

The Niche of the Refractor

Recently someone asked me what I thought was the niche of the refractor, among amateur telescopes. I think several are involved.

1) Low-magnification 50 mm refractors are perhaps the most popular astronomical instruments in the world: They come in pairs, as binoculars. There are other sizes, of course. Worthy lines I have used include Adlerblick, Fujinon's "Polaris", and Orion's "Giant", "Ultrasopic", and "Vista".

In this niche, refractors are without competition.

2) The example of binoculars shows that it is easy to make a small, low-magnification, wide-field refractor. Many manufacturers have done so. Spotting telescopes, and instruments based on binocular objectives, are good examples, as are the 63 mm Brandon and the Tele Vue Ranger and Pronto. Many such telescopes can also be used at high magnification, thus making them compact general-purpose telescopes, albeit small ones.

It is possible to make such telescopes that are not refractors, but many designs, such as fast Newtonians, have off-axis aberrations and loss of image contrast because of a proportionately large secondary. Better designs are expensive. And insufficient field of view at low magnifications is the bane of small compound telescopes.

3) Small refractors can be robust, simple, functional, and -- at long focal ratios, at least -- inexpensive. Not all have these qualities: Most junky "department-store telescopes" are small refractors. Yet from time to time the industry produces a good 50 or 60 mm refractor at a price with which no other commercial telescope can compare. Over the last several decades, one brand -- Tasco -- has been consistent about offering the best and the worst of such instruments. Celestron, Meade, and Orion have also entered this market regularly.

There are other ways to make inexpensive beginner telescopes. Unfortunately the obvious alternative -- the three-inch long-focus (say, f/10) reflector -- is less in vogue today than a generation ago.

4) High-quality refractors offer the best astronomical optical performance technology provides, at any given amateur-sized aperture. They do so at a price which is also astronomical, even at sizes as small as six inches, but appeal to technophiles and perfectionists even so. Well-known recent marques in this league include Astro-Physics, Brandon, Takahashi, Tele Vue, Unitron, Vixen, and Zeiss.

Other technophiles' telescopes include high-end Maksutovs (Intes, Quantum, Questar) and high-end Schmidt-Cassegrains (Takahashi). Yolos, Schiefspiegler, and Solanos can offer performance for a given aperture in the same league as refractors, but they are often much bulkier

designs, and often harder to keep in collimation.

5) High-quality refractors of medium speed and faster, up through about four or five inch aperture, are more compact than the tripods and mountings they ride upon, thus are good candidates for compact, portable telescopes, to load quickly into small cars and set up quickly at remote sites. Viewers who seek lunar and planetary detail, and perhaps double stars, may find them preferable to the eight-inch Schmidt-Cassegrain Telescopes (SCTs) which are their rivals in compactness. The SCTs gather more light, which is why some prefer them. Yet it is rare to find an eight-inch SCT which does as well as, say, a 130 mm Astro-Physics, on low-contrast, extended, detail. Furthermore, if you buy from a manufacturer who guarantees an SCT of that quality, you will pay a good deal more than for the Astro-Physics.

Other easily car-portable telescopes include compound units to eight or ten inch aperture, and fast Newtonians to six or eight inches.

6) Refractors generally come to thermal equilibrium much faster than other telescopes of the same aperture. Thus they are desirable instruments for quick-look viewing, in which the observer takes a telescope from a warm storage area into the cold outdoors for brief use. That quality is made more important by the fact that most quick looks will be in cities or suburbs, where bright sky restricts viewing to the Moon, planets and double stars, which need maximum optical performance.

Small reflectors with primaries made of low-expansion materials could be equally quick to settle in, but such instruments are rare.

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