

Offered Title: Astrophotography 5 – Camera Optics

I have spent 4 columns talking mostly about cameras, to give you a basis for understanding how varied astrophotography is. Not much was made of optics other than a cursory mention. So, in the next articles I correct that snub.

Try to avoid “slow” optics unless you work with a tracking mount. Slow in optical parlance means their f number (ratio of focal length to aperture (lens opening)) is large. For example, my wife’s point and shoot camera lens has an f number of 6.3, a bit large. This is not so good as it starts out needing longer exposures for a given ISO speed in low light. Her smart phone has an f number of 1.7, small. This is good. It allows for shorter exposure times, and not relying so much on high ISO speed. So, a large f number starts you out needing to increase ISO speed and/or exposure time. This is an important fact when deciding what to photograph.

This fact is universal when it comes to photography, especially astrophotography. Your exposure time increases as f number increases. For example, f4 needs only half the exposure time as f8. This can be the difference between a sharp and a blurry shot.

With DSLR/MILCs your options are numerous. Most manufacturers produce “fast” versions of optics, of course at a price. For example, if you want to shoot our home galaxy, the Milky Way, in context with hills, water, trees, etc., a good optic to choose is a wide-angle lens with an f number of 1.4 to 1.8. Manufacturers usually make these lenses so they are sharp even at f 1.4 or 1.8. This allows for a reasonable exposure time of around 20-30 seconds at a reasonable ISO of 1600, on a tripod. With a wide angle, 20-30 second exposures can still produce near pinpoint stars.

The same goes with longer focal length lenses. Without a tracking mount though exposure times need to be as short as possible. Capture constellations with 50-100mm focal length lenses, 8-10 second exposure, ISO 800-1600, f1.4-2.8. Experiment. Aim at the Teapot in Sagittarius and capture all kinds of nebulae and star clusters in our Milky Way. You can get nice shots of the Moon with a 400mm or longer lens. Keep the shutter speed at 1/125 second or faster. Prices can skyrocket for these lenses if the f number is kept small, such as f 2.8 or 4. A telephoto with an f number of 5.6 will be fine for the Moon because it is so bright. Of course, a tripod will likely be needed to keep it steady and sharp.

Zoom lenses are a flexible option, but the same rules apply. Also, they might or might not be sharp at their widest aperture.

What’s in the Sky?

Jupiter is beautiful all-night long. The Moon and Saturn get close in the southwest at dusk on the 9th and dawn on the 10th.