Highlights of the November Sky...

- - - 1st - - -
DAWN: Mercury and Spica, in Virgo, will be 4° apart above the ESE horizon.

- - - 3rd - - -
DAWN: An razor-thin waning crescent Moon, Mercury, and Spica form a right-angle triangle.

- - - 4th - - -
New Moon
5:15 pm EDT

- - - 7th - - -
DUSK: The Moon and Venus are 4¼° apart.

- - - 9th - - -
DUSK: Venus, the Moon, Saturn, and Jupiter form a 49° long line above the southern horizon.

- - - 10th - - -
DUSK: The Moon, Jupiter, and Saturn form a triangle.

- - - 11th - - -
First Quarter Moon
7:48 am EST

- - - 17th - - -
AM: Leonid meteor shower peaks, but is spoiled by the Moon.

- - - 19th - - -
Full Moon
3:59 am EST

AM: Deep Partial Lunar Eclipse (see p. 4 & 10).

- - - 23rd - - -
PM: Waning gibbous Moon and Pollux are 3° apart.

- - - 24th - - -
PM: The Moon moves to within 3° of the Beehive Cluster in Cancer.

- - - 27th - - -
Last Quarter Moon
7:29 am EST

Prime Focus

A Publication of the Kalamazoo Astronomical Society

★ ★ ★ November 2021 ★ ★ ★

This Months KAS Events

General Meeting: Friday, November 5 @ 7:00 pm
Held on Zoom • Click to Register • See Page 12 for Details

Online Viewing: Saturday, November 6 @ 9:30 pm
Held on Zoom • Click to Register • See Page 11 for Details

Board Meeting: Sunday, November 14 @ 5:00 pm
Held on Zoom • All Members Welcome to Attend

Astrophoto SIG: Friday, November 19 @ 8:00 pm
Held on Zoom • Click to Register • See Page 4 for Details

Inside the Newsletter. . .

OCTOBER Meeting Minutes

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Richard Bell on Friday, October 1, 2021 at 7:06 pm EDT. About 35 members and guests attended from their homes via Zoom.

As far back as the 1970s, the October meeting has been devoted to the art of astrophotography. This year six KAS members shared their latest and greatest images of the universe as part of *Astrophotography Night*. These members include (in order of appearance) Richard Bell, Mohammed Zafar, Eric Schreur, Pete Mumbower, Lloyd Simons, and Dave Garten. Highlights of this year's *Astrophotography Night* can be found starting on page 5.

Richard shared images of the Moon taken with the Tele Vue NP101is in Owl Observatory and Comet NEOWISE as seen from South Haven. The remaining images were from the Remote Telescope, including an in-progress image of the Whirlpool Galaxy (M51). Other images shared from the RT were taken and processed by Henry Polderman and Dominic Pullo. Mohammed shared images for the first time. Most were close-up images of the Moon taken with the Ashby Telescope during an Astrophotography Workshop in June. He also showed processed images of Jupiter from the Juno spacecraft. Eric (the Father of *Astrophotography Night*) attended a Milky Way Workshop in Colorado this past June and shared the results. Other images were acquired from his backyard observatory. Pete has been on a roll as of late since installing his backyard observatory. All the images Pete shared (and more) can be seen on his Astrobin page. Lloyd shared a few images from his new setup, an Astro-Tech AT72EDII refractor and ZWO ASI1600MM camera on a Losmandy G-11. Dave Garten concluded with a few images from his backyard observatory in Portage and his dark-sky property in the Huron-Manistee National Forest.

At the top of his President's Report, Richard encouraged members to order KAS-themed clothing from our new store on Zazzle. A plethora of colors and styles are available. They make great gifts for the holiday season! Suggestions for 2022 general meeting guest speakers from the membership are welcome and needed.

Under observing reports, Jack Price reported an enjoyable time at the recent Observing SIG gathering at Richland Township Park. Don Stilwell was at the top of Rockefeller Center in New York City recently observed a conjunction of the Moon and Venus. Anna Daly was up at 6am to observe some constellations for a class project. In current events, the Hubble Space Telescope has observed that wind speeds within Jupiter's Great Red Spot have increased by up to 8% between 2009 and 2020. Kevin Jung mentioned a story from Spaceweather about how Earth can generate its own aurora (no Sun required). After discussing upcoming activities, the meeting concluded at 8:45 pm. It can be viewed in its entirety on our YouTube channel.

BOARD Meeting Minutes

The KAS Board met on October 17, 2021 via Zoom. President Richard Bell brought the meeting to order at 5:05 pm EDT. Others present included Joe Comiskey, Dave Garten, Kevin Jung, Scott Macfarlane, Pete Mumbower, Jack Price, and Aaron Roman. Don Stilwell was unable to join us this month.

With no recommended changes to the agenda, Richard presented the Treasurer's Report on behalf of Don. Before the meeting, Don was able to provide the reports detailing through the end of August. This included Account Balance and Cash Flow Reports. While the total cash on hand and bank accounts amounts was down a little since the last report, there is no change in the Owl Observatory and Remote Telescope accounts. The first real business decision was to continue renting the same storage space for the increased rate from $79 to $109 per month.

Next, Richard presented upcoming events for the rest of October and early November. Items include the final Public Observing Session of the year at Kalamazoo Nature Center, continued Observing SIG sessions at Richland Township Park, and the November General Meeting. Another season of Online Viewing Sessions, featuring the Remote Telescope, begins on November 6th (see page 11). The Board agreed on the 2022 general meeting and public session schedules. The Board also agreed on special events in 2022 including another installment of the *Introduction to Amateur Astronomy* (Amastro) lecture series, February Freeze Out, and Messier Marathon.

Richard then moved on to some follow-up items from previous meetings. The Remote Telescope's current guide camera will need to be sold on the used market so that we are able to purchase a ZWO ASI174MM Mini. This camera boasts 1936×1216 pixels, while the current camera only has 752×582 pixels. It is hoped the new camera will make it easier to located guide stars in certain parts of the sky. The Owl Observatory's dehumidifier will need to be taken out of service for the winter. One of the more exciting new planned purchases is for an 8-inch Sky Watcher Flextube Dobsonian. This telescope will be kept in Owl Observatory and primarily used during public and member-only sessions. The Board voted and passed unanimously.

Some administrative functions voted for approval. We will again subscribe to JotForm during the membership renewal period and registration for the upcoming Amastro series. Subscribing allows us more monthly online payments and form submissions. We will also pay for three months of Zoom Webinar to cover the upcoming Amastro series. GoDaddy will be discontinuing their Workspace email service and switching to Microsoft 365. It was agreed to try it for one year, since we use the KAS email address for so many services. Aaron asked about last month's issue concerning membership dues misplaced in the KAMSC

The Board agreed to purchase a Sky-Watcher 8-inch Flextube Dobsonian, similar to the one shown above, at the Oct. 17th meeting. It will primarily be kept in Owl Observatory and used during public and member-only sessions. However, as its name suggests, the tube can be collapsed for easy transport in most vehicles on special occasions (see inset).

mailing system. Richard informed the Board that one person failed to respond to emails. The other, Martin Glista, gave a 1-year gift family membership to his son Steven. Richard offered a free 1-year membership to Martin (to make up for misplacing his original submission), but Martin declined the offer and happily paid dues for his son.

Richard is considering redesigning the newsletter, which has more-or-less remained the same since 2005. He mentioned removing the monthly sky highlights section currently on the cover. Both Aaron and Joe mentioned that they suspected beginners may find that information useful and expressed that the section should remail in place.

Richard also expressed a desire for a Treasury Report to be published in the newsletter (or at least included in the board minutes). One thought was transparency to the membership, but another was to act as a permanent record for future members to look back on and see how the treasury has evolved over time. Other Board members, while appreciating his ability to look forward, disagreed about publishing specific numbers. No decision was made though Pete reiterated that any member can join the meeting any month and that the reports are available for review. But discussion on specifically using published financial information or publishing purchased items as a good promotion aid seemed to resonate with the group. To finish the discussion, Kevin requested that we re-address the $25 spending limit in the By -laws. We may bring this up at future meetings.

At the end of the meeting, Richard mentioned that ACP (used to operate the Remote Telescope) will have to be renewed again soon. Originally, there was no plan for further meetings for the year, but as the meeting pressed later it was decided to meet again in November. The next board meeting was agreed for Sunday, November 14th at 5:00 pm on Zoom. The meeting adjourned at 6:45 pm.

Respectfully submitted by Aaron Roman

AP-SIG Meeting Minutes

A KAS Astrophotography Special Interest Group (AP-SIG) meeting was held on Friday, October 15th. Approximately 20 members and guests were present via Zoom. President Richard Bell brought the meeting to order at about 8:05 pm EDT and immediately introduced our speaker.

Jonathan Young attended Gull Lake High School and KAMSC (class of 2000) and the University of Michigan as both an undergraduate and graduate student. He has BSE degrees in Chemical & Mechanical Engineering, plus an MSE in Mechanical Engineering and Numerical Methods and Solid Mechanics. He is currently employed with Toyota Motor North America and lives in Saline, MI with his wife and four kids. He joined the KAS in 2000. The title of Jonathan's talk was *Narrowband Imaging Considerations & Lessons Learned from Southern Michigan.*

The first half of his talk started with a comparison between DSLR and cooled CMOS imaging, plus dealing with the often-challenging conditions in southern Michigan (i.e., seeing, light pollution, and limited summer nighttime hours). The second half covered his impressive narrowband imaging and techniques. Jonathan uses Siril (freeware) for image calibration and stacking, while Startools is used for imaging processing. Jonathan says Startools gives quicker results than PixInsight. His collection of images can be viewed on his Astrobin page. The entire meeting can be viewed on YouTube while Jonathan's PowerPoint file (packed with info) can be downloaded from our website as a PDF.

Pete Mumbower shared an in-progress image of the Gamma Cygni Region taken with his Sharpstar 61mm refractor. Henry Polderman has been working on a mosaic of M31 and M33 with the Remote Telescope (CDK20). In New Equipment, Pete ordered a Sky Alert weather system for his home observatory. Richard was intrigued by Apollo-M, a new line of dedicated solar imaging cameras. For the next AP-SIG meeting, the topic will be *Great Gifts for the Astrophotographer*. High member participation is required (see page 4 for a preview). The meeting ended at 9:47 pm.

Observations by Richard S. Bell

A common question amateur astronomers get asked when someone from the general public encounters us in an open field with a telescope is "What special event is going on tonight?" I take that as "Why in the world did you take the time to haul this large telescope in the middle of nowhere in the dark of night?" Yeah, these days most people don't know or think much about what goes on above the clouds. They don't realize the wealth of wonders that are accessible to everyone on any clear night. If they did, our Public Observing Sessions would be better attended! With that said, there is something special going on in the sky during the early morning hours of Friday, November 19th!

A deep partial lunar eclipse will be visible across all of North America. There are two downsides to this eclipse for us. It takes place in November, so there's a high probability it'll get clouded out. And, if it is clear, the best part, when the Moon is nearly within Earth's umbra and turns a coppery red, doesn't start until sometime after 3 o'clock in the blessed morning! Not terribly convenient for people that need to get up at dawn's early light.

As noted, this is a *deep* partial lunar eclipse. At maximum, 97% of the Moon will be immersed in Earth's darker, inner shadow. It reminds me of the partial lunar eclipse on March 23, 1997. That was also a deep partial of similar magnitude and coincided with Mars was near opposition and Comet Hale-Bopp at its best. Hundreds of people were drawn to the Nature Center for that Triple Feature. It's one of my fondest memories from my early days in the KAS.

Let's assume that skies will be uncharacteristically clear during the early morning hours of November 19th. First thing you'll need to do is dress properly. Temperatures will likely be in the upper 30s or lower 40s. The secret, of course, is to dress in multiple layers and trap body heat. In fact, wear more than you think you'll need. It's easier to remove layers then add what you don't have when away from home!

The eclipse officially (and technically) commences at 1:03 am EST when the Moon touches the outer section of Earth's penumbra. This stage of the eclipse is unobservable, so you can stay in or home and keep warm for a little while longer. The real show, when the Moon gradually glides into the umbra, starts at 2:19 am. Slowly, Earth's darker shadow creeps across the lunar surface. Take note of its curvature. Earth is round! Suck on that flat earthers! Not only are we approaching the best part of the eclipse, but the sky grows darker and darker. Stars fill the sky!

Mid-eclipse or maximum coverage happens at 4:03 am. The exact appearance of the Moon at this point depends on many factors. These include the amount of cloud cover on Earth that day, air pollution levels, and the amount of volcanic dust in the air. Another factor could be smoke from all the wildfires that plagued us last summer. My guess is that the atmosphere will be relatively clear, so most of the Moon should have a bright coppery-red color. It'll be 38° above the western horizon. The Pleiades may draw your attention, as they'll be about 6° to the Moon's north-northeast.

There's not enough room left in this column to describe how to photograph the Moon during a lunar eclipse. Instead, I'll send you to friend-of-the-KAS Alan Dyer's recent blog post on the subject. It's an in-depth piece, so check it out. If you do image the eclipse then please send me your best shots and I'll post them on social media. Be sure to share them during the next general meeting on December 3rd as well.

The umbral stage of the eclipse ends at 5:48 am. By this time most people will head in (or home) to get warm and catch up on their sleep (or take a short nap) before heading into work. In case you're curious, the eclipse technically concludes at 7:04 am. If you miss it, the next chance will be on Sunday, May 15, 2022. That lunar eclipse will be total and the chances for clear skies (and warmer temps) are higher. I hope to get out and enjoy both! After all, there's something special going on in the sky!

ASTROPHOTOGRAPHY SIG Meeting Preview

All KAS members interested in astrophotography are encouraged to attend and participate during SIG meetings. Each meeting will feature a main topic presented by members or special guests. Members are encouraged to share their latest images during each meeting. We will also discuss and review the latest imaging equipment and software.

Main Topic for November Meeting:

At its barest minimum, observational astronomy requires no investment in equipment. You can simply observe the night sky with your unaided eyes. On the other hand, astrophotography requires the purchase of at least a DSLR camera, quality lens, and a stationary tripod. The deeper you wade into the waters of imaging, the more gear you'll need. Thankfully, the season of giving is upon us and every sky shooter no doubt has a few items on their wish list. For this meeting, KAS members are encouraged to share their top astrophotography-related gifts for the holiday shopping season. Email Richard your top ideas and he'll let you know which ones to present during the meeting. He'll assemble the PowerPoint presentation, so send him your top picks ASAP!

Friday, November 19th @ 8:00 pm

Held Online via Zoom • Click Here to Register

Astrophotography Night Highlights

The Pleiades (M45)
Richard Bell & Thom Peters

Details: **Individual subframe images were acquired by both Richard Bell and Thom Peters with the KAS Remote Telescope - specifically the Takahashi FSQ-106EDX3 and STX-16803 CCD camera. Total exposure time is 4-hours. Exposures were taken through Astrodon 50-mm Gen2 E -Series Tru-Balance LRGB Filters (12 × 300-seconds each). It was calibrated and processed with PixInsight and tweaked with Adobe Lightroom by Richard Bell.**

Cygnus Wall (NGC 7000)
Henry Polderman

Details: **Henry used the KAS Remote Telescope in Portal, Arizona - specifically the PlaneWave 20-inch CDK on a Paramount MEII German equatorial mount and SBIG STX-16803 CCD camera. Total exposure time was 13 hours 40 minutes through our 3nm Astrodon Narrowband filters (SII: 15 × 20-min., H-alpha: 12 × 20-min., OIII: 14 × 20-min.). Images were taken between June 14-18, 2021. Calibration performed with Deep Sky Stacker, while PixInsight was used for processing.**

Soul Nebula (IC 1848)
Lloyd Simons

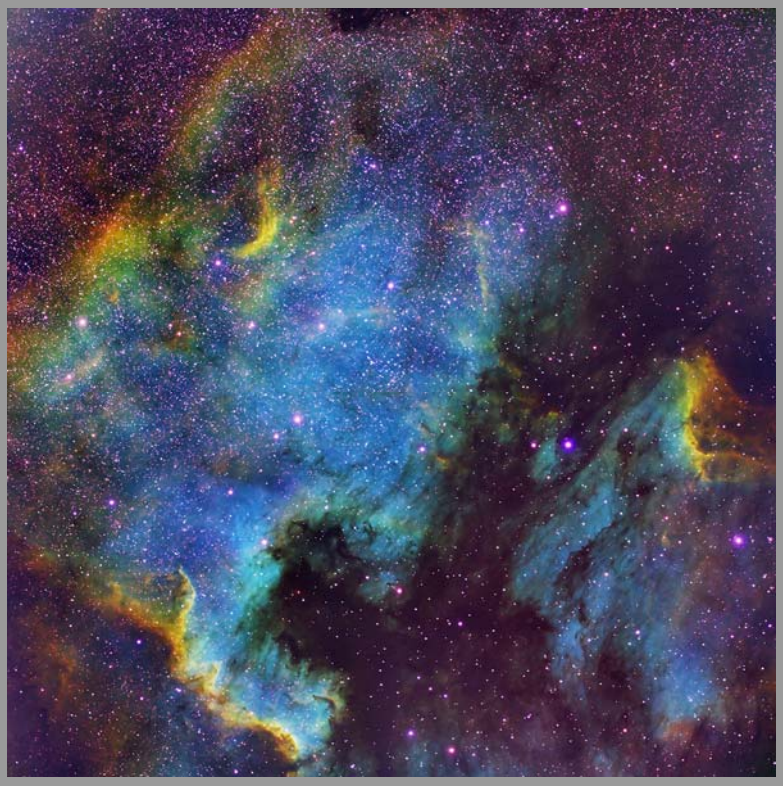
Details: **Subframe images were captured between Nov. 5 - 7, 2020. Equipment used includes an Astro-Tech AT72EDII refractor on a Losmandy G-11 equatorial mount and an ZWO ASI1600MM Pro CMOS camera.**

Total exposure time is 20.1 hours through Astrodon 5nm Narrowband filters (H-alpha: 97 × 240-sec., OIII: 105 × 240-sec., and SII: 99 × 240-sec.). Images were acquired using Nighttime Imaging 'N' Astronomy software (N.I.N.A.) and processed with PixInsight.

Astrophotography Night Highlights

Andromeda Galaxy (M31)
Pete Mumbower

Details: **Pete took this image from his home observatory in Vicksburg. Equipment includes a Sharpstar 61EDPHII 61mm f/5.5 ED Triplet Apo Refractor with 0.8× Flattener Reducer, on an Astro-Physics 1100GTO mount. Total integration time is 14 hours 10 minutes through Astronomik filters (L: 48 × 10-min., R: 25 × 5-min., G: 24 × 5-min., B: 25 × 5-min.). Subframes were acquired with Sequence Generator Pro and processed with PixInsight. Cropped from the original (full image here).**



North America & Pelican Nebula
Dave Garten

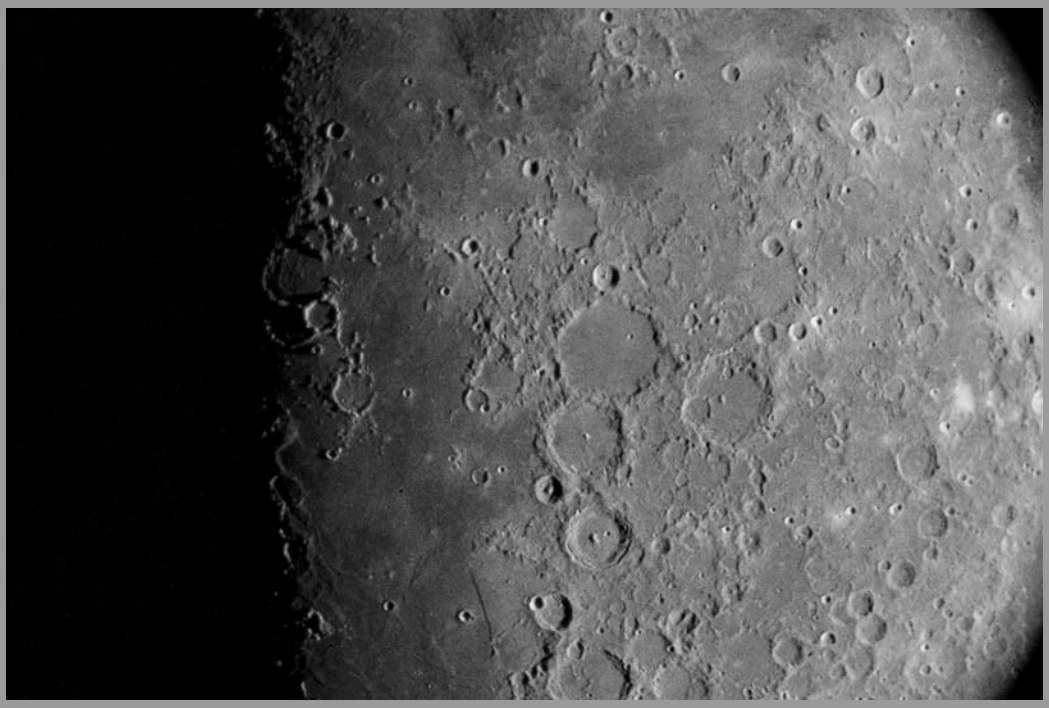
Details: **Equipment includes a Takahashi FSQ-106 refractor and ZWO ASI6200MM Pro CMOS camera on a Losmandy G-11 German equatorial mount. This is a 13-hour total exposure through ZWO 2-inch 7nm narrowband filters (H-alpha, OIII & SII = 65 × 240-seconds each). Acquired with Sequence Generator Pro and processed with PixInsight. Taken from Dave's dark-sky property near Walkerville, Michigan in the Huron-Manistee National Forest.**

The Milky Way
Eric Schreur

Details: **Eric participated in a Milky Way Photography Workshop in Colorado and took this image from the Colorado National Monument on June 11, 2021.**

Equipment includes a Nikon D5500 DSLR camera with a Tokina 11mm lens. Eric combined twenty-five 15-second images for the Milky Way and one 15-second image for the foreground (illuminated by a passing car). Images were aligned and stacked with Sequator, adjusted with Adobe Lightroom, and final tweaking in Adobe Photoshop.

Astrophotography Night Highlights



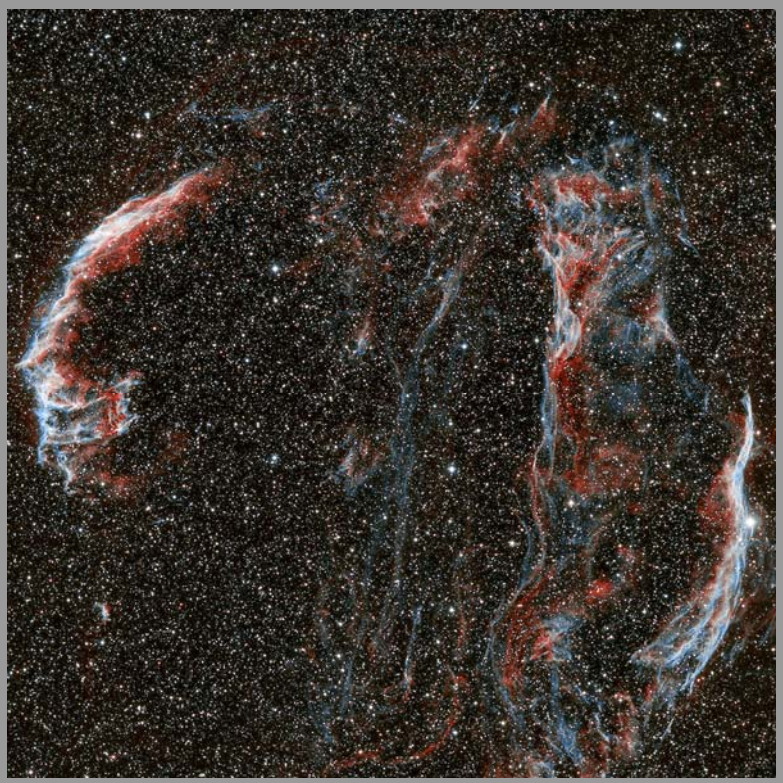
Rupes Recta (Straight Wall)
Mohammed Zafar

Details: **Mohammed took this image during an Astrophotography Workshop held in Owl Observatory on June 18, 2021.**

Equipment includes the Leonard James Ashby Telescope (Meade 16-inch SCT on an Astro-Physics 1600GTO German equatorial mount), 2× PowerMate, and Nikon Z7 mirrorless camera. It is a 1/200-second exposure at ISO 2500. Processing was done with Luminar 4.

Lagoon Nebula (M8)
Richard Bell

Details: **Individual subframe images were acquired between June 12 & 13, 2021 using the KAS Remote Telescope (PlaneWave 20-inch CDK, with an SBIG STX-16803 CCD camera, on a Paramount MEII German equatorial mount) in Portal, Arizona. It is a 2-hour 38-minute total exposure (L = 40, R = 24, G = 25, B = 23, each 90-seconds in duration). It was calibrated and processed with PixInsight, with further adjustments made in Adobe Lightroom.**



Cygnus Loop
Pete Mumbower

Details: **Equipment includes a Sharpstar 61EDPHII 61mm f/5.5 ED Triplet Apo Refractor with 0.8× Flattener Reducer, on an Astro-Physics 1100GTO mount. Total integration time is 22-hours 55-minutes through Astronomik filters (OIII (6nm): 30 × 20-min., H-alpha (6nm): 32 × 20-min., RGB: 15 × 3-min. each). Acquired with Sequence Generator Pro and processed with PixInsight . Taken from Pete's backyard observatory in Vicksburg. Cropped from the original (full image here).**

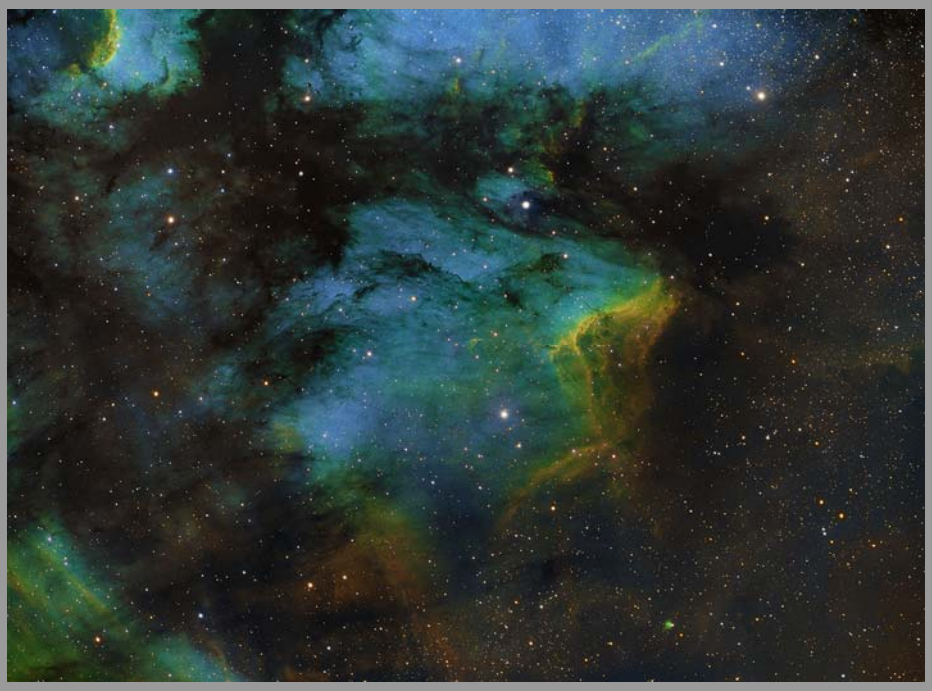
Astrophotography Night Highlights

Milky Way at Little Sable Point Lighthouse
Eric Schreur

Details: Eric captured this image of our home galaxy August 1, 2021. Equipment includes a Nikon D5500 DSLR camera with a Tokina 11mm lens. Eric combined twenty-five 15-second images for the Milky Way and twenty-five 15-second images for the foreground. Images were aligned and stacked with Sequator, adjusted with Adobe Lightroom, and final tweaking in Adobe Photoshop.

Lagoon & Trifid Nebula
Dave Garten

Details: **Equipment includes a Takahashi FSQ-106 refractor and ZWO ASI6200MM Pro CMOS camera on a Losmandy G-11 German equatorial mount. This is a 2.5-hour total exposure through a ZWO 2-inch 7nm H-alpha narrowband filter (300 × 30-seconds).**



Pelican Nebula (IC 5070)
Lloyd Simons

Details: **Individual subframe images were taken from September 20 - October 5, 2020. Equipment used includes an Astro-Tech AT72EDII refractor and an ZWO ASI1600MM Pro CMOS camera on a Losmandy G-11 German equatorial mount.**

Total exposure time is 22 hours through Astrodon 5nm Narrowband filters (H-alpha: 84 × 240-sec., OIII: 109 × 240-sec., and SII: 137 × 240-sec.). Images were acquired using Nighttime Imaging 'N' Astronomy software (N.I.N.A.) and processed with PixInsight.

NASA Night Sky Notes...

Measure the Night Sky

by David Prosper

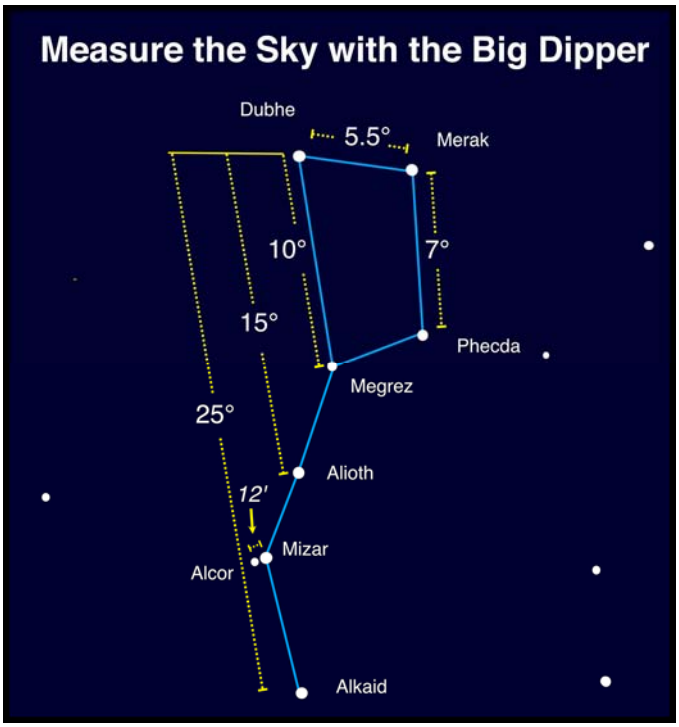
Fall and winter months bring longer nights, and with these earlier evenings, even the youngest astronomers can get stargazing. One of the handiest things you can teach a new astronomer is how to measure the sky – and if you haven't yet learned yourself, it's easier than you think!

Astronomers measure the sky using degrees, minutes, and seconds as units. These may sound more like terms for measuring time - and that's a good catch! – but today we are focused on measuring angular distance. Degrees are largest, and are each made up of 60 minutes, and each minute is made up of 60 seconds.

To start, go outside and imagine yourself in the center of a massive sphere, with yourself at the center, extending out to the stars: appropriately enough, this is called the celestial sphere. A circle contains 360 degrees, so if you have a good view of the horizon all around you, you can slowly spin around exactly once to see what 360 degrees looks like, since you are in effect drawing a circle from inside out, with yourself at the center! Now break up that circle into quarters, starting from due North; each quarter measures 90 degrees, equal to the distance between each cardinal direction! It measures 90 degrees between due North and due East, and a full 180 degrees along the horizon between due North and due South.

Now, switch from a horizontal circle to a vertical one, extending above and below your head. Look straight above your head: this point is called the zenith, the highest point in the sky. Now look down toward the horizon; it measures 90 degrees from the zenith to the horizon. You now have some basic measurements for your sky.

Use a combination of your fingers held at arm's length, along with notable objects in the night sky, to make smaller



measurements. A full Moon measures about half a degree in width - or 1/2 of your pinky finger, since each pinky measures 1 degree. The three stars of Orion's Belt create a line about 3 degrees long. The famed "Big Dipper" asterism is a great reference for Northern Hemisphere observers, since it's circumpolar and visible all night for many. The Dipper's "Pointer Stars," Dubhe and Merak, have 5.5 degrees between them - roughly three middle fingers wide. The entire asterism stretches 25 degrees from Dubhe to Alkaid - roughly the space between your outstretched thumb and pinky. On the other end of the scale, can you split Mizar and Alcor? They are separated by 12 arc minutes - about 1/5 the width of your pinky.

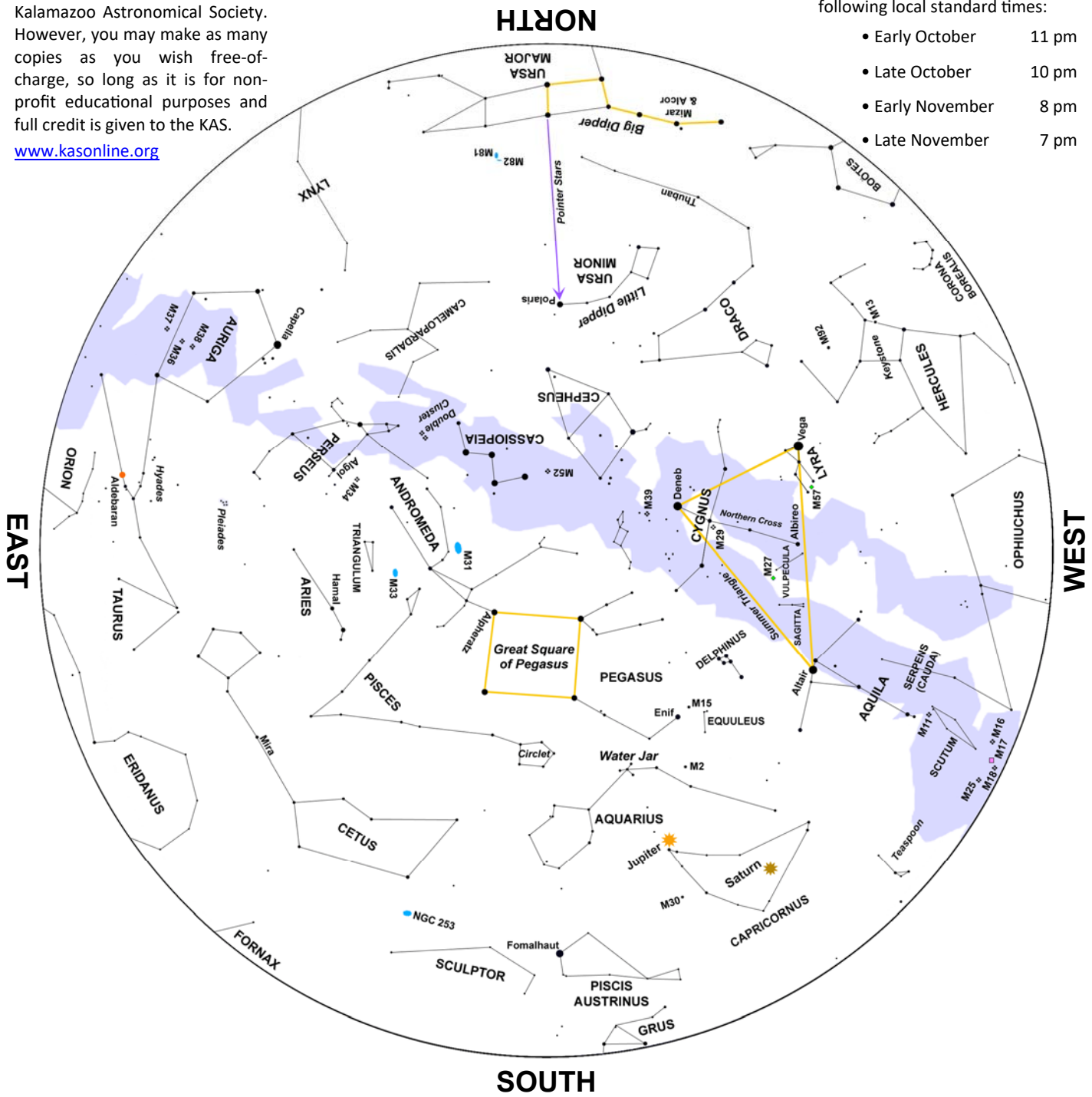
Keep practicing to build advanced star-hopping skills. How far away is Polaris from the pointer stars of the Big Dipper? Between Spica and Arcturus? Missions like Gaia and Hipparcos measure tiny differences in the angular distance between stars, at an extremely fine level. Precise measurement of the heavens is known as astrometry. Discover more about how we measure the universe, and the missions that do so, at nasa.gov.

This article is distributed by NASA Night Sky Network. The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

— November Night Sky —

This map represents the sky at the following local standard times:

- Early October 11 pm
- Late October 10 pm
- Early November 8 pm
- Late November 7 pm



Early morning risers should grab their 7×50 binoculars shortly before dawn on November 3rd. A thin waning crescent Moon (1-day before new), Mercury, and Spica form a compact triangle. You'll need a clear view of the east-southeastern horizon to enjoy the show.

Turn your gaze to the west-southwestern horizon on the evening of November 7th. A 3-day-old Moon and Venus will be separated by 4¼° - close enough to fit within the field-of-view of both 7×50 and 10×50 binoculars.

A deep (97%) partial lunar eclipse occurs during the early morning hours of November 19th. The Moon begins to move into the penumbra at 1:03 am EST, while the umbral eclipse starts at 2:19 am. Mid-eclipse falls at 4:03 am with the Moon 38° above the western horizon. The Moon's disk should appear coppery red, with the exception a small fraction of its southeast portion. The umbral phase ends at 5:48 am, while the penumbral stage ends at 7:04 am.

KAS BOARD

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ONLINE VIEWING SESSION

Enjoy the wonders of the universe as seen through the "eyes" of the KAS Remote Telescope, located under the dark skies of southeastern Arizona.

Attendees will view images of deep-sky objects captured with the system's CCD cameras in Arizona, transmitted to participant's computer, tablet, and smart phone screens in southwest Michigan and around the world.

Images acquired during each session will be made available for download.

Saturday, November 6th (7th) @ 9:30 pm

Held on Zoom • Click Here to Register

BUY ORION® TELESCOPES & BINOCULARS *and help the* KAS

Did you know that you could purchase telescopes, binoculars, eyepieces, and much more from Orion Telescopes & Binoculars and help the KAS in the process?

Simply click on the link provided above and begin shopping on Orion's website. Purchasing their products through the link gives the KAS a commission.

The KAS Needs You!

Opening nominations for 2022 KAS Officers and At-Large Board Members will take place during the November General Meeting.

Please send us your nominations if you are unable to attend the meeting. Ask not what the KAS can do for you, but what you can do for the KAS!

General Meeting Preview