Lumicon's New Oxygen III Filter

Lumicon improves a helpful visual accessory.

Lumicon's new 1¼- and 2-inch Generation 3 O III filters.

Lumicon Generation 3 Oxygen III Filter

U.S. Price: $100 (1¼-inch), $200 (2-inch)
farpointastro.com

What We Like

Improved contrast over classic O III filter

What We Don't Like

Nothing

A LOT HAS CHANGED during the 50 years I've been observing the night sky. Much of that change has been in the equipment we use to view it with. Typical amateur telescopes are bigger and undeniably better, mounts are more precise, and modern eyepiece designs make the older ones look like antiquated magnifying glasses.

For the amateur interested in viewing nebulae, however, light-pollution-reduction (LPR) filters are the innovation that's perhaps brought the most profound change. For observers under urban and suburban skies, one of these filters can make the difference between seeing many objects and not seeing anything at all.

A standard for me has been the filters from long-time accessory maker Lumicon (now owned by Optical Structures Incorporated). Recently, the company announced a "new and improved Generation 3" oxygen III filter, but I was skeptical. I've been using Lumicon O III filters since 1995, and they have performed admirably. While nothing in life is perfect, there didn't seem to be much room for improvement.

What is an O III filter? It's a filter that mainly passes the light emitted by the so-called "forbidden lines" of doubly ionized oxygen (O III for short) at 495.9 and 500.7 nanometers, while blocking light pollution that brightens our urban skies. Oxygen III is generally the dominant light emitted by planetary nebulae, and those are the objects an O III filter is best suited for observing.

A cursory inspection of the filters (I received both 1¼-inch and 2-inch formats for this review) left a positive impression. The coatings were uniform, and the filter cells are machined better than earlier models — each screwed smoothly into all of my eyepieces' filter threads. Both come in padded plastic storage boxes. Held up to the light, the new Generation 3 filters have a blue-green tint, unlike some older ones that impart a pinkish color.

A data sheet is included with a plot of the filter's transmission characteristics and a table showing the percentage of light blocked or transmitted at various wavelengths. The transmission percentages for the two spectral lines of doubly ionized oxygen are an impressive 97.7% and 98.2%, respectively. Equally impressive is the percentage of "bad" light blocked. For example, at 583 nm, near the 589-nm wavelength of sodium vapor streetlights, the report states the filter passed a mere 0.29% of the light.

While the filters looked good indoors, the real test is their performance under the stars. I didn't have the test equipment necessary to quantify the figures given in the report, but I did have my eyes, which have never failed me when it comes to evaluating astronomy products.

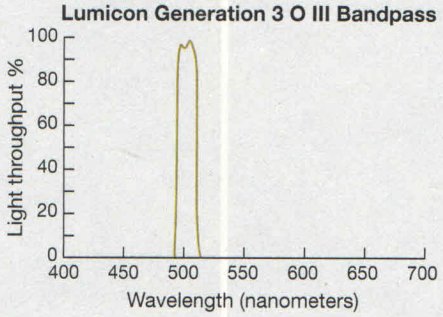
ALL IMAGES BY THE AUTHOR

I was lucky to be experiencing a lull in winter storms and was able to get into my suburban backyard with my 10-inch f/5 Dobsonian reflector one hazy evening immediately after receiving the filter. The first target was one of the best planetary nebulae in the sky, Messier 27, the Dumbbell Nebula.

After a few minutes hunting around at 50× without the filter, I swept up a faint, round glow in the field of the 25-mm wide-field eyepiece. Adding my older 2-inch Lumicon O III filter to the ocular confirmed the telescope was on the correct spot. With the filter in place, the nebula went from barely visible to showing hints of its apple-core shape. There wasn't much other detail visible, but the view was impressive considering the conditions, which now included a full Moon rising in the east.

I didn't expect much improvement when I replaced the original O III with the new Generation 3 filter. However, the view was undeniably better! The sky background was noticeably darker, and the nebula wasn't any dimmer than it had been looking through the older filter. In fact, it was more prominent, and as I stared, I began to see detail the original O III filter hadn't revealed.

Although the dumbbell shape was detectable with the older Lumicon filter, it wasn't easy. Most of the time M27 looked more like a rectangle. With the Generation 3 filter, however, curved arcs of nebulosity at either end of the nebula came into view, and the rectangle's center began to look narrower than its ends. There was also subtle dark detail within the nebula that was invisible with the older filter.



▲ The report supplied with the Generation 3 O III filter shows a roughly 10-nanometer-wide passband that includes both the 496- and 501-nm wavelengths emitted by doubly ionized oxygen in planetary and other nebulae.

How would the new filter perform on smaller planetary nebulae? Rising in the east was NGC 2392, Gemini's well-known magnitude-9.7, 48-arcsecond-diameter nebula. After locating the object with the 25-mm eyepiece, I switched to a 1¼-inch 4.7-mm ocular that yielded 266× in hopes of seeing some details. Adding an older Lumicon O III manufactured in the 1990s made the nebula easy to see, but it was lacking detail beyond that visible in the unfiltered view. It was a slightly oval gray ball with a brighter center.

The difference between the Generation 3 and the older Lumicon filters was even more readily visible here than it had been when viewing M27. With the new O III filter, not only was the sky background considerably darker, details that completely eluded the original Lumicon were visible.

Like all light-pollution blocking filters, the new O III filter dims the stars in the field. It's an unavoidable consequence, since their total light spans the spectral range, including the wavelengths of light pollution the filter is designed to block. The nebula's bright central star was still prominent, however. Despite the presence of the full Moon a mere 15° away, I also detected signs of the inner ring and dark detail that make the nebula resemble a face. These features are easy to see in long-exposure images but difficult to spot in an eyepiece.

While O III filters work best on planetary nebulae, they can help us see other nebulae as well, most notably supernovae remnants. The Veil Nebula in Cygnus was really too close to the horizon to observe when I tested the filter, but I could at least see traces of it with the Generation 3 filter. The 25-mm eyepiece alone or equipped with the older 2-inch O III filter didn't show a sign of it.

An oxygen III filter belongs in the accessory case of every serious deep-sky observer. One can dramatically improve views of planetary nebulae, not just under city or suburban skies, but also under dark skies. I've used many O III filters over the years, but the Lumicon Generation 3 Oxygen III filter exceeded the performance of any of them. It's one of those rare instances where "new and improved" really *is* "new and improved."

■ **ROD MOLLISE** can be found enjoying deep-sky observing at several star parties each year.

GRAPH: S&T ILLUSTRATION

▶ The Dumbbell Nebula, M27, was just visible in the author's 10-inch Newtonian under light-polluted skies *(left)*. Adding an older Lumicon O III filter began to bring the shape of the inner part of the nebula into view *(middle)*, while the outer arcs were only visible when using the Generation 3 filter *(right)*.