

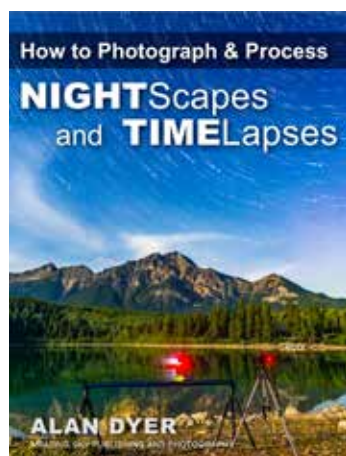
Astronomy's sixth annual STAR PRODUCTS

by Phil Harrington

Manufacturers from around the world continue to introduce innovative products that enhance the amateur astronomer's quality of life. Here are 35 noteworthy astro-wares, arranged in alphabetical order by manufacturer, that have caught the attention of our non-resident equipment expert during the past year.

1 AMAZING SKY PUBLISHING ▶ *Nightscapes and Timelapses*

Just as our hobby is changing in light of the digital age, publishing also is evolving. Embracing the revolution, Canadian author Alan Dyer has self-published the e-book *How to Photograph & Process Nightscapes and Timelapses* on wide-field astrophotography. As the title implies, the text focuses on shooting nighttime landscapes — stills as well as time-lapse movies — of the Moon and stars using DSLR cameras. But this is no ordinary e-book. Dyer includes many embedded videos and step-by-step tutorials covering cameras, software, and astronomy basics.



2 ARCTURUS LABS ▶ Magnifi

Many adapters allow you to couple your iPhone to your telescope for quick shots of the Moon, but only the Magnifi serves the dual purpose of adapter and case. A clever two-piece bayonet design locks the removable eyepiece adapter to the case with a simple counterclockwise twist. The manufacturer constructed the Magnifi from impact-resistant polycarbonate plastic and wrapped the phone's body with a stainless steel band.



3 ASTRO-PHYSICS ▶ 1100GTO German Equatorial Mount

Astro-Physics is famous for fine refractors and rock-steady mounts. They don't come any better, and that includes the company's sturdy 1100GTO German Equatorial Mount. Designed for up to 8-inch refractors and 16-inch catadioptrics, the 1100GTO features internal cabling, error-free tracking, and zero backlash, all in a portable design. The 1100GTO allows for continued tracking past the meridian, an important plus for long-exposure imaging that can last many hours.

4 ASTROSYSTEMS ▶ Dew Guard

Newtonians are great in damp environments because, unlike refractors and catadioptric instruments, their long tubes with no front lenses usually keep dew from forming on the optics. Unless your Newtonian doesn't have a tube, that is. Truss designs cool the mirrors faster but leave the optics exposed to dampness. While cloth light shrouds keep primary mirrors fog-free, secondary mirrors at the front of the truss remain susceptible. AstroSystems' Dew Guard secondary mirror heating system pastes a circuit board to the back side of the secondary to automatically sense the ambient air temperature and compare it to the mirror's temperature. It then maintains the secondary at an adjustable preset temperature just above that of the air. If you live in a damp environment, this could extend your viewing time for hours after everyone else has packed up.



5 CELESTRON ▶ Rowe-Ackermann Schmidt Astrograph

For those advanced deep-sky astrophotographers looking to augment their arsenal with a large-aperture, fast-focal-ratio system, Celestron's 11-inch "RASA" could be your next purchase. Optical designers Dave Rowe and Mark Ackermann have come up with an update to Celestron's classic Schmidt Camera that accepts both 42mm T-thread and 48mm camera adapters. This means that dedicated CCD imagers as well as popular DSLR cameras can produce outstanding results when coupled to this fast, large instrument.



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6 CELESTRON ▶ NexStar Evolution 9.25

Celestron's RASA is for photos only, but its new NexStar Evolution 9.25 is for everyone. As the name implies, this instrument raises the bar to the next level. The NexStar Evolution 9.25 is the first Schmidt-Cassegrain telescope with integrated Wi-Fi. That means you can forget a separate hand controller. Instead, the Evolution's built-in Wi-Fi syncs to your smartphone or tablet (iOS and Android), allowing you to control the night using Celestron's SkyPortal app. The built-in lithium-ion rechargeable battery promises up to 10 hours on a single charge.



7 CHATTANOOGA MILLWORKS ▶ ZLOMOTION

No doubt about it, manual Dobsonian mounts used with Newtonian reflectors are wonderfully simple to use — except when it comes to tracking. Enter the ZLOMOTION dual-axis slow-motion control system, available for most popular 8- to 12-inch instruments. By turning a pair of micro-adjustment knobs, the observer can slowly tweak the telescope's aim without losing a challenging object. To change vertical aim, the ZLOMOTION system uses a dual-rod device attached between telescope tube and ground board. Tweak the horizontal aim by twisting a second wheel attached to a belt-driven pulley system mounted to the base. To make large altitude changes, loosen a lock on the sleeve.



8 DAYSTAR INSTRUMENTS ▶ Quark

If you own a small f/4 to f/9 refractor and long for stunning views of solar prominences, filaments, and other chromospheric features, Daystar's all-in-one Quark Hydrogen-alpha (H α) eyepiece filter is for you. The unit combines a 4.2x telecentric Barlow lens, adapters, and an electronically controlled, temperature-regulated H α filter into one simple assembly that slips into your scope's focuser. Two models are available, one optimized for prominences and a second for the chromosphere.



9 EXPLORE SCIENTIFIC
▶ Twilight I

Explore Scientific's Twilight I alt-azimuth mount and included matching tripod make a perfect grab-and-go pair for a quick mid-week viewing session through your small- to medium-sized refractor or catadioptric scope. The combo has a payload capacity of 15 pounds (6.8kg) and mates with any telescope that uses a Vixen-style dovetail bracket. Further, you can tilt the mount's head to 45° for easier viewing near the zenith. Flexible cables attached to slow-motion controls on both axes turn smoothly and easily, even if you are wearing gloves.



10 FOX
▶ *Cosmos*

Rather than simply remake the classic Carl Sagan PBS miniseries *Cosmos*, Sagan's widow, Ann Druyan, and *Family Guy* creator Seth MacFarlane followed their own unique path for bringing the universe into our homes. Now available on Blu-ray, *Cosmos: A Spacetime Odyssey* uses spectacular imagery and well-written dialogue narrated by Neil deGrasse Tyson. The new *Cosmos* tells two stories: one about the universe and the other of how we humans continue to figure it out.



11 HOTECH
▶ Advanced CT Laser Collimator

There are plenty of laser collimators for reflectors, but few designed specifically for Schmidt-Cassegrains. HOTECH addresses this dilemma with its Advanced CT Laser Collimator. Consisting of three perfectly aligned lasers attached to a bull's-eye target, the beams simulate parallel rays of starlight. By installing the supplied Reflector Mirror into the

focuser and aligning the target and telescope, the laser beams pass through the telescope twice and back onto the target. Adjust everything per the instructions, and you have a collimated telescope ready to go.



12 IOPTRON
▶ SkyGuider

All of iOptron's mounts are among the best sold today, including this portable equatorial dedicated to guided night-scape photography through your DSLR. Sharing some of the same mechanics as the company's iEQ25 telescope mount, the SkyGuider can track reasonably heavy cameras and lenses across the sky. You can attach ball heads to the mount's cradle as well as to the end of the counterweight shaft, allowing two cameras to operate simultaneously.



13 JMI TELESCOPES
▶ MOTOFOCUS



JMI is well known for its innovative accessories for all brands and models of telescopes. Recently, the company has expanded its line of MOTOFOCUS electric focusers to include retrofit kits for Crayford focusers made by Guan Sheng

Optical, found on some of today's most popular instruments. The MOTOFOCUS attaches directly to the focuser without drilling. Once it's in place, just attach the hand controller to the MOTOFOCUS using the supplied coiled cable. A 9-volt battery in the controller powers the MOTOFOCUS' motor, while push-buttons on the box control the direction of focuser travel. A three-position switch adjusts the focusing speed.

14 KENDRICK ASTRO INSTRUMENTS
▶ Camera-Cozy

Does dew do you in when you're photographing the sky? Kendrick, known for its innovative anti-dew systems, now sells one designed to keep your camera lens clear of dew and frost-free all night. The Camera-Cozy includes a wrap-around heater strap for the lens, a controller to regulate temperature, and an unheated "body sock." The body sock slips over your DSLR to keep the internals dry but cool to prevent introducing image noise. Kendrick also offers several 12-volt battery packs to power the heater.



15 MALLINCAM
▶ Pro Dob II

Have a Dobsonian and want to try your hand at astrovideography? MallinCam's new Pro Dob II camera is designed with you in mind. Housed in a 2-inch-diameter tube, the Pro Dob II slides into your focuser just like an eyepiece. Powered by 12 volts DC, the Pro Dob II electronically triples a telescope's aperture, instantly displaying a color

or black-and-white image (your choice) showing details invisible through an eyepiece. The company includes a specially designed 2" C-mount adapter and a 0.5x focal reducer, and sells an 8-inch LCD monitor separately.

16 NIKON
▶ D810A

Earlier this year, Nikon introduced its first DSLR camera designed specifically to capture the vivid Hydrogen-alpha (H α) red wavelength (656 nanometers) so prevalent in emission nebulae. In the D810A, Nikon uses a specially constructed optical filter it attaches to the front surface of the camera's 36-megapixel CMOS sensor to gain four times greater transmission of H α than its standard D810. The D810A, like its predecessor, can enlarge the live view through the lens up to approximately 23x for better focusing accuracy.



17 OPTIQUES FULLUM
▶ 50-inch telescope

Got aperture fever? Award-winning Canadian telescope maker Normand Fullum has the cure. Optiques Fullum makes custom telescopes, including a 50-inch f/3.5 folded Newtonian reflector. Fullum manufactures everything in-house, including the "Techno-Fusion" honeycombed primary mirror. The folded design, which adds a mirror between the primary and



the elliptical secondary, lowers the height of the eyepiece by about 50 percent, which means most observers can reach the eyepiece by climbing only three steps. The open truss instrument comes equipped with the ServoCat/Argo Navis GoTo System. And despite the telescope weighing an estimated 1,400 pounds (635kg), a person can move it in altitude or azimuth with just one finger.



18 ORION
▶ EON 130mm ED Triplet Apochromatic Refractor Telescope

It's tough to design a telescope that satisfies the demands of astrophotography and produces great visual views of star clusters and nebulae, all while maintaining a down-to-earth price. But Orion's EON 130mm ED succeeds. The secret to its performance is the 5.1-inch air-spaced triplet lens made with extra-low dispersion glass. Its f/7 focal ratio suppresses spurious false color, while three internal baffles eliminate contrast-robbing reflections. The EON comes with a solid 3" dual-speed rack-and-pinion focuser, tube rings, and a custom-fitted hard case.

19 ORION
▶ Mini Deluxe Pro AutoGuider Package

One of the biggest obstacles to successful astrophotography is accurate tracking. Orion's Mini Deluxe Pro AutoGuider Package offers a solution for observers who use telescopes up to a focal length of 1,500mm. The heart of the system is a compact 50mm guide scope coupled to the company's StarShoot AutoGuider Pro monochromatic camera. This pair attaches to the side of the imaging telescope using a standard finder scope dovetail base, which Orion supplies. Weight isn't an issue, since the system adds a scant 21.2 ounces (600 grams) to your system. And tracking accuracy is excellent.



20 QUANTUM SCIENTIFIC IMAGING

► QSI 690

Quantum Scientific Imaging built its advanced line of QSI 690 cameras around Sony's 9.19-megapixel ICX814 CCD sensor. The ICX814 chip offers remarkable sensitivity with peak quantum efficiency (how much of the light gets captured) of more than 75 percent. That, coupled with its wide dynamic range, low noise, and available internal color filter wheel, integrated guider port, and mechanical shutter, makes the QSI 690 a great choice for anyone looking to take the next step into the realm of advanced astrophotography.



21 SCOPESTUFF

► RED Dot Finder for SLR Hotshoe



If you use a dedicated camera drive, such as Sky-Watcher USA's Star Adventurer (No. 23), then you know the challenge of aiming your camera toward a specific part of the sky. Images in viewfinders are just too faint to see much of

anything. ScopeStuff offers a red dot finder that makes aiming a snap. The unit comes with a bracket designed to slip into an SLR's hotshoe base. Simply adjust the aim of the finder as you would on a telescope, secure the locking thumbnut at the base, and adjust the red dot's brightness to your liking.

22 SKY-WATCHER

► StarGate 18" Dobsonian

Sky-Watcher's new 18-inch f/4 Dobsonian packs a lot into little space. Its all-aluminum truss-tube design combined with a ribbed Pyrex primary mirror keeps weight to an absolute minimum. Standard accessories include a Crayford focuser, a right-angle finder, and a cloth light shroud. Word is that Sky-Watcher also will be offering a go-to upgrade kit in the near future.



23 SKY-WATCHER USA

► Star Adventurer Photo Package

Sky-Watcher USA designed its Star Adventurer Photo Package for creative astrophotography and time-lapse imaging. After a user attaches the Star Adventurer to a heavy-duty camera tripod (or optional equatorial base) and aligns it with the celestial pole, the Star Adventurer will track the sky at sidereal, solar, or lunar rates. It also offers automatic DSLR shutter-release control and includes other preprogrammed settings that allow you to create spectacular time-lapse videos.



24 SOFTWARE BISQUE

► TheSky Mobile

Many would say that the planetarium software market was born in 1983 when Software Bisque introduced *TheSky* for DOS. Today, several iterations later, *TheSky* has expanded into the mobile device market with the introduction of *TheSky* Mobile for iPhones and iPads. The product retains many popular features from the desktop version, including expandable object databases and field-of-view overlays, while also adding Wi-Fi telescope control that lets you operate your telescope directly from your device.



25 SONY

► α7S



This changes everything. With a 12-megapixel full-frame 35mm sensor, the Sony α7S is designed to shoot in extremely low light conditions at astronomically high ISO settings up to 409,600.

Admittedly, there is a lot of "noise" at that extreme setting, but it allows you to set up a shot before shooting at a lower speed setting. At ISOs around 50,000 with quick exposures, unguided wide-field images taken with the α7S record amazing detail in Milky Way star fields. As astrophotographer Ian Norman said in his online review, "The α7S is so sensitive that it almost overexposed the Milky Way!"

26 STARGAZER STEVE

► 8-Inch f/6 Ultimate Reflector Kit

Telescope making used to be a mainstay of amateur astronomy. For those who still enjoy that creative aspect of our hobby, Steve "Stargazer Steve" Dodson, an award-winning telescope maker from Sudbury, Ontario, offers the 8-Inch f/6 Ultimate Reflector Kit. His unique product combines the advantages of a solid-tube telescope with the portability of truss-tube design. The kit includes the optics, cardboard tube, rack-and-pinion focuser, birch plywood mount, and Teflon bearings.



27 STARLIGHT XPRESS

► Lodestar X2 Autoguider



Sony's low-noise ICX829ALA EXview HAD CCD II detector powers Starlight Xpress' new Lodestar X2 imaging and autoguiding camera. Sensitivity is excellent, with an impressive quantum efficiency of 77 percent. The large 6.45mm by 4.75mm imaging area makes finding and acquiring a guide star easy. At the size of an eyepiece and weighing just 3 ounces (85g), the Lodestar X2

slips into a standard 1¼" focuser. Two connections are available, a USB 2.0 Mini interface for power and direct imaging and an RJ12 connector to accurately guide your mount.

28 STELLARVUE

► SV60EDS APO

With Stellarvue's new SV60EDS apochromatic refractor, small is big news. At the core of it all is a 2.4-inch f/5.5 doublet objective that features one element made from O'Hara FPL-53 glass. FPL-53 is well known as one of the finest materials for smothering unwanted chromatic aberration and boosting contrast. This little guy weighs a trim 3 pounds (1.4kg) and comes with a 2" dual-speed rack-and-pinion focuser, a mounting ring, and a foam-padded airline carry-on case. A photographic field flattener is available optionally.



29 SURPLUS SHED

► "The Amateur Scientist" on CD-ROM



For more than seven decades, *Scientific American* ran a regular column devoted to shade-tree scientists. Topics covered every field of science, from astronomy and archeology to chemistry and physics. Now, more than 1,000 of these, complete with original photos and diagrams, have been compiled on CD-ROM that works with Windows, Mac, Unix, and Linux. If you're a tinkerer, this is a must-have.

30 TAKAHASHI

► Quadriceps Turret Revolution

As with everything branded Takahashi, the Quadriceps Turret Revolution four-eyepiece holder is solidly made. The company intends the holder's 90° design for refractors and catadioptric telescopes. The turret threads onto the telescope's tailstock like any visual back and accepts up to four 1¼" eyepieces. To view through one of them, simply rotate the holder until the chosen eyepiece click-stops into position.



ASTRONOMY'S STAR PRODUCTS



#	COMPANY	PRODUCT	PRICE	WEBSITE
1	Amazing Sky Publishing	<i>Nightsapes and Timelapses</i>	\$24.99	www.amazingsky.com
2	Arcturus Labs	Magnifi	\$79.99	www.arcturuslabs.com
3	Astro-Physics	1100GTO German Equatorial Mount	\$8,800	www.astro-physics.com
4	AstroSystems	Dew Guard	\$37 to \$47	www.astrosystems.biz
5	Celestron	Rowe-Ackermann Schmidt Astrograph	\$3,499.95	www.celestron.com
6	Celestron	NexStar Evolution 9.25	\$2,099.95	www.celestron.com
7	Chattanooga Millworks	ZLOMOTION	\$249 to \$369	www.zlomotion.com
8	Daystar Instruments	Quark	\$995	www.daystarfilters.com
9	Explore Scientific	Twilight I	\$199.99	www.explorescientific.com
10	FOX	<i>Cosmos: A Spacetime Odyssey Blu-ray</i>	\$38.99	www.foxconnect.com
11	HOTECH	Advanced CT Laser Collimator	\$455	www.hotechusa.com
12	iOptron	SkyGuider	\$489	www.ioptron.com
13	JMI Telescopes	MOTOFOCUS	\$179	www.jmitelescopes.com
14	Kendrick Astro Instruments	Camera-Cozy	\$159 to \$184	www.kendrickastro.com
15	MallinCam	Pro Dob II	\$399.99	www.mallincam.net
16	Nikon	D810A	\$3,799.95	www.nikonusa.com
17	Optiques Fullum	50-inch telescope	\$197,500	www.normandfullumtelescope.com
18	Orion	EON 130mm ED Triplet Apochromatic Refractor Telescope	\$2,999.99	www.telescope.com
19	Orion	Mini Deluxe Pro AutoGuider Package	\$519.99	www.telescope.com
20	Quantum Scientific Imaging	QSI 690	\$3,395 to \$4,290	www.qsimaging.com
21	ScopeStuff	RED Dot Finder for SLR Hotshoe	\$31	www.scopestuff.com
22	Sky-Watcher	StarGate 18" Dobsonian	£3,799	www.skywatcher.com
23	Sky-Watcher USA	Star Adventurer Photo Package	\$319	www.skywatcherusa.com
24	Software Bisque	TheSky Mobile	\$14.99 to \$29.99	www.bisque.com
25	Sony	α7S	\$2,499.99	www.sony.com
26	Stargazer Steve	8-Inch f/6 Ultimate Reflector Kit	\$529	www.stargazersteve.com
27	Starlight Xpress	Lodestar X2 Autoguider	\$649	www.sxccd.com
28	Stellarvue	SV60EDS APO	\$599	www.stellarvue.com
29	Surplus Shed	"The Amateur Scientist" on CD-ROM	\$29.50	www.surplussed.com
30	Takahashi	Quadriiceps Turret Revolution	\$595	www.takahashiamerica.com
31	Tele Vue Optics	BIG Paracorr Type-2	\$1,060	www.televue.com
32	Vixen Optics	Sphinx SX2 Mount	\$1,399	www.vixenoptics.com
33	Vixen Optics	Astrograph VSD100F3.8	\$6,299	www.vixenoptics.com
34	Waite Research	Renegade 20	\$9,495	www.waitereseach.com
35	William Optics	WO-Star71 Imaging APO	\$1,068	www.williamoptics.com

31 TELE VUE OPTICS ▶ BIG Paracorr Type-2



Owners of superfast Newtonians know that Tele Vue's Paracorr Type-2 coma corrector is a must-have for eliminating coma and improving image sharpness across the field of view. Now Tele Vue has heard the call of astrophotographers who want the same benefit across the full field of their large CCD chips. The BIG Paracorr Type-2 does just that. With a housing measuring 3 inches across, the BIG T2's optical design eliminates coma across CCDs measuring up to 52mm diagonally, with spectacular results. Adapters are also available to use the BIG T2 visually.

32 VIXEN OPTICS ▶ Sphinx SX2 Mount



Vixen's latest addition to its cadre of portable German equatorial mounts is the Sphinx SX2. The Sphinx SX2 offers complete go-to control and precise tracking. Stepper motors on both the right ascension and declination axes drive the mount, while the new Star Book One hand controller allows you to locate thousands of objects stored in the internal database. The mount can track the sky at sidereal, solar, lunar, and King rates, and slew to targets at up to 999x sidereal rate. Vixen included periodic error correction and a standard autoguider input. The SX2 also cleverly locates the drive motors so that they act as built-in counterweights. Small telescopes may require no additional counterweights.

33 VIXEN OPTICS ▶ Astrograph VSD100F3.8

Vixen's new VSD100F3.8 astrograph is a superfast imaging telescope designed with one thing in mind: to produce the best possible images of wide star fields and striking nebulosity. And it succeeds beautifully thanks to its advanced five-element objective lens design that includes a super-low dispersion lens in the front and an extra-low dispersion lens in the rear. Using those, the VSD100F3.8 achieves superb color correction. The blue halos so often seen around bright stars in photographs taken with traditional four-element objectives are gone. And for photographers who want to go big, the oversized focuser accepts 645 medium-format cameras without difficulty.



34 WAITE RESEARCH ▶ Renegade 20

Less is more when it comes to transporting and viewing through large-aperture Newtonians. Observers will have no need to ascend a tall ladder to enjoy the view through Waite Research's 20-inch f/3.3 minimalist Dobsonian-mounted reflector. Featuring the company's superb optics, Baltic Birch construction, and stainless steel hardware, the Renegade 20 includes high-end components such as a Starlight Feather Touch focuser, Moonlite truss hardware, an AstroSystems spider, and a Kendrick anti-dew system.

35 WILLIAM OPTICS ▶ WO-Star71 Imaging APO

Like the Vixen astrograph described earlier (No. 33), the William Optics WO-Star71 apochromatic refractor is built for astrophotography. Using FPL-53 glass for color-free performance, the WO-Star71's objective contains five elements in a three-group arrangement. The scope's 2.5" dual-speed rack-and-pinion focuser terminates in a male M48x0.75 thread that accepts camera T-mount adapter rings. For those amateur astronomers who want to use the scope visually, William Optics also sells a 1 1/4" dielectric mirror diagonal and adapter that threads onto the telescope's focuser tube.

