designed to completely eliminate the defocused blue haze visible in achromatic refractors, as well as to take contrast enhancement and skyglow reduction to the maximum level possible from a filter. The Contrast-Booster filters are available in both 1¼" and 2" sizes.

When I used this filter to observe Mars I noted that it gives a light yellow tint to the image due to the fact the that defocused blue wavelengths are filtered out. I found this filter was a little too strong for my taste, but I know of some observers who use large Dobsonian reflectors who felt it was the best filter they used for Mars. So I would recommend people try it to see how it works for them.

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5) Baader Planetarium's UHC-S Nebula Filter

Baader Planetarium's UHC-S Filter

When I first read about the Baader UHC-S filter I was intrigued by its design as it appears to be a blend of a Ultra High Contrast filter and Deep-Sky filter, so it holds the promise of being useful for a different deep-sky objects. This would include planetary nebula, diffuse nebula, and emission nebula. I tested it on a variety of deep-sky objects from the fall, winter, spring, and summer nighttime sky. This included M1, a supernova remnant; M42 and M43, both emission nebula; M56, a planetary nebula; M78, a diffuse nebula; M97, another planetary nebula; M108, a spiral galaxy; the Rosette Nebula, emission nebula and open cluster, and the Christmas Tree Cluster, an open cluster and emission nebula, using a TMB 105mm f/6.2 and a TMB 130mm f/9.25 refractors.

During my initial testing I only had a 1¼" Baader UHC-S filter on hand for testing, so I was limited to using 1¼" eyepieces. This meant that the maximum exit pupil I could obtain when using the 24mm TV Panoptic, my widest angle 1¼" eyepiece, was 3.9mm in the TMB 105mm f/6.2 refractor, and 2.6mm in the TMB 130mm f/9.25 refractor. However since then I have purchased a 2" filter so I can use it with my 2" eyepieces.

The limiting magnitude of my observing site on the best nights is around 5.5 - 5.6. So I depending upon what kind of deep-sky objects I am observing, and the observing conditions, I may use a filter to help enhance the detail. While I have used Ultra High Contrast and Deep-Sky filters from different manufactures, I have found an OIII filter most useful to bring out the detail in fainter planetary nebula, diffuse nebula, and emission nebula. So was interested to see how the Baader UHC-S filter would perform.

The first night I observed M56, The Ring Nebula. Through the TMB 130mm f/9.25 using a 24mm TV Panoptic (50x) and TMB 14mm Super Monocentric (146x) the ring looked nice even though it was low in the sky (only 20 degrees in elevation), and the darker inner portion of the ring was prominent. Inserting the Baader UHC-S filter helped to darken the sky background and bring out more of the extensions of the ring at each end, as well as enhance the ring.

On other night I tested the Baader UHC-S filter on M1, The Crab Nebula, using the TMB 130mm f/9.25 refractor. Without the filter M1 appeared somewhat elongated and had a slight greenish color to it using a 31mm Nagler (39x). At 60x (20mm Nagler) the nebula appeared somewhat mottled. When the Baader UHC-S filter was inserted the mottling was more pronounced, and the nebula had a slightly brighter zigzag pattern across its front.

I generally don't use filters for M42, The Great Orion Nebula, as it is a bright emission nebula and shows a lot of detail from my observing site. However I decided to try the Baader UHC-S filter when observing it with TMB 105mm f/6.2 refractor. Without the filter the central portion of the nebula had a light blue color to it at 21x (31mm TV Nagler) and 27x (24mm TV Panoptic). With the filter in place fainter detail was visible in the central portion of the nebula, as well as along the top and bottom of the nebula. The filter helped to enhance the detail in M43 as well.

After observing M42 and M43 I swung the TMB 105mm f/6.2 refractor over to observe M78. Even though this diffuse nebula was lower in the sky, the Baader UHC-S filter did help to enhance more detail in the nebula. This included the brighter central region with its two stars, and its fainter section. As Stephen O'Meara notes in his book *The Messier Objects*, M78 does resemble a comet with a split nucleus, parabolic hood, and tail.

M97, The Owl Nebula, and M108, a spiral galaxy, are only around a degree apart, and easily fit into the same field of view of the TMB 130mm f/9.25 in the 41mm Panoptic (29x) and 31mm TV Nagler (39x), with M97 appearing larger and brighter than M108. Usually Ultra High Contrast filters and Deep-Sky filters do not do much when it comes to enchasing detail in galaxies, and this was the case for M108 as well with the Baader UHC-S filter. However for M97 the filter helped to enhance detail in the Owl Nebula, including the eyes.

I ran some additional tests of the Baader UHC-S filter on deep-sky objects including The Rosette Nebula, and the Christmas Tree Cluster, using the TMB 105mm f/6.2 refractor. The Rosette Nebula is composed of a open cluster, NGC 2244, and emission nebula surrounding it, NGC 2237-39, while the Christmas Tree Cluster, NGC 2264, is composed of an open cluster and emission nebula. Both the Rosette Nebula and Christmas Tree Cluster are located in the constellation of Monoceros. The limiting magnitude during these observations was between 5.0 and 4.8.

On the first night I observed a number of deep-sky objects including the Rosette Nebula. Without a filter there were times when I could detect some faint nebula outside of the star cluster. The Baader UHC-S filter helped to enhance the brighter portions of the nebula. The best view was with the Baader O-III filter, as it helped to enhance both the fainter and brighter areas of the nebula. Through this filter the nebula appeared large, with a "hole" around the star cluster, and there were brighter regions in the nebula visible to the north, northwest, and southeast. In addition there were times when

it appeared that some portions of the nebula had striations or darker sections to it. I compared the Baader O-III filter with a Lumicon O-III filter, and will be posting a review of these two filters in the near future.

On the next night I observed several deep-sky objects including the Christmas Tree Cluster. This is a very pretty cluster and lives up to its name. When I inserted the Baader UHC-S filter there appeared to be some areas of nebulosity around some of the stars in nebula, in particular stars to the southwest of 15 Monocerotis, which is the brightest star in the cluster.

Overall I was impressed by how well the filter worked in enhancing detail in different kinds of deep-sky objects, and in the future I will try it on all nebula that I observe to see if it brings out any additional detail. Another thing I liked about the Baader UHC-S filter was that while it darkened the sky background and increased the detail of the nebula it was still possible to see the entire field of view and see faint background stars. This makes it easier to focus on background stars to ensure the nebula is in sharp focus. With other filters that darken the sky more it can be harder to focus on fainter stars in the field of view. The Baader UHC-S filter is available in both 1¼" and 2" sizes. Highly recommended.

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6)Antares 7 x 50mm and 12 x 80mm Right Angle Correct Image Finders

I recently was looking to replace my old 8 x 50mm right angle correct image finder, which had become worn out after years of service. One finder that caught my eye was the Antares 7 x 50mm finder which is available from Astronomics.

Antares 7 x 50mm Right Angle Correct Image Finder

I first began using a 8 x 50mm right angle correct image finder back in 1980 when I owned a C8. Correct image finders use an Amici prism diagonal that provide images that are right side up and non-reversed, which made it easier for me to locate deep-sky objects rather than finders that provide images that are upside down and reversed.

When considering which brand of finder to buy there were a number of features I was looking for. This included: the finder being made of aluminum and available in white color; the achromatic lenses being fully multicoated; an Amici prism diagonal that uses 1.25" eyepieces that are removable; and a finder that was not be too heavy.

The Antares 7 x 50mm provided all of these features and at a price of $84.95 (as of fall 2005) was less expensive than some other finders on the market. The finder has a fully multicoated achromatic doublet that provides a limiting magnitude of 11, and a field of view is 6.3 degrees wide. The eye relief is 15mm and the eyepiece has a roll-down rubber eyecup for those who wear eyeglasses. The lens shade on the finder has internal grooving that cuts down on light scatter and increases contrast, as well as reduce dew formation. The finder weighs 18.4 ounces, without a finder bracket.

Closeup of the Antares Eyepiece

To reach focus you loosen the set screw on the side of the prism diagonal and slide the eyepiece in and out until the image is sharp, then tighten the set screw. The eyepiece does have a diopter ring that

can be used to fine-tune the focus. Also the eyepiece can be rotated so that the cross hairs match the telescopes' optical axis.

Intial impressions from testing the finder during the day were favorable. For example nearby trees appeared sharp and showed good contrast. Under the night sky the same was true for deep-sky objects and the Moon. One nice feature is that the cross hairs are wide enough to be easily visible, something I have not always seen in finders from other manufacturers. Star images were sharp out to around 75% ~ 80% of the field of view before they began to show some distortion, similar to performance I have noted in other finders.

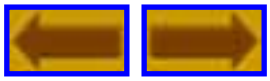
Antares 12 x 80mm Right Angle Correct Image Finder

I decided to purchase an Antares 12 x 80mm Right Angle Correct Image Finder to use with my TMB 175mm refractor to help locate faint deep-sky objects. It's features are the same as the 7 x 50mm finder, except that its' field of view is 4.33 degrees wide, and it is larger and weighs 44.5 ounces. Depending upon which telescope you plan to use this finder on you may need to add an additional counterweight. The price of the 12 x 80mm finder as of fall 2005 was $184.95.

The limiting magnitude of the 12 x 80mm finder is 12, and the added light grasp and resolution of this finder makes it easier to see fainter deep-sky objects that are more difficult to see in the 7 x

50mm finder. It shows also more detail in the brighter deep-sky objects. For example, while M31 is visible in the 7 x 50mm finder it begins to show some of its structure in the 12 x 80mm finder, such as a dust lane.

Overall I have been very impressed by how well these finders perform. The quality is quite good, and they are less expensive than some other finders on the market are. Besides being available in white, they are available also in blue and black colors. Highly recommended.



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