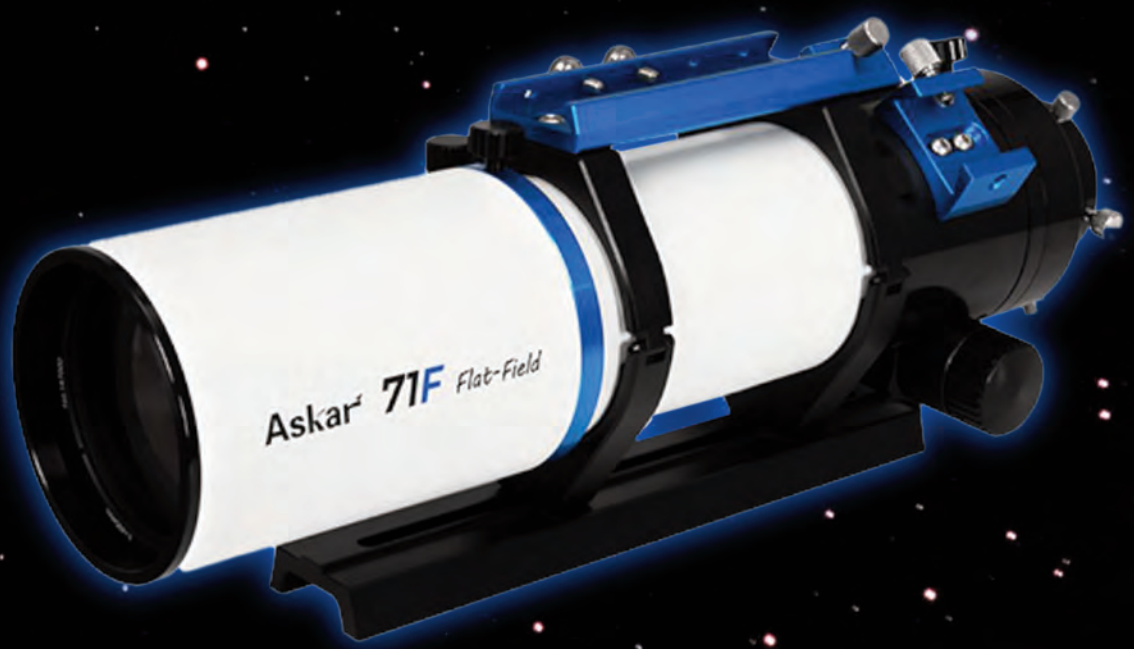
ASTRONOMY
TECHNOLOGY TODAY
Your Complete Guide to Astronomical Equipment

ASTRONOMICAL SPECTROSCOPY WITH THE SHELYAK ALPY
THE TOP 10 EEA CHALLENGES • INDUSTRY NEWS • NEW PRODUCTS

THE ASKAR 71MM F/6.9 FLAT FIELD TELESCOPE



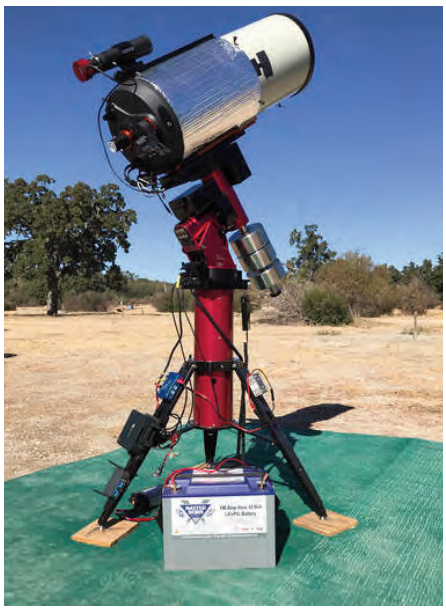
Volume 18 • Issue 5 $6.00 US

Contents

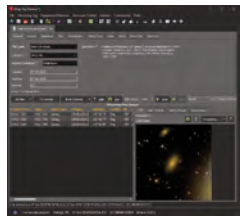
Cover Article - Page 45

In his cover article Dr. Dire reviews one of Askar's newest releases, a 71mm f/6.9 quadruplet refractor called the model 71F. The accompanying image is the Owl Nebula (M97) and Surfboard Galaxy (M108) captured with the Askar 71F using an SBIG STF-8300C camera. The total exposure was 120 minutes unfiltered added to 120 minutes with a triband (Hα, Hβ and O-II) filter.

In This Issue



Industry News/New Products



ATT Contributing Writers

Dr. James Dire has a M.S. degree in physics from the University of Central Florida and M.A. and Ph.D. degrees from The Johns Hopkins University, both in planetary science. He has been a professor of chemistry, physics and astronomy and an administrator at several colleges and universities. He has played a key role in several observatory projects including the Powell Observatory in Louisburg, KS, which houses a 30-inch (0.75-m) Newtonian; the Naval Academy observatory with an 8-inch (0.20-m) Alvin Clark refractor; and he built the Coast Guard Academy Astronomical Observatory in Stonington, CT, which houses a 20-inch (0.51-m) Ritchey Chrétien Cassegrain. Dire is a seasoned visual observer and veteran astro-imager.

Robert K. Buchheim has been a successful Business and Program Manager for an aerospace company, an enthusiastic amateur astronomer, and a leader in several non-profit organizations. He has been an amateur astronomer since childhood (his first telescope was 2.5 inch Sears refractor). In the late '80's he was introduced to CCD photometry, which dramatically changed his emphasis from visual deep-sky observing, to photometry of asteroids and variable stars and more recently spectroscopy. He published "The Sky is Your Laboratory: Advanced Astronomy Projects for Amateurs" with Springer. He is a former board member for The American Association of Variable Star Observers (AAVSO) and of the Society of the for Astronomical Sciences (SAS), where he has helped to facilitate several joint meetings of SAS and AAVSO, which were successful events for both organizations.

Curtis V. Macchioni is a physicist who spent most of his career in Silicon Valley working on magnetic data storage technology. Now retired he enjoys the extra time under the night sky and writing about astronomy equipment and methods on his web site www.californiaskys.com and producing astronomy helpful videos on his YouTube channel "Astronomy Tips and Reviews with Curtis." He hopes to attend many of the major star parties across the country over the coming years.

Stuart Parkerson has been the publisher of Astronomy Technology Today since its inception in 2006. While working primarily in the background of the company's magazine and website business operations, he now has a more active role in contributing content to the magazine. He also is the founding publisher of App Developer Magazine which launched in 2012. He grew the company to become one top software magazines and websites globally and sold his ownership interest in 2016.

Contents

Industry News/New Products

THE ASKAR 71MM F/6.9 FLAT FIELD TELESCOPE

By Dr. James R. Dire

In 2020, Askar released their first telescope, the FRA400, a 72mm f/5.6 Petzval design quadruplet refractor. The telescope was excellent. I had the pleasure of reviewing it in this magazine (ATT Volume 14, Issue 8). Askar telescopes are made by Jiaxing RuiXing Optical Instrument Company. Jiaxing is a suburb of Shanghai, China. Since 2020, they have released almost 20 more telescope models.

The company also manufactures telescopes under the name Sharpstar. There are nearly as many Sharpstar models including three catadioptric reflectors. Askar's newest release is a 71mm f/6.9 quadruplet refractor called the model 71F. I have the privilege of reviewing it in this issue.

Like the first Askar telescope I reviewed, this one came nicely packed in a double cardboard box with lots of Styrofoam to keep it safe (**Image 1**). The telescope comes with a multitude of accessories as seen in **Image 2**. Inside the focuser is a 2-inch to 1.25" adapter. There is a cover for the objective end of the tube, two Plössl eyepieces, a 1.25-inch 45° diagonal, and three adapter rings for various astronomical camera thread sizes (M48, M54 and M64).

The 45° diagonal is for terrestrial use to ensure the image is upright. Most people use a 90° diagonal for astronomical use and might already own a 2-inch or 1.25-inch model. Fortunately, I own both sizes and they both work well with this telescope.

The Askar 71F has a 490mm focal length. The two Plössl eyepieces were a nice bonus to receive with the telescope. Their quality is as good as any other brand Plössl eyepiece I have used. One has a focal length of 20mm and provides 24.5x magnification (490/20). The other is an 8mm eyepiece and provides 61x magnification (490/8).

Image 1 - The Askar 71F came double boxed and well padded with Styrofoam.

Image 2 - The Askar 71F comes with more accessories than you could possible imagine including two eyepieces, a diagonal and adapter rings for many different cameras.

Image 3 - The objective is 71mm in diameter and has a focal ratio of 6.9 providing a 490mm focal length.

Image 4 - With the dew shield fully retracted, the telescope is 14.67 inches (372.5 mm) long.

Image 5 - With the dew shield fully extended the telescope is slightly less than 17 inches (431mm) long.

Image 6 - Askar's first model, the FRA400, side by side with their newest model, the 71F.

The objective lens of the telescope is pictured in **Image 3**. There are four lenses in the telescope, one with extra-low dispersion glass (ED) glass. I believe they are in two groups of two, one group near the objective end and the other group farther down the tube. The four lenses with one being ED glass serve two purposes. The first is to eliminate all chromatic aberration. The other is to remove field curvature to provide a flat field for an imaging sensor.

This telescope will do a much better job of elimination chromatic aberration than a doublet refractor, or a triplet that does not use ED glass. Most doublet and triplet refractors with smaller focal ratios (< f/10) suffer from field curvature and require a field flattener for imaging. The telescope requires no additional field flattener.

Image 4 shows the telescope with the dew shield fully retraced. The length is 14.67 inches (372.5 mm). The dew shield is fully extended in **Image 5**. It is less than 17 inches in length (431mm). The optical tube assembly weighs 5.5 pounds (2.5 kg) by itself. With everything attached to it as seen in Images 4 and 5, it weighs 6.6 pounds (3.0 kg). The Vixen style dovetail plate is 9 inches long (230mm), typical for a telescope this size and plenty lengthy to balance it on a mount.

The two Askar telescope are shown side by side in **Image 6**. The FRA400

Image 7 - From this view it can be seen that the objective lenses are indistinguishable in diameter. The 71F (right) was made lighter by using a smaller diameter tube and thinner tube rings.

Image 8 - Both Askar telescope have identical (except for the diameter) and smooth operating two-speed rack-and-pinion focusers.

has red trim while the 71F has blue trim. Askar uses different colors for each model series of their telescopes. For the photographs, I used two of my 1.25-inch right angle diagonals with the Askar 20mm Plössl eyepiece in one and the 8mm eyepiece in the other. **Image 7** shows the optics of both scopes side by side. The apertures only differ by 1mm. But it is obvious the FRA has a beefier tube, tube rings and lens cells. **Image 8** shows the focusers side-by-side. Both focusers are equivalent, nice quality rack & pinion focusers. The FRA400 focuser is 3 inches in diameter, while the 71F focuser is 2.4 inches.

Besides those I mentioned in the earlier paragraph, other differences be-

Image 9 - There are three places to attached accessories atop the 71f (left) than on the FRA400 (right). The FRA400 did come with a handle attached to the top of the tube rings, which I had removed to lighten the load.

Image 10 - This view shows a 9x50mm right angle finder scope attached the FRA400. There is a red dot finder and a Celestron StarSense autoguider attached to the 71F.

tween the two scopes are the FRA400 has two ED elements and the 71F only has one and the FRA400 is f/5.6 verses f/6.9 for the 71F. Faster focal ratio optics are generally more expensive to make. All of these differences result in a price difference between the two telescopes. At the time of this writing, the FRA400 sold for $1199 while the 71F sold for $599. However the quality of the views through them are indistinguishable. The FRA400 is just faster photographically. I actually own the 0.7x focal reducer for the FRA400 turning it into an f/3.9 (~$250). As of this writing there is no focal reducer for the 71F.

Image 9 is a view that shows three places on the 71F where a finder scope or another accessory can be attached to the telescope. There is a finder shoe bracket on each side of the focuser assembly, plus a rail along the top that connects the two tube rings. The rail also doubles as a handle. The FRA400 also came with a handle connecting the tube rings (which I removed), but nothing can readily be attached to it. In **Image 10**, I have attached a 9x50mm finder scope to the FRA400. A red dot finder and a Celestron StarSense autoguider are attached to the 71F.

There were three things I did not like about the FRA400 when I first bought it, but it was still a keeper! First, the dew shield did not have a locking screw to keep it from sliding down when pointing the telescope vertical. Second, the dew shield did not seem long enough to be very effective. Finally, you needed a metric Allen wrench to loosen the tube rings. As you can see in Images 6-9, the 71F has a much longer dew shield with a locking screw, and the tube rings have hand knobs. These and the extra finder slots show that Askar has made some friendly improvements since their first telescope model.

The drawtubes for both telescopes are shown in **Image 11**. Note both have graduations etched on the tubes. The 71F drawtube has a 5cm focus range. The focus range on the FRA400 is 5.5cm. Both focusers can be rotated. The drawtube on the 71F also has angle graduations to assist in the rotation (**Image 12**), another nifty new feature.

Out in the field, I decided to test the Askar 71F telescope side-by-side with my Stellarvue SV-70T, a 70mm f/6 triplet refractor. The apertures were comparable within a millimeter and the focal lengths were not that far apart (420mm versus 490mm). I reviewed the Stellarvue SV-70T in this magazine in 2011 (ATT Volume 11, Issue 2). It has been my mainstay for wide-field imaging (with a 0.8x focal reducer/field flattener) for more than seven years. I mounted both telescopes on a Celestron AVX mount (**Image 13**) in a dark site in the Texas Hill Country. The two telescopes are very close in tube dimensions and features (**Image 14**). The tube rings are just thicker and heavier on the Stellarvue (**Image 15**).

I viewed through both telescopes moving the same eyepiece back and forth. The views through both were excellent and indistinguishable. Pointing at the nearly first quarter Moon, there was no hint of chromatic aberration. Stars were pinpoint throughout the field regardless of which eyepiece I used (5mm to 30mm). Star colors were vivid in each. I easily split Epision Lyrae to see all four stars with my 5mm eyepiece.

Next I took images of the Moon through each using a Canon 650D

Image 11 - The draws tubes for both telescopes (fully extended here) have graduations that allow recording of focus positions for different eyepieces or cameras. The 71F has a 5cm draw tube while the FRA400 has a 5.5cm drawtube.

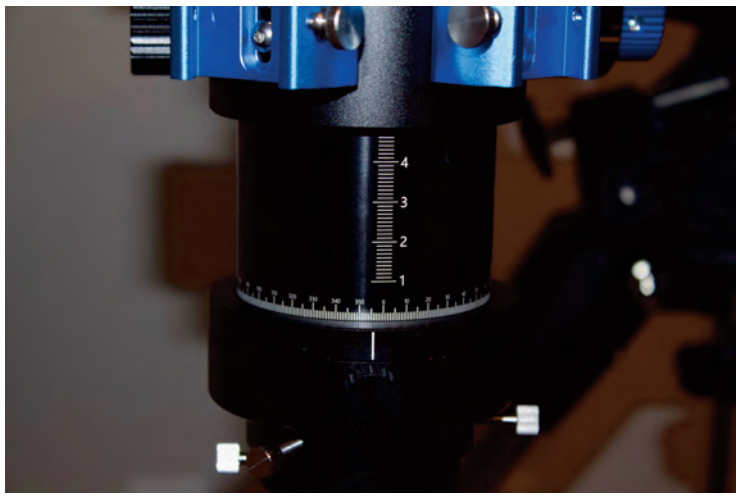


Image 12 - Both telescopes have rotating focusers. But only the 71F has a scale to show the degrees of rotation.

Image 13 - The author's Celestron AVX mount is perfect for one or two small refractors.

Image 14 - The author tested the Askar 71F side by side with a Stellarvue SV70T. These two scopes are closer in focal length (420mm and 490mm) than his two Askar models.

Image 15 -The two telescopes were compared by swapping myriad eyepieces back and forth between the two telescopes.

DSLR camera. I focused using the camera's live view feature. To keep the camera still while actuating the shutter, I used the timer feature on the camera to let vibrations dampen out before the image was taken. **Image 16** is the Moon with the Askar 71F and **Image 17** is with the SV-70T. The Moon is slightly larger in Image 16 due to the slightly longer focal length of the 71F. These images have not been processed in any way. They both have excellent color and resolution!

Next I attached a SBIG STF-8300C CCD camera to the 71F with a ZWO autoguider camera on the SV-70T (**Image 18**). My first target was M13 in Hercules. I took six 10-minute exposures. I processed them on my computer (darks, flats, registering and stacking). The result is in **Image 19**.

For this size CCD sensor, the stars are sharp and pinpoint all the way to the edges of the image. This attests to the flat field produced by the telescope. Stars are resolved almost to the center of the cluster. The brightest star in the image is the orange star to the left of M13. This star is spectral class K7. It's color came out perfect. On the lower right edge of the image is a bright red giant star of spectral class M3. It appears and should be redder than the K7 star. Finally to the lower right of the cluster is a bright spectral class A8 star. This star should be blue-white. Its color also looks correct. The Askar 71F delivers accurate colors.

Image 20 is composition of M97 and M108 I took with the 71F from my backyard in Bortle 6 skies. I collected data over two nights around the summer solstice and full Moon. The first night I captured 12 ten-minute images through a light pollution filter that only transmitted light around Hα, Hβ and O-III wavelengths. Two nights later, before moonrise, I shot 24 five-minute unfiltered images. Overall, I used 240minutes of data. Unfortunately, the second night I inadvertently placed the camera in the telescope rotated 90° from the first night. So this image is cropped to the overlapping area when I stacked both nights worth of images. The image registering wasn't perfect, but the result was still impressive.

I always enjoy capturing galaxy groupings. **Image 21** contains Markarian's Chain located along the boundary between the Constellations Virgo and Coma Berenices. These galaxies are part of the larger Virgo Cluster. The brightest two members, on the lower right side of the image, are M84 and M86. The Askar 71F is perfect for capturing celestial groups spread out over a couple of degrees. This uncropped image covers 2.10° degrees of right ascension and 1.58° of declination.

The last image I shot to test this telescope was the Veil Nebula. I could only tackle the eastern side of this massive

Image 16 - Prime focus image of the Moon through the Askar 71F using a Canon 650 camera. The image is extremely sharp with no hint of chromatic aberration.

Image 17 - Prime focus image of the Moon through the Stellarvue SV70T using a Canon 650 camera to compare with Image 16. The only difference is the Moon is slightly smaller here due to the shorter focal length.

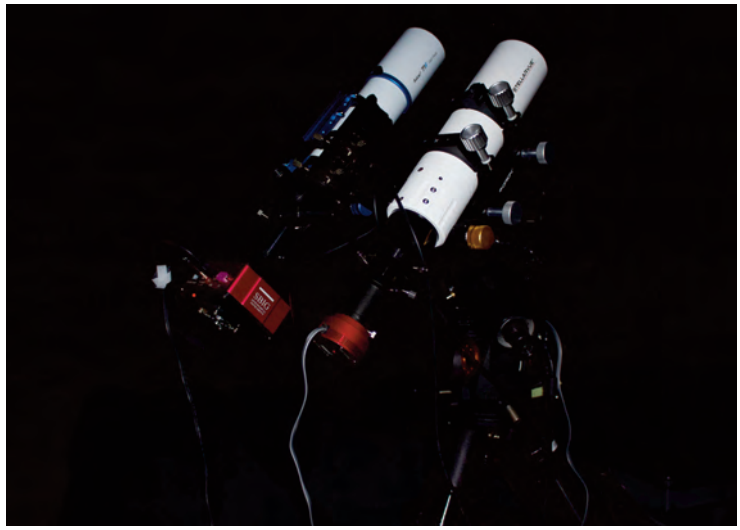


Image 18 - The author took long exposure CCD images through the Askar 71F using an SBIG STF-8300C camera guiding through the Stellarvue refractor.

Image 19 - The globular cluster M13 captured with the Askar 71F using an SBIG STF-8300C camera. The total exposure was 60 minutes.

supernova remnant with this telescope and my SBIG camera. I took 12 ten-minute exposures from a Bortle 4.5 site. I could have used 2-3 times more integration time, but clouds rolled in as I was just completing the 12th subframe. The myriad pinpoint stars in this image attest to the ease of which I was able to focus the telescope. The Eastern Veil Nebula, NGC6995, displays many bright red and blue filaments. The image was framed so that NGC6974 and 6979 would be in the upper right hand corner. These nebulae are not as bright as NGC6995. There is a hint of the red glow of NGC6974 on the composition. The red glow along the right edge halfway up is the eastern edge of Pickering's Triangle.

The price of telescope equipment has risen considerable over the past five years. This started during the COVID-19 pandemic when consumers who were homebound during the pandemic depleted inventories, and factories were shut down and unable to replenish supplies. Inflation since the pandemic continued to cause prices to rise. The Askar 71 telescope is priced amazingly low for the current market, especially considering all of the features it has and accessories it contains. It has four elements with one piece of ED glass. It produces a flat field. It has a great two-speed focuser. It can accommodate a lot of finders and other accessories, has a 45° diagonal and two eyepieces. I honestly don't know how they can sell it this low. This is one of the best values in a telescope I have seen in decades! ATT

Image 20 -The Owl Nebula (M97) and Surfboard Galaxy (M108) captured with the Askar 71F using an SBIG STF-8300C camera. The total exposure was 120 minutes unfiltered added to 120 minutes with a triband (Hα, Hβ and O-II) filter.

Image 21 - Markarian's Chain of galaxies taken with the Askar 71F using an SBIG STF-8300C camera. The total exposure was 60 minutes.

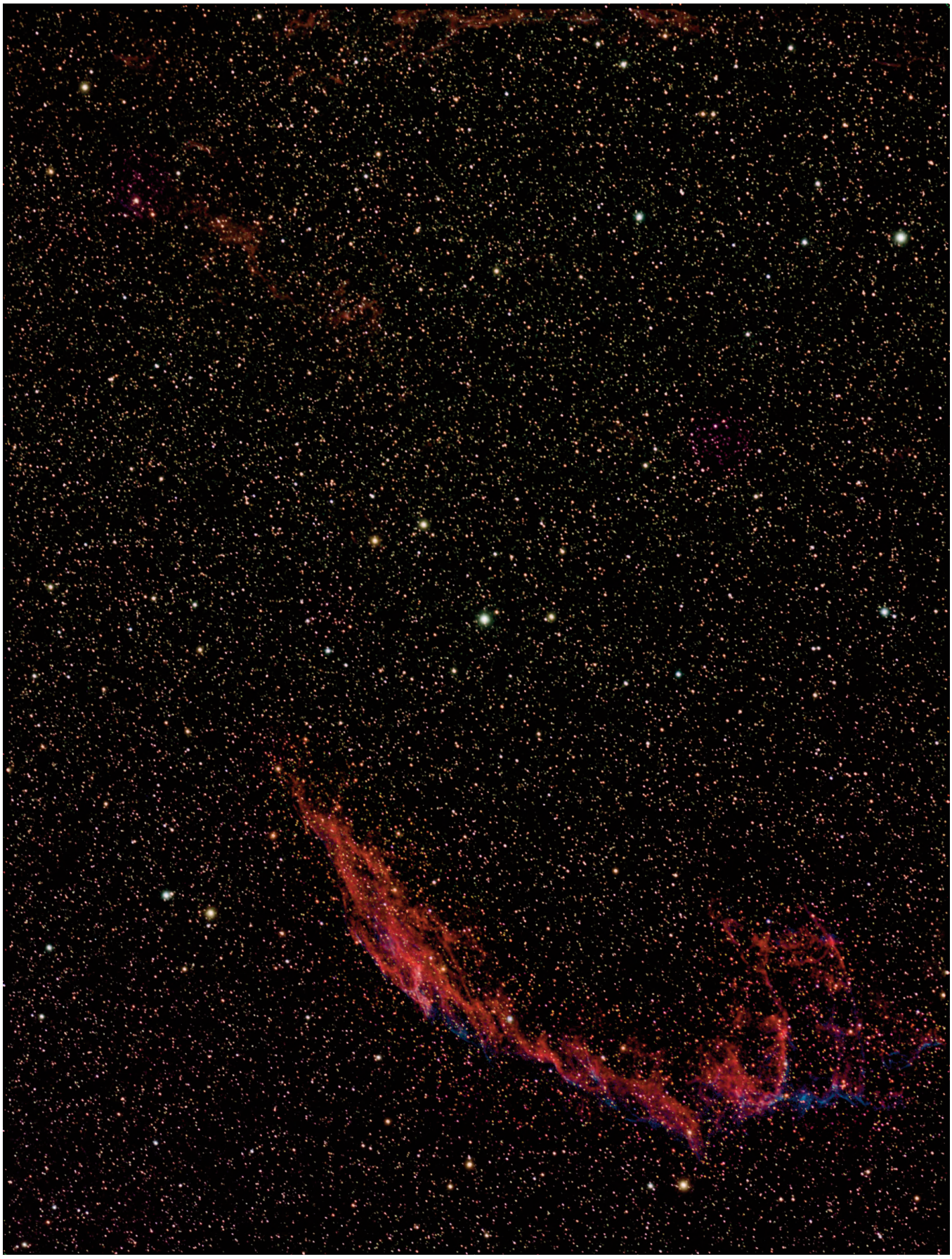


Image 22 - The Eastern Veil Nebula (NGC6995) taken with the Askar 71F using an SBIG STF-8300C camera. The total exposure was 120 minutes.