

# Celestial Observer

The Official Newsletter of the  
Amateur Observers' Society of NY, Inc.  
A 501(c)3 organization

Sept 2021



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Next Meeting: Sunday, Sept 12, 1:15pm  
Delay Due to Labor Day  
**In Person and Online**

For Meeting Invitation Contact [AOSSecretary@aosny.org](mailto:AOSSecretary@aosny.org)

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## The President's Message-Sue Rose

**Wishing everyone a safe and healthy Labor Day, Grandparents Day and Jewish New Year.**

The end of summer is here as the Autumnal Equinox begins the new season on Sept 22 while the Sun sinks from its' highest point in the sky last June toward the lowest in a few short months. The fewer hours of sunlight signals that we have more hours of darkness to observe, at a more reasonable hour and temperature, so I hope to see more people at our special permit nights Sept 10&11 and Oct 1&2.

**BIG NEWS-**Our first in person meeting in 18 months will occur on Sunday, Sept 12 at 1:15 at the Cradle of Aviation Museum, in the cafeteria, on Charles Lindbergh Blvd in Garden City, NY 11530, <https://www.cradleofaviation.org/>. **Mask protocols of the time must be followed.** Due to unforeseen circumstances, the situation may change so watch our club website, [www.aosny.org](http://www.aosny.org), and io member hotline for last minute changes. Hofstra University is not yet available for outside groups. Since our online meetings have gone so well, we will attempt to stream this live meeting as well with **Prof Alan Calder** of Stony Brook University who will discuss the **Juno Mission-10 Years Later**. We are still working out the details for member and guest entry. Members will receive all the details on the hotline prior to Sunday. Non-members will need to contact our Secretary for details on how to attend in person, or for a digital link. Contact [AOSSecretary@aosny.org](mailto:AOSSecretary@aosny.org), or 516-725-2129. Looking forward to seeing everyone in person.

**Jason C** has again done a fantastic job of providing an outstanding group of speakers this past summer. We greatly appreciate all the people who took time from their Sunday to inform us on a variety of subjects. Many thanks to **Prof Marc Gagne** of West Chester University, PA, **Associate Professor Jacob Bean** of the University of Chicago, **Bob Farrell** of Custer Institute and **Prof Michael Dennin** - Vice Provost for Teaching & Learning, Dean of Undergraduate Education, Professor of Physics UCI, CA. Here's what we can look forward to (mark your calendars)- Sep 26 **Prof Mike Edmunds**, President of the Royal Astronomical Society, London, England - "The Antikythera Mechanism & The Mechanics of the Universe", Oct 3 **Prof Karl Friston** of the Institute of Neurology, University College of London, England - "The Mathematics of the Mind - Consciousness of Possible Futures" and Nov 7 **Prof Przemek Mroz** of the University of Ohio Physics Department - "Gravitational Lensing & Discovery of Rogue Planets". Sorry, they will not visit in person but will join our meetings digitally. If you miss a presentation, members can receive a link for the recording from Jason.

Hoping to see everyone at our in person and online meetings, Sept 12 & 26 and Oct 3.

**Remember, the only dumb question is the one you don't ask.**

***Friends are like stars. You don't always see them,  
but you know they are always there!***



The AOS expresses its deepest appreciation to Custer Institute for hosting our Suffolk Observatory, the Sierra Club, Long Island Group, for the 20" telescope, <http://newyork.sierraclub.org/longisland/>, and to The Cradle of Aviation.

**AOS Calendar**-It's that time of year again. We will only print prepaid orders. If you can pick it up at a meeting, \$15. If mailed, \$18. Sends checks made out to AOSNY to Harvey M, Treas AOS, 105 Betty Rd, East Meadow, NY 11554 or <https://tinyurl.com/5kurtx5n>. Where it shows to write a note under the amount, type calendar.

### **Outreach Activities are Returning - Thanks to all of our volunteers!! - Linda P**

We participated in the East Meadow Night Out Against Crime on Aug 3. It was good to get out among people again, even if not well attended. Thanks to our volunteers.

East Meadow Pride Day will be Sunday, Sept 16. Volunteers are needed. We'll have a table with handouts and telescopes for solar viewing, weather permitting. Set-up at 10am. It ends at 3. Any of those hours are appreciated. Parking after noon is not close and needs a shuttle bus. The Cradle of Aviation will hold an observing night on Oct 19. Volunteers are needed. We are working out a date for Sea Cliff. Contact Linda.

### **SAFETY REMINDER FOR PUBLIC PROGRAMS**

For those who are attending to scopes, either your own or one of the AOS', it is very important that you be concerned with safety, both of equipment and visitors. A child damaging an eye is something we don't want to have happen. **Under NO circumstances should you allow anyone to stand on tiptoes or lift a child to place their eye on the eyepiece.** If a stepladder with a handle is not available, make your apologies. Please also insist that the child hold onto the ladder, not the telescope, and that the accompanying adult steady the child on any ladder. ALSO-ENSURE that scopes and ladders are not left unattended. Children jump at the chance to climb ladders. The taking of photos through eyepieces with handheld cameras for any open Newtonian scopes at observatories and outreach programs is prohibited, for fear that a dropped camera will damage the primary mirror. On other scopes, let the camera owner be responsible for the photo at your discretion. We want everyone to have a good experience and be safe. Remember; for them, for you and for Chris.

***Volunteers are unpaid, not because they are worthless, but because they are priceless!***

**The Golden Rule of Astronomy:**

**"If you own a telescope, you have a moral obligation to share the view!" – John Dobson**

### **Observing Sites-**

As we go to press, the Covid restrictions in NY have been mostly eliminated. It feels great to rejoin the real world and begin to see family and especially AOS friends. Let us hope we won't have a resurgence. Please do whatever you can to stay safe.

**AOS Susan F Rose Observatory** on the grounds of Custer Institute in Southold. **Director Bill C**, with help from **Jason C** and **Bill B**, has continued to bring the night sky objects into view for the public using digital means to project images captured by our C14 within the 8 foot dome to a monitor outside. He can always use extra help. Since this experiment has worked so well, and been well received by the visitors, we will be continuing to use this even after in-person viewing resumes. To that end, we have purchased new digital equipment. Generous donations will help to pay for these items. If anyone would like to donate toward this project, please contact **Treasurer Harvey M**.

**Sagamore Hill** is patiently awaiting our return to bring the night sky views back to their visitors as is the new Jones Beach Nature & Energy Center. We are hoping that at some point in the not-too-distant future we will be back there with all our equipment and seeing the public once again.

**Exclusive AOS Permit**-The New York State Parks Dept has given us a permit for a specific place to observe which has open restrooms. The location is available for specific dates with a limit of 50 people, ALL of whom must be AOS members. A copy of the permit and membership card will be mandatory. You **MAY**

**NOT** share this info with non-members. We have been working on this for many months and are very pleased that the state has agreed that we can operate in a safe manner on their property. Upcoming dates are Sept 10, 11, Oct 1, 2, 8, 9, 29, 30, Nov 5, 6, 18, 26, 27, Dec 3, 4. Nov and Dec dates will be canceled if the Holiday Light Show goes on. Make sure to download the updated permit which removed many restrictions. **Picnic**-The picnic went on at our new observing location attended by 19 members. Although the sky didn't cooperate for much observing, **Nancy R** got this photo of a **Sun Pillar**, a good time was had by all just because we were together.



**Stargazing in the NYS Parks**

It's a good idea to put a note on the hotline and let others know you're going so you might get some company. ALWAYS tell someone where you will be. You might also call the NYS Police at 631-669-2500 to let them know you'll be there. PLEASE, make sure it is in your cell phone in a speed dial. **Star Gazing Permits**-They are again available from the NYS Parks Dept, either by mail or in person at offices in Bethpage, Jones Beach or Robert Moses after Labor Day. This would allow you to observe in designated areas after sunset. Many of our members have been doing this since outreach has been canceled. Rest rooms are not open in the winter. They expire Dec 31 when new ones for 2022 will need to be purchased. Due to the lack of available observing locations, it may be a good idea to get a permit. They are for the vehicle, not the people, and you must have some star gazing equipment, such as a chart.

**Why is the sky black?** A worthwhile article on the subject: <https://www.livescience.com/why-does-space-look-black.html> Olbers' Paradox is found on only one paragraph. A better discussion of the paradox can be found here: [https://en.wikipedia.org/wiki/Olbers%27\\_paradox](https://en.wikipedia.org/wiki/Olbers%27_paradox)

**Digital Library Free ebooks form NASA in PDF** [www.nasa.gov/content/goddard/hubble-e-books](http://www.nasa.gov/content/goddard/hubble-e-books)

**Sept Observing**

**The Night Sky This Month** -<https://cosmicpursuits.com/night-sky-this-month/>

[In-the-Sky.org](http://In-the-Sky.org)

**Astronomy Magazine** <https://astronomy.com/observing/sky-this-week>

[Skymaps.com](http://Skymaps.com)

**Sky & Telescope Magazine** <https://skyandtelescope.org/>

**Globe at Night** map light pollution <https://www.globeatnight.org/> **EarthSky** <https://earthsky.org/>

**What's Up each month** <https://tinyurl.com/y3a7ll3n>

**Comet Watch 2021** <https://tinyurl.com/29ua6svz> If you own an 8" or larger telescope you might see more than a dozen new and returning comets this year, including one potential naked-eye candidate.

**Tonight's Sky** <https://hubblesite.org/resource-gallery/learning-resources/tonights-sky>

**International Dark Sky Association** learn more about light pollution and its effects on us and our world <http://darksky.org/>

**Light Pollution Effects**-Title of article: Light pollution from street lamps linked to insect loss. First sentence: Scientists say light pollution may be contributing to "worrying" declines in insects seen in recent decades. Third sentence: Modern LED streetlights appeared to have the biggest impact. Read it here <https://www.bbc.com/news/science-environment-58333233>

**Light Pollution Projects**

The **Globe at Night**, [www.globeatnight.org/](http://www.globeatnight.org/), constellation for Sept 17-Oct 6 is Pegasus. See the charts at <https://www.globeatnight.org/finding/leo>. Adjust for your latitude.

**Lunar X & V Observations** <https://skynews.ca/lunar-x-marks-the-spot/>. Sep 13 @ 5:18pm, Nov 11 @ 5:29pm.

**Meteor Showers** [www.theskyscrapers.org/meteor-showers](http://www.theskyscrapers.org/meteor-showers), [www.amsmeteors.org/](http://www.amsmeteors.org/) Meteor Showers displayed in space with Earth crossing path <http://www.ianww.com/meteor-showers/>

**Observing Projects for Month** <http://www.theskyscrapers.org/september>

**Astronomical League's 75th Anniversary Challenge** Due to the timing of the mechanics of our Solar System, 2021 also coincides with almost a complete apparition of Jupiter (January 29, 2021 at 1213 through March 5, 2022). See details and requirements at <https://www.astroleague.org/content/al-observing-challenge-special-observing-award>

**Constellation Hunter Observing Program with Sue Rose** So far, I've included the following constellations- Andromeda, Antlia, Aries, Aquila, Auriga, Bootes, Cancer, Canes Venatici, Canis Major & Minor, Capricornus, Cassiopeia, Coma Berenices, Corona Borealis, Corvus, Crater, Cygnus, Delphinus, Equuleus, Gemini, Hercules, Hydra, Leo Major & Minor, Lepus, Lynx, Lyra, Microscopium, Monoceros, Orion, Pegasus, Perseus, Pisces Austrinus, Pyxis, Sagitta, Sagittarius, Scorpius, Sextans, Taurus, Triangulum, Ursa Major & Minor, Virgo, Vulpecula. If you'd like to catch up, you can find my posts in the hotline messages or send me an email. Let's hope we can get together at our new location and work on these together. So you can see which stars are within the boundaries, download and print the constellation charts from <https://www.iau.org/public/themes/constellations/>.

**NASA 2017-2018 software catalogue** released, available for [free download](#), without any royalty or copyright fees. Worth downloading. [www.sciencealert.com/nasa-s-just-released-a-bunch-of-its-software-for-free](http://www.sciencealert.com/nasa-s-just-released-a-bunch-of-its-software-for-free)

**Cosmic Camp, an Intergalactic Family Adventure Launches on September 6th at CAMP's NYC Flagship Store** <https://tinyurl.com/n7erzz8d>



**Citizen Science Projects**

**Searching for galaxies** looking like jellyfish is a new Citizen Science project for 2021. Jellyfish Galaxies research <https://www.zooniverse.org/projects/apillepich/cosmological-jellyfish/about/research>

**NASA is asking citizen scientists** to help hunt exoplanets in the vast trove of images gathered by the Transiting Exoplanet Survey Satellite (TESS). <https://tinyurl.com/4h5mkit4>

**NASA's Exoplanet Watch Needs You!** Help NASA find exoplanets. Use your own telescope - or even a remote robotic telescope - to observe transit events and share your data as part of the Exoplanet Watch citizen science project! [https://nightsky.jpl.nasa.gov/news-display.cfm?News\\_ID=969](https://nightsky.jpl.nasa.gov/news-display.cfm?News_ID=969)

**Laser Interferometer Gravitational-wave Observatory (LIGO)-** The Gravity Spy project enlists citizen scientists who will have the opportunity to learn to characterize and classify potentially new sources of noise in the LIGO system; working in concert with machine-learning algorithms to amplify the work of the citizen scientists, this project helps scientists narrow their focus to gravitational wave sources and develop citizen science methods that can scale with upcoming data-intensive scientific endeavors.

**THE MOST BREATHTAKING SIX HOURS OF YOUR LIFE** To gaze upon Earth from space – to take in the astounding views and vivid colors – is an unforgettable spectacle that astronauts call life-altering. We have reimagined space travel. Instead of rocketing away from the Earth at high velocity, you ascend on a gentle, yet thrilling journey and look back at our planet from an entirely new perspective. 2024 is already sold out. <https://tinyurl.com/5eb5udnc> \$125,000 is a bargain.

**Did you see the June 10 partial annular eclipse? Did you catch the eclipse bug? What a good excuse to travel and see the world.** Keep the dates-On Nov 19, 2021, watch for a near total lunar eclipse and May 16 & Nov 8, 2022 for total lunar eclipses. If you don't mind the cold, you can travel to the Antarctic on Dec 4, 2021 by plane (contact our own foremost eclipse chaser Dr Glenn Schneider) for a total solar eclipse or maybe try a cruise <https://www.chimuadventures.com/en-au/antarctica/ocean-endeavour-solar-eclipse-voyage>. Contact James McAloon at [james.mcalloon@chimuadventures.com](mailto:james.mcalloon@chimuadventures.com). On April 20, 2023, there's a hybrid solar eclipse over Australia/Indonesia, <https://siriustravel.com/solar-eclipse-tours/2023-western-australia-total-solar-eclipse-tour/>. On Oct 14, 2023, there will be an annular solar eclipse over the south and mid-west US, only partial here in NY. On April 8, 2024, the US will once again be treated to a total solar eclipse, this time stretching from Mexico, up through the center of the country over Buffalo, into Canada, etc. The Moon will nearly cover the Sun from here on Long Island, but with the totality path soooo close, why wouldn't you travel? Don't miss this one. It's time to start making plans. Who wants to help with this? Contact Sue. Our San Antonio contingent, **John Eaccarino**, will be in great position for the last 2. See more info at <https://www.greatamericaneclipse.com/future-eclipses/eclipseglobe>.

**20 of the best places to view the 2024 Great North American Eclipse** Scope out your spot for the 2024 total solar eclipse. <https://tinyurl.com/t5pwukae>

**Amateur Astronomy Survey-Closes Sept 15-**Please share this survey widely - we will look at both US and international trends. Working with researchers at the Institute for Learning Innovation, we should have a report to share by the end of the year. [Past surveys](#) have received more than a thousand responses, so give us a good cross-section of our community. Below is a brief announcement for newsletters and a link to our social media posts to share. Please share the announcement widely. Thank you all so much!

Amateur Astronomers - we want to hear from you! Tell us about your experiences in amateur astronomy including club changes, outreach needs, and your areas of interest. Please take 15 minutes to let us know how to best support you and/or your astronomy club for the next decade and beyond. Enter to win great prizes, like a Moon globe, a constellation globe, or a sunspotter! Share your thoughts here: [bit.ly/astrosurvey2021](https://bit.ly/astrosurvey2021) More information and survey findings available (by the end of the year) here: [https://nightsky.jpl.nasa.gov/news-display.cfm?News\\_ID=975](https://nightsky.jpl.nasa.gov/news-display.cfm?News_ID=975) **Facebook:** [www.facebook.com/nightskynetwork/posts/4710848672275764](https://www.facebook.com/nightskynetwork/posts/4710848672275764), **Twitter:** <https://twitter.com/nightskynetwork/status/1425628517098737665>, **Instagram:** [www.instagram.com/p/CSdM1uTjsH1/](https://www.instagram.com/p/CSdM1uTjsH1/)

Vivian White, Director of Free Choice Learning, [NASA Night Sky Network](#), [Astronomical Society of the Pacific](#),

**Astronomy For Change-**A new organization whose mission is to affect positive change through astronomy and science education by inspiring and empowering current and future generations to become engaged and interested in Astronomy and Science. See articles and sign up for the free newsletter at <https://astronomyforchange.org>. We post general interest articles on our main site and videos (YouTube channel [www.youtube.com/c/AstronomyForChange](https://www.youtube.com/c/AstronomyForChange)) on astronomy, new discoveries in physics, astrophysics, astronomy and science, offer tutoring (astronomy, physics and math), and we're getting ready to launch a series of courses on same. We're open to anyone who would like to author/ contribute an article (or two, or three...). Twitter: <https://twitter.com/astronomychange> Check it out.

**Inviting you to two new astronomical/educational newsletters-Dr. Larry Krumenaker**

The Classroom Astronomer Newsletter #1 - May 15, 2021, Astronomy Education Articles, Techniques, News, Research. *The Classroom Astronomer Newsletter* is a successor to the magazine of that name that ran from 2009-2015 which contained articles and teaching tips for those who teach astronomy in schools at all levels, including home-school teachers. This newsletter is free during an introductory period after which it will be a premium newsletter for subscribers only.

**The Galactic Times Newsletter Highlights** <https://classroomastronomer.substack.com/p/the-classroom-astronomer-newsletter> The Galactic Times Newsletter #1 - May 15-31, 2021 News, Calendar, Podcast, Astronomy in Everyday Life. In response to comments made during the 2020 run of *The Galactic Times Podcast*, a newsletter concerning sky events and sky news for the more general public is being offered! It is meant in part to those who are also pandemically stuck at home and seeking sky information they can use for both fun and educational purposes.

**THE 2021 HUMANS TO MARS SUMMIT**, an Explore Mars Event  
September 13-15, 2021, 10:00 AM to 3:00 PM EDT Daily <https://www.exploremars.org/summit/>

**CBS TV Logo**-Has anyone noticed that the CBS TV "eye" is a solar eclipse? Then it turns into a transparent seething solar atmosphere. It's been going on for a few weeks already.

**Star Parties, Special Events, Conventions, Online Programs, etc.**

**AAA Fall Starfest**, Sept 17, Evergreen Cemetery, Bushwick Ave in Brooklyn, 7-10:30pm. See pg 9

**Sept 22-24 Black Forest Star Party** <http://bfsp.org/>

**Amateur Astronomers Association, AAA** [www.aaa.org](http://www.aaa.org) for calendar of upcoming events

**Custer Institute & Observatory** <http://www.custerobservatory.org> **Stargazing every clear Sat eve** Call 631-765-2626  
Fundraising to replace the telescope in the dome. Help at [www.gofundme.com/custer](http://www.gofundme.com/custer). Donations welcome

**Explore Scientific Online Presentations** <https://youtu.be/bOzZjO8QWfc>

**Montauk Observatory** <http://www.montaukobservatory.com/> Star Parties (weather permitting) Montauk County Park (formerly Theodore Roosevelt County Park) Entrance off Rt 27 (Montauk Hwy) at the Ross School Tennis Center, 20 Goodfriend Drive, East Hampton, NY 11937

**Northern Lights Trip**-Ever want to visit Iceland and see the northern lights and volcanoes and other geothermal features? We had discussed making a club trip just before the pandemic broke so maybe it's time to try again. Anyone want to help organize? He is a tour already arranged. Maybe we could get a group rate?

**NYSkies Seminars** 1st and 3rd Fri of each month. 6:30-9PM McBurney Hall, 125 W 14th St, 6/7 Ave, NYC  
[www.nyskies.org/seminar.htm](http://www.nyskies.org/seminar.htm) Join their hotline for local activities at [nyskies@nyskies.org](mailto:nyskies@nyskies.org)

**Rockland Summer Star Party** Rescheduled for 2022 [www.rocklandastronomy.com](http://www.rocklandastronomy.com)

**Stony Brook University Astronomy Open Night** Fall 2021 Open Nights will be virtual on the first Fri each month via Zoom, 7:30PM. Use this link to avoid having to supply a passcode. This link will remain valid throughout the 2021 Open Night season. **Please have your microphone and video camera turned off until instructed otherwise.**  
<https://stonybrook.zoom.us/j/96446568983?pwd=b2cvVlVlZuMkdTNHlUZXN2L1FOZz09=b2cvVlVlZuMkdTNHlUZXN2L1FOZz09>

**World Science Festival and free Astronomy Courses-** <https://www.worldsciencefestival.com/>

**Other Star Party lists** <https://tinyurl.com/hwzcsef4>

**If you're visiting France**, check this site [www.stelvision.com/astro/les-plus-beaux-observatoires-de-france/](http://www.stelvision.com/astro/les-plus-beaux-observatoires-de-france/).

**FOR SALE!!!**

Have unused equipment that could use a new home? We will gladly list items for sale in the CO. Please send information on your items directly to the Editor at [AOSeditor@aosny.org](mailto:AOSeditor@aosny.org) for inclusion each month.

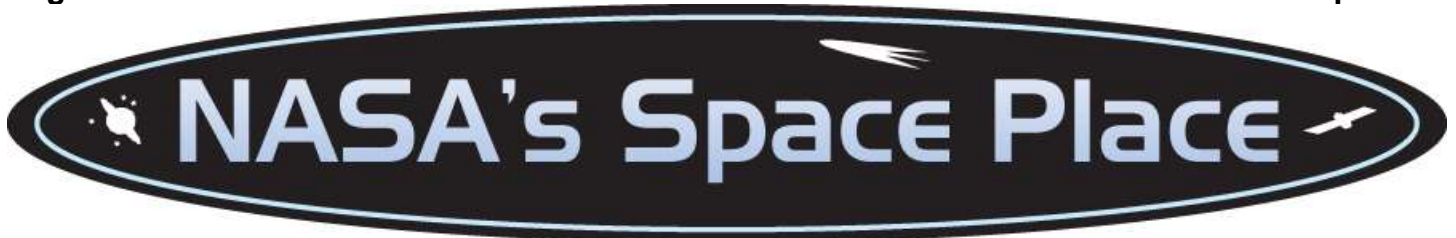
Meade 10" LX50 Schmidt-Cassegrains (weight about 58lb), Meade Superwedge (very heavy duty Alt-Azimuth mount), Meade Field Tripod, Magellan II Telescope Computer. The LX50 has the Encoder installed so that the Magellan can read out where you are pointing on the sky. It only has 1 motor to rotate in the azimuth direction. It does not have an active "go-to" function. The Magellan can only "guide" you to a destination. It does not move the scope. The whole setup and the optics are in very good condition. Have the original box and foam for the LX50 for safe transportation. \$700 for the package. **Wesley Chuen** [wesley888@gmail.com](mailto:wesley888@gmail.com)

**Launch Back to School with NASA**-As students across the country are saying goodbye to the summer and hello to a new school year, we're gearing up to engage K-12 students in activities and challenges. [Check out our many resources](#) to inspire the next generation of explorers, and help educators and students stay involved in NASA's missions. **Take the**

**Next Giant Leap with Us** – With Artemis, NASA will land the first woman and first person of color on the Moon. This exciting new era is underway and the first uncrewed flight test of our powerful Space Launch System rocket and Orion spacecraft, Artemis I, will launch later this year. Get involved in our [Artemis Student Challenges](#). **Look Beyond** – The James Webb Space Telescope will be the largest, most powerful and complex space science observatory ever built. Learn more about how Webb can be used as a window into the early universe with our [STEM Toolkit](#). **Share Your Earth-Inspired Art** – For 50 years, Landsat satellites have collected images of Earth from space. On Sept. 16, Landsat 9 is scheduled to launch and continue this legacy. Crafters of all ages are invited to share [Landsat-inspired art creations](#). More resources at <https://www.nasa.gov/stem/foreducators/k-12/index.html>.

**NASA Student Challenge Opportunity** Do you teach about aeronautics and Earth's atmosphere? Have you taken a look at our **Where in the Air Are We?** <https://tinyurl.com/42mbem7y> Activity? Take that activity one step further with the

**NASA TechRise Student Challenge** <https://tinyurl.com/6fhuj8fb> 6-12th grade participants design an experiment to test on a suborbital rocket or high-altitude balloon. The challenge is now open and entries are due by Nov. 3, 2021.



**This article is provided by NASA Space Place.** With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](https://spaceplace.nasa.gov) to explore space and Earth science! The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!

### **Astrophotography With Your Smartphone** by David Prosper

Have you ever wanted to take nighttime photos like you've seen online, with the Milky Way stretched across the sky, a blood-red Moon during a total eclipse, or a colorful nebula? Many astrophotos take hours of time, expensive equipment, and travel, which can intimidate beginners to astrophotography. However, anyone with a camera can take astrophotos; even if you have a just smartphone, you can do astrophotography. Seriously!

Don't expect Hubble-level images starting out! However, you can take surprisingly impressive shots by practicing several basic techniques: steadiness, locked focus, long exposure, and processing. First, steady your smartphone to keep your subjects sharp. This is especially important in low light conditions. A small tripod is ideal, but an improvised stand, like a rock or block of wood, works in a pinch. Most camera apps offer timer options to delay taking a photo by a few seconds, which reduces the vibration of your fingers when taking a shot. Next, lock your focus. Smartphones use autofocus, which is not ideal for low-light photos, especially if the camera readjusts focus mid-session. Tap the phone's screen to focus on a distant bright star or streetlight, then check for options to fine-tune and lock it. Adjusting your camera's exposure time is also essential. The longer your camera is open, the more light it gathers - essential for low-light astrophotography. Start by setting your exposure time to a few seconds. With those options set, take a test photo of your target! If your phone's camera app doesn't offer these options, you can download apps that do. While some phones offer an "astrophotography" setting, this is still rare as of 2021. Finally, process your photos using an app on your phone or computer to bring out additional detail! Post-processing is the secret of all astrophotography.

You now have your own first astrophotos! Wondering what you can do next? Practice: take lots of photos using different settings, especially before deciding on any equipment upgrades. Luckily, there are many amazing resources for budding astrophotographers. NASA has a free eBook with extensive tips for smartphone astrophotography at [bit.ly/smartastrophoto](https://bit.ly/smartastrophoto), and you can also join the Smartphone Astrophotography project at [bit.ly/smartphoneastroproject](https://bit.ly/smartphoneastroproject).



Members of astronomy clubs often offer tips or even lessons on astrophotography; you can find a club near you by searching the "Clubs and Events" map on the Night Sky Network's website at [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov). May you have clear skies!

*A small tripod for a smartphone. They are relatively inexpensive – the author found this at a local dollar store!*



*The Moon is large and bright, making it a great target for beginners. The author took both of these photos using an iPhone 6s. The crescent moon at sunset (left) was taken with a phone propped on the roof rack of a car; the closeup shot of lunar craters (right) was taken through the eyepiece of a friend's Celestron C8 telescope.*





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### Corner the Great Square of Pegasus by David Prosper

The Summer Triangle may be the most famous seasonal star pattern, but during early August evenings another geometrically-themed asterism rises: the Great Square of Pegasus. This asterism's name is a bit misleading: while three of its stars - Scheat, Markab, and Algenib - are indeed found in the constellation of the winged horse Pegasus, its fourth star, Alpheratz, is the brightest star in the constellation Andromeda!

August evenings are an excellent time to look for the Great Square, as it will be rising in the east after sunset. If not obvious at first, wait for this star pattern to rise a bit above the murky air, and remember that depending on your point of view, it may appear more like a diamond than a square. Look for it below the Summer Triangle, or to the southeast of nearby Cassiopeia at this time. As the Great Square rises in prominence during autumn evenings, it becomes a handy guidepost to finding more constellations, including some of the dimmer members of the Zodiac: Aries, Pisces, Aquarius, and Capricornus. Like the Summer Triangle, the Great Square of Pegasus is also huge, but Pegasus itself is even larger; out of the 88 constellations, Pegasus is 7th in size, and feels larger as the stars in its neighboring constellations are much dimmer.

There are many notable deep-sky objects found within the stars of Pegasus - ranging from easily spotted to expert level targets - making it a great constellation to revisit as your observing skills improve. Notable objects include the densely-packed stars of globular cluster M15, a great first target. The potential "Milky Way look-alike" galaxy NGC 7331 is a fun target for more advanced observers, and expert observers can hop nearby to try to tease out the much dimmer interacting galaxies of Stephan's Quintet. A fascinating (but extremely difficult to observe) object is a gravitationally-lensed quasar famously known as the Einstein Cross. Pegasus has quite a storied history in the field of exoplanet research: 51 Pegasi was the first Sun-like star discovered to be host to a planet outside our solar system, now officially named Dimidium.

While observing Pegasus and its surroundings, keep your eyes relaxed and ready to catch some Perseids, too! August 2021 promises an excellent showing of this annual meteor shower. The crescent Moon sets early on the evening of the

shower's peak on Aug 11-12, but you can spot stray Perseids most of the month. If you trace the path of these meteors, you'll find they originate from one point in Perseus - their radiant. Giant planets Jupiter and Saturn will be up all evening as well. Look south - they easily stand out as the brightest objects in the faint constellations Aquarius and Capricornus.

Pegasus truly holds some fantastic astronomical treasures! Continue your exploration of the stars of Pegasus and beyond with NASA at [nasa.gov](https://nasa.gov).



While the stars of the Great Square of Pegasus are not as bright as those of the Summer Triangle, they still stand out compared to their neighbors, and make a great foundation for exploring this area of the night sky. Note that the brightness of the stars near the horizon is exaggerated in this picture.

Stephan's Quintet is one of the most famous deep-sky objects in Pegasus. First discovered in 1877, it contains the first galaxy group discovered (which includes 4 of the 5 galaxies making up the Quintet) - and has been studied extensively ever since. One day this group will merge into one supergalaxy! While famous, these galaxies are hard to spot in all but the largest backyard telescopes - but are a favorite target of astrophotographers. Take a virtual flyby of these galaxies with a tour created from Hubble data at: [bit.ly/quintetflyby](https://bit.ly/quintetflyby)

Credit: NASA, ESA, and G. Bacon, J. DePasquale, F. Summers, and Z. Levay (STScI)





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### Catch Andromeda Rising David Prosper

If you're thinking of a galaxy, the image in your head is probably the Andromeda Galaxy! Studies of this massive neighboring galaxy, also called M31, have played an incredibly important role in shaping modern astronomy. As a bonus for stargazers, the Andromeda Galaxy is also a beautiful sight.

Have you heard that all the stars you see at night are part of our Milky Way galaxy? While that is mostly true, one star-like object located near the border between the constellations of Andromeda and Cassiopeia appears fuzzy to unaided eyes. That's because it's not a star, but the Andromeda Galaxy, its trillion stars appearing to our eyes as a 3.4 magnitude patch of haze. Why so dim? Distance! It's outside our galaxy, around 2.5 million light years distant - so far away that the light you see left M31's stars when our earliest ancestors figured out stone tools. Binoculars show more detail: M31's bright core stands out, along with a bit of its wispy, saucer-shaped disc. Telescopes bring out greater detail but often can't view the entire galaxy at once. Depending on the quality of your skies and your magnification, you may be able to make out individual globular clusters, structure, and at least two of its orbiting dwarf galaxies: M110 and M32. Light pollution and thin clouds, smoke, or haze will severely hamper observing fainter detail, as they will for any "faint fuzzy." Surprisingly, persistent stargazers can still spot M31's core from areas of moderate light pollution as long as skies are otherwise clear.

Modern astronomy was greatly shaped by studies of the Andromeda Galaxy. A hundred years ago, the idea that there were other galaxies beside our own was not widely accepted, and so M31 was called the "Andromeda Nebula." Increasingly detailed observations of M31 caused astronomers to question its place in our universe – was M31 its own "island universe," and not part of our Milky Way? Harlow Shapley and Heber Curtis engaged in the "Great Debate" of 1920 over



its nature. Curtis argued forcefully from his observations of dimmer than expected nova, dust lanes, and other oddities that the "nebula" was in fact an entirely different galaxy from our own. A few years later, Edwin Hubble, building on Henrietta Leavitt's work on Cepheid variable stars as a "standard candle" for distance measurement, concluded that M31 was indeed another galaxy after he observed Cepheids in photos of Andromeda, and estimated M31's distance as far outside our galaxy's boundaries. And so, the Andromeda Nebula became known as the Andromeda Galaxy. These discoveries inspire astronomers to this day, who continue to observe M31 and many other galaxies for hints about the nature of our universe. One of the Hubble Space Telescope's longest-running observing campaigns was a study of M31: the Pachromatic Hubble Andromeda Treasury (PHAT): [bit.ly/m31phat](https://bit.ly/m31phat). Dig into NASA's latest discoveries about the Andromeda Galaxy, and the cosmos at large, at [nasa.gov](https://nasa.gov).

Spot the Andromeda Galaxy! M31's more common name comes from its parent constellation, which becomes prominent as autumn arrives in the Northern Hemisphere. Surprising amounts of detail can be observed with unaided eyes from dark sky sites. Hints of it can even be made out from light polluted areas. *Image created with assistance from Stellarium*

While M31's disc appears larger than you might expect (about 3 Moon widths wide), its "galactic halo" is much, much larger – as you can see here. In fact, it is suspected that its halo is so huge that it may already mingle with our Milky Way's own halo, which makes sense since our galaxies are expected to merge sometime in the next few billion years! The dots are quasars, objects located behind the halo, which are the very energetic cores of distant galaxies powered by black holes at their center. The Hubble team studied the composition of M31's halo by measuring how the quasars' light was absorbed by the halo's material. *Credits: NASA, ESA, and E. Wheatley (STScI) Source: <https://bit.ly/m31halo>*





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