Dioptrx: Prescription for Perfection

By Dennis di Cicco Conceptually, as well as optically and mechanically, the Tele Vue Dioptrx ($98) is a simple device. But a chance observation made me really appreciate what this astigmatism corrector can do.

Our view of the heavens depends on the optical performance of our eyes as well as that of our telescopes. A twist of the scope's focus knob compensates for near- or farsightedness, but astigmatism — the aberration affecting nearly one in three adults, rendering stars as little dashes rather than sharp points — is more problematic. Observers with astigmatism typically have to wear their eyeglasses while looking through a telescope.

Dioptrx transfers correction for the eye's astigmatism from eyeglasses to a lens atop the telescope's eyepiece. Serious observers will find that the pros of this approach far outweigh any cons. A big advantage is that Dioptrx is a high-quality, multicoated glass lens made to fit more than two dozen Tele Vue eyepieces (there's a list at www.televue.com). One of the few negatives is that a Dioptrx-equipped eyepiece isn't convenient for a group of people taking turns with a telescope, though the corrector can be removed in seconds (which also makes it easy to transfer among eyepieces).

Not every observer with astigmatism needs correction at the telescope, but determining who does and who doesn't isn't an exact science. Those with significant astigmatism generally need correction. It's also more of an issue with low-power optical systems having exit pupils that approach the 7-millimeter maximum of the typical eye. (You calculate the size of the exit pupil — the light bundle exiting an eyepiece — by dividing the eyepiece's focal length by the telescope's focal ratio, or f/number.)

Your eyeglass prescription tells what, if any, astigmatism you have. It's usually called "cylinder," and is given as a plus-or-minus (±) value in diopters. For the purpose of selecting the right Dioptrx, the ± is irrelevant (as is the angle); you need only know the absolute value in diopters. Observers with 2 diopters of astigmatism often see its image-degrading effects with exit pupils as small as 1 mm. My minor 0.5-diopter astigmatism isn't particularly obvious until the exit pupil reaches 4 mm or larger. Your mileage may vary.

Dioptrx lets you see pinpoint stars in the eyepiece without wearing your eyeglasses. Simple enough. I tried it, and it works nicely. End of story — or so I thought. Last spring I fitted a Dioptrx to a 35-mm Panoptic eyepiece and turned the TV-NP127is toward the Double Cluster in Perseus. There's a reason why every astronomy author through the ages has lauded this pairing of open star clusters as one of the finest targets for amateur telescopes. To see the Double Cluster at a magnification of 19× swimming in the Panoptic's 3.3° field with perfect, tack-sharp stars was proof I didn't really need.

But as I was scanning the field for the orange tint of red-giant stars, something singular happened. In the tranquil moment of that chilly evening, the telescope just seemed to melt away. It was as if there were nothing between me and the stars, not even my eyeglasses. Were it not for a lone spring peeper calling out for a mate, I could imagine myself floating in space looking at an infinite starry sky. It was a moment of observing Nirvana.

It was also a moment that made me understand what Tele Vue founder Al Nagler means by optics that "do no harm." *S&T* columnist David Levy profiled Nagler in the June 1999 issue (page 99). The story of boy telescope maker growing up to establish a successful company isn't unique. Celestron, Meade, Astro-Physics, and a host of smaller companies were built on similar foundations. But Tele Vue's milestones, either by chance or by design, have always brought wide, breathtaking views of the starry sky to more and more observers.

S&T: DENNIS DI CICCO

With the right Dioptrx lens attached to an eyepiece, observers suffering from astigmatism can enjoy pinpoint stars without needing to wear prescription eyeglasses. Although custom made to fit more than two dozen Tele Vue eyepieces, Dioptrx's 43-mm-diameter (1.7-inch) mounting ring can be jury-rigged to fit other eyepieces.

My experience with the Double Cluster made me think of Glenn E. Shaw's article on rich-field telescopes (*S&T:* March 1980, page 192). Like others before him, Shaw pondered what type of telescope would show the most stars in a single view. But he also rationalized that lots of easily seen stars would trump a view of stars teetering at the limit of visibility. He concluded that a 5-inch f/5 refractor with a 33-mm eyepiece was the perfect instrument. "The magnification is 19×, and the exit pupil 6.6 mm across," he wrote. "This little telescope is potent — it provides truly breathtaking views of some two hundred billion suns in our galaxy."

By dumb luck, my view of the Double Cluster was with Shaw's ideal prescription. But I also had the luxury of uncompromising optics (something that Shaw didn't enjoy a quarter century ago with his achromatic refractor and Erfle eyepiece). I'd say it doesn't get any better than that, but knowing Nagler and Tele Vue, I wouldn't bet we've heard the last word on this subject.