Astrophotography With a Portrait Lens

Creating more detailed astrophotos requires a boost in focal length.

Portrait lenses are popular among professional photographers because they create a flattering perspective of people's faces while simultaneously blurring the background, helping separate the subject from its surroundings. Such lenses typically have focal lengths between 70 and 200 mm, with appealingly fast apertures often starting at f/1.2 to f/2.8. These specifications also make portrait lenses excellent options for a lightweight, high-performance astrophotography system. However, before you invest in a new lens, consider both its advantages and disadvantages for the types of images you want to create.

I'm a big fan of taking a structured approach to astrophotography. This means only buying additional gear if it makes sense for your budget and level of experience. Don't underestimate what you can accomplish with only a budget camera, a kit lens, and a sturdy tripod. (I described such an approach in the February 2023 issue, page 54.) Once you have some real-world experience imaging under the night sky, you'll be better able to evaluate what additional gear you might need.

A Speedy Upgrade

A first purchase is often a better lens. The main problem with the inexpensive lens that your camera came with is that it's probably fairly slow at the upper end of its zoom range — typically f/5.6 or narrower. This limits its light-gathering ability, which leads to significantly longer exposures.

A faster lens not only allows shorter exposures, it produces a much brighter image, which makes focusing on faint objects easier. The auto-focus systems on some cameras struggle with the dim light of the stars. Often, you'll need to switch your lens to manual mode and

▲ **85-MM NORTH AMERICA** The Canon EF 85mm f/1.8 USM lens is one of the author's favorite, budget-friendly astrophotography options. When mounted on an APS-format, or cropped-sensor camera (such as the astro-modified Canon 60D used for this photo), it offers sky coverage equal to a 136-mm lens on a full-frame camera. For this 2-minute exposure of the North America Nebula, the camera was set to ISO 3200 with the lens wide open, while an iOptron iEQ30Pro equatorial mount tracked the night sky.

ALL IMAGES COURTESY OF THE AUTHOR

STELLAR VALUES Three of the author's favorite portrait lenses for astrophotography are (left to right) Canon's EF 85mm f/1.8 USM lens, the EF100mm f/2.8 Macro USM, and the EF 70-200mm f/2.8L USM zoom lens (shown here attached to a Canon EOS R7 mirrorless camera with an EF-EOS R Mount Adapter. All three are available at deep discounts on the used equipment market.

use *live view* to zoom in and focus on a bright star or planet. The brighter image of a fast, high-quality lens simply makes it that much easier to achieve perfect focus. And sharp focus is critical for satisfying photos.

A fast lens is good, but you have to give some thought to the type of images that you want to create before you can figure out what focal length is going to be most useful. If you're mainly interested in wide-field astrophotography, such as landscapes with the Milky Way or an auroral display, you'll benefit most from an ultra-wide-angle lens. This will enable you to shoot short exposures (less than 30 seconds) from a fixed tripod without getting star trails. However, if you want to zoom in on specific deep-sky objects, such as nebulae and galaxies, you should look at something with a longer focal length. This is where portrait lenses excel.

Stellar Portraits

Portrait lenses sit in a kind of Goldilocks Zone — they produce a sufficient image scale to show details in individual objects, without being so large that they require a heavy-duty tracking mount. Plus, their typically wide apertures make them ideal candidates for imaging in the low-light conditions that typify night-sky photography.

Used on a full-frame camera, the 70-mm end of the portrait-lens range lets you capture entire constellations and large deep-sky objects, such as the North America and Pelican nebulae. At the longer focal lengths (up to 200 mm), individual clusters, nebulae, and the nearest galaxies start to reveal a surprising amount of detail.

Keep in mind that if your camera has the smaller APS-C-sized sensor, you'll need to do a little math to figure out the equivalent focal length a given lens will yield. Simply multiply the actual focal length of the lens by your camera's crop factor. The 1.6× crop factor of Canon cameras means that a 100-mm lens provides the same field of view as a 160-mm model on a full-frame camera. (For Nikon, Sony, and Fuji cameras, the conversion factor is 1.5×.)

In fact, if you own an APS-C camera body you can get into portrait-lens territory with the popular 50-mm prime lens. Often referred to as a "nifty fifty," these are often the most inexpensive option in a manufacturer's lineup. And despite its low price, a standard 50-mm lens delivers exceptional optical performance and offers aspiring astrophotographers an ideal starting point. Importantly, with a typically wide f/1.8 aperture, such lenses deliver over 10 times more light than a f/5.6 optic. The only downside is that a 50-mm lens lacks the magnification of longer-focal-length lenses, meaning they don't deliver as much detail in deep-sky objects.

Traditional Values

Because portrait lenses are so widely used by professional photographers, they can usually be found on the used market at reasonable prices. This is especially true if you're willing to use an adapter ring to mount an older model on systems that have changed their lens mounts in the past few years. You can save even more by avoiding options like image stabilization and auto-focus. These features are great for actual portrait photography, but you don't need them for imaging the night sky.

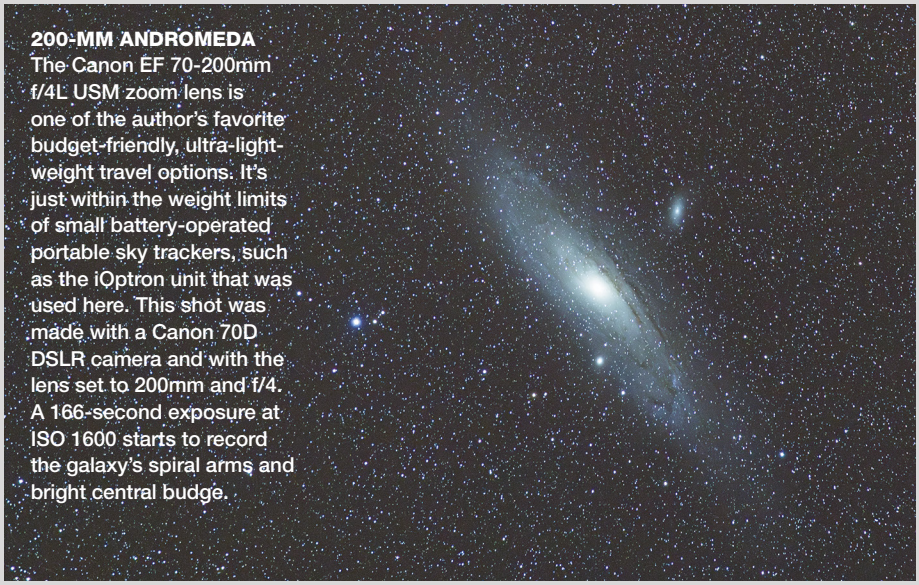
Although I've emphasized how useful fast optics are, you probably should stay away from ultra-fast portrait lenses (such as f/1.2). Not only are these models extremely expensive, but they typically suffer from poor image quality off-axis. This flaw is difficult to spot in portraits with their blurry backgrounds, but it's obvious in astrophotos. An aberration, called *coma*, turns stars near the edges of the frame into comet-like streaks — and it can't be fixed with image-editing programs like *Photoshop*. The only way around the problem is to reduce the aperture by a stop or two, but then it's no use paying a premium for an f/1.2 lens if you can only use it at f/2.8. You might as well save money and buy a lower-priced, slower model that performs just as well at the apertures you actually shoot with.

As a Canon user, two of my favorite portrait lenses are the Canon EF 85mm f/1.8 USM and the EF 100mm

ALONG FOR THE RIDE If your telescope has an equatorial mount, chances are the optical tube assembly can be replaced by a camera attached to a dovetail bar (such as the short version manufactured by ADM shown at right). Here, the author's Canon EOS 60D is attached to a Canon EF 70-200mm f/2.8L USM zoom lens riding on an iOptron iEQ30Pro equatorial mount.

f/2.8 Macro USM. The Sigma 85mm F1.4 DG HSM Art lens is also a strong performer. Happily, these models can usually be found on the used market at substantial savings.

Longer-focus lenses operating at 135 to 200 mm are some of the most compelling options for astrophotography with their ability to reveal significant detail in many deep-sky targets. The Canon EF 135mm f/2L USM lens is an excellent choice, as is the Sigma 135mm F1.8 DG HSM Art lens. At the upper end of the portrait range, older lenses like the Canon EF 200mm f/2.8L II USM are available used at hefty discounts.



200-MM ANDROMEDA The Canon EF 70-200mm f/4L USM zoom lens is one of the author's favorite budget-friendly, ultra-light-weight travel options. It's just within the weight limits of small battery-operated portable sky trackers, such as the iOptron unit that was used here. This shot was made with a Canon 70D DSLR camera and with the lens set to 200mm and f/4. A 166-second exposure at ISO 1600 starts to record the galaxy's spiral arms and bright central budge.

Stop the Earth

Of course, as the focal length increases, Earth's rotation becomes an increasingly significant factor. Shooting from a stationary tripod restricts exposures to a few seconds or less to preserve pinpoint stars. While short shutter speeds might be sufficient to capture conjunctions of the Moon and planets, photos of galaxies, nebulae, and clusters require much longer exposures. This means you'll need some way of tracking the stars.

If you own a telescope on a motorized equatorial mount, you can buy (or make) an inexpensive piggyback adapter that allows your camera to come along for the ride as your scope tracks the stars. The main downside to this approach is that it adds extra weight, which may impair your mount's tracking performance. Alternatively, assuming your mount has a standard dovetail system, you can simply remove the telescope and attach your camera in its place via a small aluminum dovetail plate, which you can acquire from most telescope vendors.

Another route to pinpoint stars is to purchase a dedicated, battery-operated sky tracker (*S&T:* Feb. 2022, p. 54). There are several different makes and models to choose from, and they're all much smaller and lighter than a typical telescope mount. Because of this, star trackers make excellent travel companions when a full-sized mount might be impractical. These units will fit in your carry-on bag for a winter vacation, or in your backpack for a summer camping trip.

Either option will allow you to record images for up to several minutes at portrait-lens focal lengths, opening a universe of deep-sky imaging possibilities. Even if you plan to bring your telescope with you, sometimes it's nice to have a separate mount dedicated to astrophotography. That way you can enjoy viewing objects in your scope while your camera clicks away nearby.

▶ **SKY TRACKER** A portable, battery-operated tracking mount, such as the iOptron SkyTracker Pro shown here, permits the use of lenses that have longer focal lengths without the risk of star trails. The tracker mounts in between your existing tripod and ball head, to create an ultra-portable system.

Cosmic Zooms

Finally, while most of my recommendations are fixed-focal-length primes, there are other notable options. Many manufacturers offer extremely high-quality zoom lenses that work well over their entire range. For example, the Canon EF 70-200mm f/2.8L USM (the version without image stabilization) is an excellent value for astrophotography. You can save even more money (and weight) by selecting the f/4 version of this lens. In fact, because of its high-quality optics and versatility, this is one of my all-time favorite lightweight travel lenses to pair with a small tracking mount.

Using a portrait lens for astrophotography presents some additional challenges compared to a simple, wide-angle lens used with a fixed tripod. But the reward for your efforts is stunning images that reveal rich detail and color in your celestial subjects.

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