The Night Sky By Eric Erickson

Offered Title: Mirror…Mirror

I'll admit it, I'm a refractor guy. The high contrast they produce just gets me. Nevertheless, the most popular and widely used telescopes use a mirror as the mechanism for focusing light. Why? Bang for buck. Well-made reflector telescopes produce very nice images and are usually way less costly.

Let's take a look at two common reflector telescope designs.

Newtonian: Sir Isaac Newton is credited with inventing it.

This is the basic reflector telescope, with a concave primary mirror at one end that focuses light at the other end of a tube. Well, it's not quite that simple. You cannot simply stick your head at the focus point because it gets in the way, it blocks the very light you want to focus. Newton had to come up with a way to keep his head out of the light stream and figured a second, much smaller mirror near the focus point would do the trick. Newton angled this mirror so it reflected the focused light from his primary mirror out the side of his telescope. There is still an obstruction, but much smaller, so it does not affect the light too much. Today's Newtonian reflector telescopes use the same principle. They are relatively simple, easy to make, and unlike refractors, do not greatly escalate in price as size increases.

There are variants of the basic Newtonian design that improve its performance. They employ a corrector lens covering the front end that corrects specific aberrations inherent with all concave mirrors. This combination of a corrector lens (refraction) and mirror (reflection) results in a new name for these telescopes. They are called catadioptric and depending on the end purpose, one of two types of corrector lens is used. A Schmidt design lens is used for wider views (Schmidt Newtonian), or a Maksutov design lens is used for power and better contrast (Maksutov Newtonian).

Cassegrainian: Attributed to Laurent Cassegrain

This reflector telescope also uses two mirrors but instead of directing the light sideways, this telescope's secondary mirror directs and focuses it straight back. Yes, right back toward the primary mirror. There is a hole in the primary that lets the reflected light pass through. This makes for a compact telescope as the light is folded backward. The Cassegrain design is also subject to aberrations, but is improved using Schmidt or Maksutov correctors, giving the names Schmidt-Cassegrain or Maksutov -Cassegrain telescopes. Sound familiar? Good old Schmidt and Maksutov come to the rescue and again.

Seems the addition of refractor elements has real advantages for reflector telescopes.

Any down side? Most reflector telescopes have an obstruction (the secondary mirror) and this does lower image contrast. Bigger obstruction equals lower contrast.

What's in the Sky?

On or around April 15th look for comet 41P/Tuttle-Giacobini-Kresak in Ursa Minor (little dipper), southeast of the cup's end. You will need a telescope or binoculars.