

The Astrogator

Grand Strand Astronomers Club Newsletter

ISSUE #9 Volume #3
December 1, 2025



Contents

- 01: Insights from Ian
- 02: Meeting Recap
- 03: Club Announcements
- 04: Astrophotography
- 05: Articles of Interest
- 06: Events and Outings
- 07: Sky Charts

Grand Strand Astronomers Leadership

Ian Hewitt – Executive Officer

John DeFreitas – Treasurer

Gerald Drake – Secretary

Tim Kelly – Newsletter Co-Editor

Insights from Ian

We are almost at the end of the year and entering the holiday season. After a string of clouded out observing events, the last quarter has delivered some great observing, including our public observing event at Hampton State Park. In addition to clear weather nights, we had two very bright comets in the evening sky. November also delivered another aurora event for us here in South Carolina. We have one meeting and two observing sessions left in this calendar year and hope that our luck will continue. Clear Skies everyone. -I

Meeting Recap

Held on October 2, 2025

Ian opened the meeting and welcomed those attending.

The 2026 events are now in our webpage. Based on the moon cycle, it looks like the 2nd or 3rd Saturday of the month will be good for observing and the 4th Thursday of the month looks good for our indoor meetings. Check out Events on: gsastro.org

Ian shared a video of a Falcon 9 rocket launch from Kennedy Space Center. He took the video while there on business. It was impressive to watch.

We discussed the comets shared in last month's meeting. Ian tried to image one with his SeeStar, but the image smeared due to the comet's speed. He is working on ways to improve the image. His image of Swann was underwhelming. He reports there was not much of a trail and the image is green and smudgy.

He did take some awesome images of the Milky Way from Hampton Plantation using a Cannon DSLR and an inexpensive fisheye lens. We had some folks from the Columbia astronomy club come out to Hampton. Enjoyed having them.

We discussed Pixinsight software for processing images. Here is the link: <https://pixinsight.com/>. It is a great processing tool with lots of tutorials, and it's a free download.

We discussed the SeeStar smart telescope for astrophotography noting that it will not be good for planetary, but is great for deep sky imaging. It is easy to use, self-aligning, and performs plate solving (goes to a star and compares the background with its data to determine if it is pointed in the right direction). It is a \$500 telescope and performs well if you don't ask too much of it. It will not compete with the typical astrophotography set up, but it is getting great reviews.

One of the reviewers mentioned is Cuiv, the Lazy Geek. Catch his YouTube video review of the SeeStar S50 here: https://youtu.be/Nt29_kHV1Fg. He also reviews a lot of other gear and software like Pixinsight, Nina, and power boxes.

Another interesting YouTuber is Dillion O'Donnel who hosts Star Stuff. Example here: <https://youtu.be/as8qosZGsuA>. He explains things

well and is plugged into what is going on in industry. Ed Ting is a YouTuber who gives good info on telescopes. See his link here:

<https://www.youtube.com/@edting>.

Gerald raised a question about SharpCap, wondering if it will control the telescope mount. The consensus is that it will adjust, but not give you full control. You still have to use your control software. Gerald will experiment with this and report back.

We discussed Aynor Middle School's request for telescopes they could buy with a budget of around \$750. They reached out to us earlier this year to join them in an astronomy outing at their school, which we participated in successfully. It was a great night. They are interested in promoting astronomy at the school. It was suggested that since we have two telescopes in our club that no one uses, we could donate one to them to use. We decided the 8" Dobsonian would be best as the 10" Dobsonian can be a bit much to handle. Gerald will send them an email with the offer and see what they say.

Meeting adjourned.

Hampton Plantation Outing:

Hampton Plantation held a public event for astronomy on October 18, 2025. Our club was represented along with members from the Columbia Astronomy Club. There was a light public turnout, but the skies were clear so observing and imaging went well.

Interesting Astronomy Quotes

Sophocles (497- 405 BC): "Astronomy? Impossible to understand and madness to investigate."

Plato (429 –347 BC): "Astronomy compels the soul to look upwards and leads us from this world to another."

Club Announcements

Donation of the Club's 8" Dobsonian:

As mentioned in the Meeting Recap, we offered the club's 8" Dobsonian to Aynor Middle School who gladly accepted it. It was delivered on November 11. Pictured below are Adrienne Bostic, Grade 8 Science Department Head of Aynor Middle School; and Gerald Drake representing Grand Strand Astronomers



Our club still has the 10" Dobsonian. It's fully restored and is in great shape. Truly a "light bucket," it will give you great views of the night sky. Reach out to us at info@gsastro.org if you'd like to borrow it.

Astrophotography

By Ken Legal

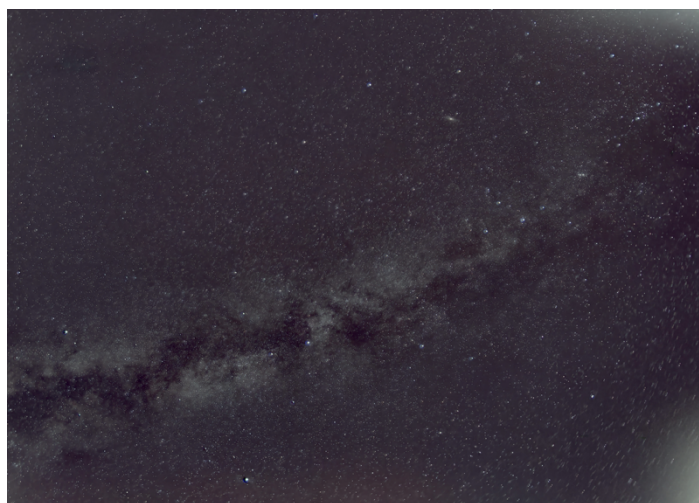
Below is the Elephant Trunk Nebula (within IC 1396) – 21 frames of 300sec each.

Taken from my back yard in MB with an 80mm f/6 triplet refractor and 0.8x field flattener, ZWO533MC Pro camera at 105 Gain & -10C, and a ZWO Duo Band filter. Guided with PHD2.



By Ian Hewitt

Below is an image of the Milky Way taken while at Hampton Plantation using a DSLR with a fisheye lens on a tracking mount. Post imaging processed with PixInsight and [BlurXTerminator](#)



Articles of Interest



Reprint from Celestron - November 11, 2020

submitted by Gerald Drake

March 2025

Saturn, the sixth planet from the Sun, is arguably the most breathtaking object in our Solar System. Named after the Roman god of agriculture and abundance, Saturnus (or Cronus in Greek mythology), the planet's opulent rings evoke an image of wealth and grandeur.

For centuries, Saturn has captivated telescope viewers with its stunning rings. These rings have inspired countless people worldwide to take up astronomy as a hobby. Any amateur observer will tell you that seeing Saturn's rings through a telescope for the first time is an unforgettable experience. Once you've seen it, Saturn is sure to remain one of your favorite observing targets.

2025 is a fascinating year to observe Saturn because its iconic rings will go 'razor-thin,' offering a rare and dramatic perspective not seen since 2009.

Important 2025 Dates and Sky Events

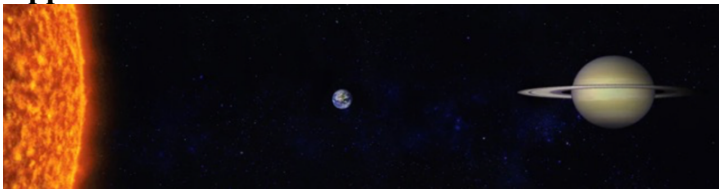
Ring Plane Crossing

- **What's Happening:** On March 23, 2025, Saturn's rings will reach a rare edge-on alignment with Earth in an event known as a ring plane crossing. Although Saturn won't be visible on that date due to its position in the daytime sky, the alignment marks a key turning point. Starting around April 11, you can spot Saturn in the pre-dawn sky as its ultra-thin rings begin to gradually reappear.

Due to the planet's axial tilt, the rings will gradually reappear but disappear again in November 2025. *Please note that Saturn will be too close to the Sun to observe in March 2025. Because Saturn reached conjunction with the Sun on March 12, 2025, it will be unobservable until April 11.*

- **Why It Matters:** Ring plane crossings occur roughly every 13 to 15 years, with the last one taking place in 2009. As Saturn orbits the Sun, the angle of its rings shifts relative to Earth, gradually appearing more shallow until they align edge-on with our line of sight—making the rings look like a thin line and seemingly “vanish.”
- **Saturn’s Ring Tilt Cycle:** After the rings reach their edge-on position, they will slowly open up again. By 2032, they’ll reach their maximum tilt, offering a stunning view of Saturn’s iconic ring system before the cycle begins anew.

Opposition



- **Date:** Saturn will reach opposition on September 21, 2025.
- **Constellation:** Pisces
- **Apparent Diameter & Brightness:** 19.4 arcseconds in diameter. 100% fully illuminated, shining at +0.6.
- **Visibility:** During opposition, Saturn will be directly opposite the Sun in the sky, rising in the east as the Sun sets in the west, making the planet visible all night long. Opposition is the best time to observe Saturn because it will be at its brightest and closest point to Earth for the year. As discussed above, Saturn's rings are visible in small telescopes but will appear

edge-on this year.

Conjunctions

- **Saturn and Venus:** On April 28, 2025, Saturn and Venus will appear within 4 degrees of each other, low in the east before dawn in the constellation Pisces.
- **Saturn and Moon:** On June 18, 2025, the Moon passes 3° north of Saturn.
- **Saturn and Neptune:** On June 29, 2025, Saturn passes 1° south of Neptune.
- **Saturn and Moon:** On July 16, 2025, the Moon passes 4° north of Saturn.
- **Saturn and Neptune:** On August 6, 2025, Saturn passes 1.1° south of Neptune.
- **Saturn and Moon:** On October 5, 2025, the Moon passes 4° north of Saturn.
- **Saturn and Moon:** On November 2, 2025, the Moon passes 4° north of Saturn.
- **Saturn and Moon:** On December 26, 2025, the Moon passes 4° north of Saturn.

15 Key Saturn Facts

- **Galileo Galilei:** The Italian astronomer Galileo was the first to observe Saturn through a telescope, but his tiny refractor wasn't powerful enough to discern its rings. Instead, he noted that the gas giant had "lobes." In 1655, Dutch astronomer Christiaan Huygens was the first to propose that a ring encircled Saturn. Today, history credits him with the discovery of Saturn's rings.
- **Saturn's Orbit:** Saturn takes 29.5 Earth years to orbit the Sun. On Saturn, you would be nearly 30 years old and celebrating your first birthday!

- **Size Comparison:** It would take 9.5 Earths lined side-by-side to span Saturn's equatorial diameter and 21 to span its massive rings.
- **Distance from Earth:** When Earth and Saturn are at their closest, they lie approximately 746 million miles apart. They can be over a billion miles apart when on opposite sides of the Sun.
- **Volume:** More than 700 Earths could fit inside if Saturn were hollow.
- **Moons:** As of 2025, NASA scientists have confirmed 146 moons orbiting Saturn.
- **Enceladus:** One of Saturn's smallest moons, Enceladus, is covered in ice and appears to have an ocean hidden below its frozen surface. The Cassini spacecraft observed water plumes jetting into space, revealing a potentially habitable environment beneath its surface.
- **Titan:** Saturn's largest moon and the second-largest in the Solar System, Titan, has a thick yellow-orange methane and nitrogen atmosphere. Its surface contains liquid methane lakes. Only one space probe, Huygens, descended to its surface and briefly transmitted data back to the Cassini orbiter until its batteries failed.
- **Density:** Saturn is the least dense planet in the Solar System. If a body of water were large enough to hold it, Saturn would float.
- **Composition:** Like Jupiter, Saturn is composed mainly of hydrogen and helium with no actual landmass. Its top cloud layers are ammonia ice; below is mostly water ice with intermixed ammonium hydrosulfide ice bands.
- **Hexagon Storm:** Saturn's largest storm at the planet's north pole is twice as large as Earth and shaped like a near-perfect hexagon. Voyager first discovered the storm, and later, Cassini mapped it. In 2013, Australian

husband-and-wife team Darryl Milika and Patricia Nicholas were the first amateur astronomers to image the hexagon using a Celestron C14.

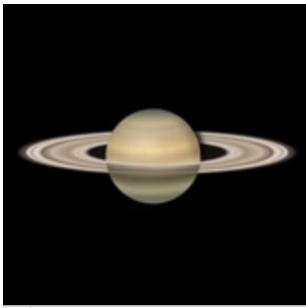
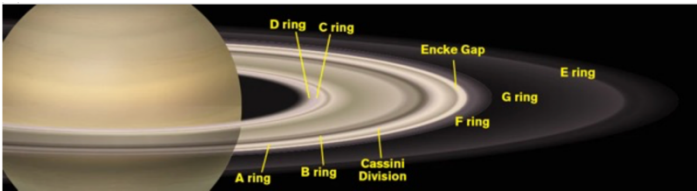
- **Rotation:** Saturn is the flattest planet in the Solar System due to its low density and fast rotation speed. It takes approximately ten and a half hours to complete one rotation on its axis.
- **Ring System:** Although other planets have rings, Saturn's ring system is the most complex in the Solar System. The rings comprise billions of dust particles, ice chunks, and rocky remnants of comets, asteroids, and shattered moons. The rings extend more than 175,000 miles from the planet but are quite thin—only about 100 yards thick. To understand the thinness of the rings, imagine an 8.5" x 11" sheet of paper. If the 11" long axis of the sheet represents the span of the rings from one side to the other, the rings' thickness would be 1/100th the thickness of the paper!
- **Ring Groups:** Astronomers have divided Saturn's rings into seven groups (four primary and three fainter). Outwards from Saturn, the ring groups are D, C, B, A, F, G, and E.
- **Spacecraft Visits:** Four spacecraft have visited Saturn. Pioneer 11, Voyager 1, and Voyager 2 flew by the planet. Cassini orbited Saturn 294 times from 2004 to 2017, gathering a wealth of information before ending its mission in a fiery (but planned) "death dive."

Where to Find Saturn in 2025

- **April:** Saturn emerges from the Sun's glare and will become visible in the morning sky.
- **September through December:** Saturn is well positioned for nighttime viewing, especially when it reaches opposition. It will be at its brightest on September 21. Saturn is located in Pisces and will remain there until the end of the calendar year.

What to Look for while Observing Saturn

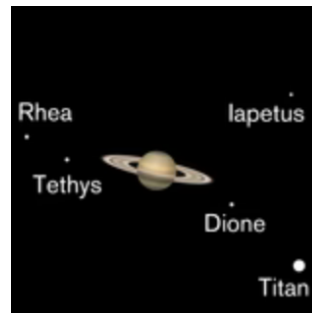
Rings: Saturn's rings are undoubtedly its most iconic feature. With a smaller aperture telescope, you can see the rings as a small, cream-colored oval encircling the planet. A larger aperture telescope, under steady viewing conditions, will reveal the intricate divisions within the rings. Look for the main outer A ring and the middle B ring, separated by the dark Cassini Division. For a more challenging observation, use an 11-inch or larger telescope under extremely steady conditions to try spotting the faint Encke Division near the edge of the outer A ring. Pay attention to the tilt of the rings over time. In 2017, the rings were at their widest angle of 27 degrees, as seen from Earth. Since then, the angle has gradually decreased. By 2025, the rings will appear edge-on and, due to their thinness, will virtually disappear, leaving Saturn looking like a lonely orb. Gradually, the rings will begin to reopen until they reach their maximum tilt again in 2032.



Seeliger Effect: Around the time of opposition, when Saturn is fully illuminated by the Sun, its rings appear a bit brighter for a few nights. Saturn's shadow is hidden behind the planet during this period, revealing more of the ring's surface. The tiny particles that make up the rings cast no shadows, allowing sunlight to reflect directly into our line of sight. These factors combine to make Saturn's rings temporarily shine brighter than usual. Look for this effect when the rings open again in the coming years.



Shadows: Observers can witness a fascinating interplay of shadow and light on Saturn. Sometimes, the rings cast intriguing shadows onto the planet. At other times, Saturn casts its shadow onto the rings. By observing over many nights, you can see these changes unfold. Look for this effect once the rings open again in the coming years.



Moons: Amateur telescopes can resolve approximately six of Saturn's 146 moons. Its largest moon, Titan, shines at about ninth magnitude and is easily visible. During your observing session, try to identify Titan, Rhea, Dione, Tethys, Enceladus, and Mimas.



Belts and Zones: Look for dark belts and zones on Saturn's face. These regions flow strongly in opposite directions around the entire planet. Although they are much less pronounced than Jupiter's belts and zones,

they contain smaller storms. Using color filters can help bring out more detail.

Conjunctions: Planetary alignments, or conjunctions, occur when two or more planets appear very close together in the night sky, creating the illusion that they are near each other, even though they are thousands of miles apart. Conjunctions are often spectacular, especially involving the largest or brightest planets. One such event was the Great Conjunction of Jupiter and Saturn during the 2020 Winter Solstice. Look for the next conjunction when Saturn and Venus pair up on January 19, 2025.

The Best Equipment for Viewing Saturn

Telescopes



A small telescope with an aperture of at least 50mm and a modest power of 25x is sufficient to reveal Saturn's rings and its brightest moon, Titan. For optimal viewing, Maksutov-Cassegrain and Schmidt-Cassegrain telescopes, with apertures ranging from 4" to 14", are recommended due to their superior light-gathering capabilities, longer focal lengths, and ability to support higher magnifications (150x or more). Larger telescopes can reveal intricate details in Saturn's atmosphere and rings, especially under calm conditions. Using a larger telescope will enhance your ability to observe prominent features. Remember, the larger the telescope's mirror or lens, the more light it will collect, resulting in better resolution. However, this also increases the cost and weight of the telescope, so carefully consider these factors when choosing your ideal telescope.

Filters



Color filters are an excellent way to enhance subtle features in Saturn's atmosphere, making your observing experience more enjoyable. Filters can be threaded individually onto the end of eyepiece barrels or stacked together to combine their benefits. (Note: Stacking filters reduces the amount of light that reaches your eye, so we recommend this only for telescopes with at least an 8" aperture.) Here are the most popular filters for enhancing details on Saturn:

- **#12 Deep Yellow Filter (74% Transmission):** This filter penetrates and darkens atmospheric currents with low-hue blue tones, enhancing the orange and red features of the belts and zones.
- **#21 Orange Filter (46% Transmission):** Improves the structure of the cloud bands and highlights blue polar regions.
- **#25 Red Filter (14% Transmission):** Aids in observing bluer clouds.
- **#58 Green Filter (24% Transmission):** Enhances white features in Saturn's atmosphere.
- **#80A Blue Filter (30% Transmission):** Enhances low-contrast features between the belts and zones.
- **Variable Polarizing Filter:** Reduces light transmission and glare.

Color filters are available in the following Celestron kits:

- **PowerSeeker Accessory Kit - 1.25" #94306**

- **AstroMaster Accessory Kit - 1.25" #94307**
- **Observer's Accessory Kit - 1.25" #94308**
- **Lunar and Planetary Filter Set - 1.25" #94119-10**
- **Eyepiece and Filter Kit - 1.25" #94303**
- **Eyepiece and Filter Kit - 2" #94305**

Cameras and Phone Adapters



Now that you have observed Saturn visually, take your experience to the next level by capturing detailed images of the ringed planet with your smartphone, DSLR, or a planetary imaging camera. Smartphones' built-in cameras are continuously improving. You can hold your phone up directly to the telescope's eyepiece to take advantage of its image scale with higher magnification to capture the planet and its magnificent rings. You can use the smartphone's digital zoom feature to increase Saturn's size. It can be tricky to center your target correctly, but using a smartphone adapter like the Basic Phone Adapter #81035 or the NexYZ 3-Axis Universal Smartphone Adapter #81055 will make centering Saturn quick and easy.

DSLR cameras are another popular tool you can use to capture Saturn. You will need a T-Adapter (different models are available for your telescope) and a camera-specific T-Ring (i.e., Canon, Nikon, etc.). The T-Ring attaches to your camera's bayonet. Then, the T-Adapter threads onto the T-Ring. Depending on your T-Adapter, it will slide into the eyepiece drawtube or screw directly onto the telescope's rear cell.

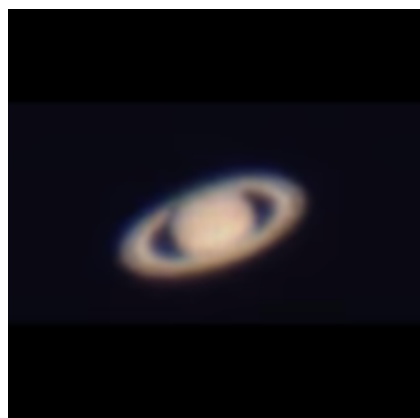
Planetary imaging cameras are also a great way to

capture high-resolution images with tremendous detail—and getting started is easier than you might think! The camera takes the place of your telescope's eyepiece and connects via USB to your computer or laptop. The software analyzes each frame of the live video capture and throws away the blurry images due to poor atmospheric turbulence. It then stacks and perfectly aligns the clearest video frames to create a bright, detailed, colorful image. Celestron's planetary imaging cameras include:

- NexImage 5 #93711

Helpful Observing Hints

Tip #1:
Steady seeing conditions are critical



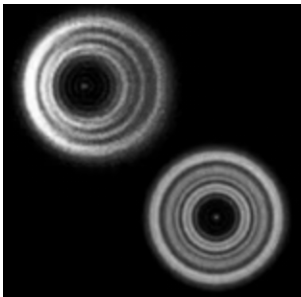
Steady Seeing Conditions: Steady seeing conditions are crucial for imaging or observing Saturn. Avoid nights with poor seeing when the atmosphere is turbulent and Saturn appears as a shimmering blob on your laptop screen or in a telescope eyepiece. Start with low magnification and increase it if the views remain steady. On a night with good seeing, you'll be amazed at how sharp and detailed Saturn appears—even the Cassini Division will be visible when the rings are at a favorable tilt to see it.

Tip #2:
Cool your telescope down!



Cooling Your Telescope: Make sure to bring your telescope outside about an hour before observing to allow it to cool to ambient temperature. The telescope needs to reach thermal equilibrium with the outside air to avoid producing distorted views. Telescopes with large mirrors and lenses may take longer to cool down properly for the best views.

Tip #3:
Collimate, collimate, collimate!



Collimation: If you own a Newtonian or Schmidt-Cassegrain telescope, ensure the optics are collimated. Proper collimation is crucial for discerning fine planetary details. Misaligned optics can prevent you from seeing Saturn's clearest and sharpest features. Make it a habit to check and adjust collimation once your telescope has cooled down. Most refractor telescopes generally do not require collimation.

Tip #5:
Use a Stereo Binocular Viewer



3-D Appearance: Saturn displays a noticeable 3-D appearance due to the darkened edges of its disk. A stereo binocular viewer attached to a mid-to-large-aperture Schmidt-Cassegrain or Maksutov-Cassegrain telescope will enhance this 3-D effect, making it feel like you can reach and almost touch the planet! You'll need two matching eyepieces of the same focal length, which can be costly, but the reward is a unique, realistic view full of detail and contrast, making it an excellent investment.

Saturn is one of the most thrilling planets to observe through a telescope. This year, its edge-on appearance offers a rare and fascinating view for backyard astronomers around the world. While the rings may seem to vanish, this unique perspective is part of the planet's ongoing dance with Earth—and it won't be long before the rings gradually open again, revealing their full splendor.

We hope this guide helps you get acquainted with Saturn and serves as a resource for you and your family during your next observing session. Enjoy viewing Saturn's edge-on appearance for the rest of the year.

Clear skies and happy observing!

Make a Telescope Dolly from PVC Pipe

By Gerald Drake

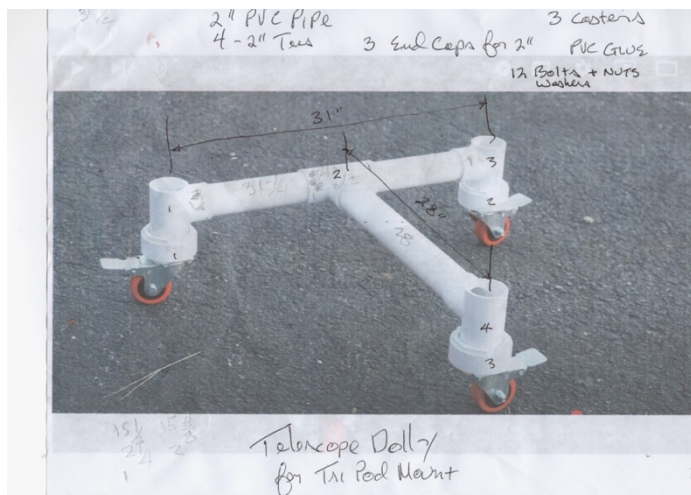
The primary telescope I use is the CPC 9.25 by Celestron. It's heavy at 58 pounds with just the tube and fork assembly. Add the tripod and there's another 19 pounds. So, moving it around is a bit of a chore. Now there are telescope dolly's available on the market to help do this. For example: there is the Scope Buggy for \$345 plus shipping shown below. Not a bad deal. You can check them out at

www.ScopeBuggy.com.



I did not want to spend the \$345 right now, so I searched for other options. I follow a

YouTuber who regularly post telescope information and she shared how to make a telescope dolly out of PVC pipe. See tsulasbigadventures.com for more info.



The design is simple. I captured the image above from her video, then printed it out, measured my tripod legs, made a parts list, and took it to Lowes.

2" PVC pipe is not expensive, but the fittings cost more than I had planned. When completed I had spent less than 1/3 of the cost of ordering the telescope dolly. PVC pipe is easy to work with. You can cut it with a hack saw, or I used a Sabre saw. It does create dust, so keep your telescope equipment covered or away from your work area. It was a fun build and doesn't take long to assemble.

Here is my completed unit. I measured pretty close and only had to make a few adjustments. I highly recommend the large casters because smaller ones will stick in driveway expansion joints. Also, locking casters are the way to



go since they'll prevent your telescope from moving once aligned. Be sure to glue all of the fittings. The telescope stands a little higher now, but it is fine for me. I'm now able to roll this out onto the driveway, lock wheels, and do a SkyAlign fairly quickly now. When done, I'm able to simply roll it back into the garage. Not bad.

Picking a Place to Observe

From High Point Scientific

Submitted by Tim Kelly,

Finding The Right Place

Where you place your telescope when observing is dependent upon your unique situation, but if you have a choice, follow these suggestions:

- Find a level or near level spot
- Choose grass or dirt whenever possible
- Stay away from decks or other elevated surfaces. They vibrate when you walk on them and will shake your telescope and therefore, the image.
- Concrete or asphalt is okay, but if it has been warm outside, it will take awhile before the surface radiating heat, which distorts the air and therefore, the image.
- Try to stay away from sources of light. Turn off your porch lights, and if you are friendly with

your neighbors, ask them to turn theirs off as well, and then come share the view through your telescope!

If you live in a light polluted location, welcome to the situation faced by millions of amateur astronomers! Take heart that Los Angeles has a very large population of telescope enthusiasts. The point here is to choose the darkest location possible for your situation, and then enjoy the views!

- Finally, pick a location with the widest view of the sky you can find. In wooded areas and those with lots of tall buildings, this can be a challenge, but just like the whole light pollution thing, the idea is to choose the best your situation has to offer.

Check Out Your Seeing Conditions

Why do you care what the seeing conditions are like? As long as it's not totally cloudy, snowing, or raining, so what, right?

You will be amazed at how quickly seeing conditions change, and what effect they have on observations! The sky may be perfectly clear, but seeing can be so bad that Jupiter or Saturn might look like they are under water, and even low magnification views are not in focus. The next night (or the next hour!) those same planets will look perfectly focused in your highest magnification eyepiece, and all because the seeing conditions improved.

One of the biggest mistakes new amateur astronomers make is assuming that focus will be sharp on any subject, with any eyepiece, on any night. Understanding that seeing conditions can support high magnification views one moment and cause an unfocused mess the next will help you get the most out of your telescope and accessories, and lower your blood pressure! Before you set up your telescope for a night of observing, get in the habit of taking a few moments to look up and check conditions

- Are the skies clear or are there passing clouds? Knowing there are clouds in the area helps you understand why an object you are gazing at suddenly disappears, or your GoTo telescope insists an object is there but you can't see it!
- Are the stars twinkling? If so, are they steady

overhead, or do they twinkle from horizon to horizon? Most of the time, stars overhead are steady and the twinkling increases as you move towards the horizon due to the increased atmosphere. If stars are twinkling overhead, you have "poor seeing", but if they are steady almost to the horizon, then grab your scope and get set up, because the seeing is especially good, and who knows how long it will last!

- Is it especially humid out? Is dew already forming on surfaces? Dew is not a deal-breaker unless it gets so heavy that all of your optics are affected, but knowing whether it's going to be a dewy night will help you plan your accessories. We'll talk more about [dew prevention](#) in the "recommended accessories" section below.
- Is it windy? A slight breeze can help keep dew at bay, but too much wind can degrade seeing conditions and make observing uncomfortable.



START OBSERVING!

Collect Your Telescope Gear: Whether you are driving to a dark-sky location or are observing in your back yard, it makes sense to make sure you collect everything you will need for an evening under the stars before you head outside. Some people find it works best to make a list and keep it near your telescope. Others keep everything they need in [accessory cases](#) for quick and easy access.

Whichever organizational method you choose, keep in mind that it is better to bring everything out at once than to keep going back into the house and subjecting your eyes to white light, or worse yet, not have what you need when you are miles away from home. Don't forget your red flashlight, remember to bring extra batteries, and pack some coffee or hot cocoa while you're at it!

Level Your Tripod: If you've picked a relatively flat observing location, this should be pretty easy.

Adjust your tripod legs until the tripod looks as level as possible. This is usually exact enough for basic visual astronomy, but you may want to increase the precision with a bubble level.

Align Your Telescope: The method used for telescope alignment depends on the type of mount you have and whether it is computerized or not. If you have a non-computerized alt-az mount, you can set your telescope down so that it points in any direction. If you have a non-computerized equatorial mount, you will want to set the telescope on the ground so that the polar axis is pointing north, and then follow the instructions in your manual to polar align your telescope. To find North, you can use a compass or navigational device, or learn how to find the North Star (Polaris) visually. The alignment method used for computerized telescopes varies by manufacturer and by telescope series. Follow the instructions in your manual to input the required data in your hand controller, and to align your telescope so it will accurately find objects for you.

Tweak Your Finder: If you followed the instructions in the [Aligning & Using Your Finder section](#) of this guide, your finder scope should need only the slightest adjustments to its alignment. Insert your lowest powered eyepiece and then point your finder at the largest object in the sky (other than the Sun, of course). This may be the Moon, or it may be Jupiter, or it may be a bright star. Center it in your eyepiece's field of view as best you can, and then look through your finder and make any adjustments necessary to cause the object to be centered in the crosshairs. If you want greater precision, switch eyepieces and do the same thing at higher magnification.

This quick procedure should be done before you start any observing session, and normally it will take just a few seconds. However, if you accidentally bumped your finder or turned the adjustment knob by mistake, you may need to re-align your finder. This happens to everyone sooner or later, but you will get really good at it and even a major re-alignment will be a piece of cake.

Use Your Lowest Power Eyepiece Whenever You Start Observing, Regardless of the Object:

Starting at low magnification accomplishes a couple of things. First, it tells you a lot about your seeing conditions. If you look at Saturn with a 30 mm eyepiece and it is "swimming" in the atmosphere, you know right away that you won't be able to use a higher magnification eyepiece until conditions improve. Another reason for starting with the lowest power eyepiece has to do with the ease or difficulty of finding an object in the sky. This is true whether you are using a computerized telescope or not. It is way easier to find and center an object if you are searching for it in a wider swath of sky. The more magnification you use, the less celestial real estate you will see, and the more precise you will have to be to get your target into the field of the eyepiece. So, do yourself a favor and start with a low power eyepiece.

Remember to Focus: All telescopes have a focuser, and whenever you walk up to a telescope's eyepiece, whether it is your telescope or someone else's, you should focus the image so that it looks as sharp as possible. Remember, everyone's eyes are different, and "almost" in focus isn't good enough. You will miss subtle details with an out of focus image, so the first thing you should do after inserting an eyepiece into a focuser or diagonal is focus. Remind your guests to focus for their eyes, too...they will enjoy the experience way more if you do. By the way, sometimes focus is hard to achieve, especially at higher magnifications or during less-than-stellar seeing conditions. When this is the case, the best way to focus is to slowly adjust the focuser until you feel that you have just passed best focus, then back up to the sweet spot. If you cannot focus, you are trying to observe at a magnification that the image cannot support due to the limitations of the telescope or the seeing conditions. The best course of action when this happens is to remove that eyepiece and use something with less power.

Changing Magnification: When you are ready to look at an object at higher or lower magnification, it is time to change eyepieces or add a [Barlow](#). Before you remove the eyepiece you are currently using, take a second and center the object in the field of view first. Now carefully loosen the thumbscrew holding

the eyepiece in place, slide it out, and insert the new eyepiece. Remember to tighten the thumbscrew securely so that your eyepiece will not fall out when you move the telescope. You may need to re-focus for the new eyepiece. Some eyepiece sets are “parfocal” which means the manufacturer designed them to have little or no change in focus between eyepieces in a series, but most of the time, you will have different styles and models of eyepieces, and so re-focusing will most certainly be required. Most amateur astronomers have several eyepieces at their disposal. An average eyepiece count is between 3 & 5, with a Barlow thrown in for good measure. Extra eyepieces allow you to adjust the magnification to the evening’s seeing conditions, as well as match the magnification or field of view to the object.

Calculating Power: To figure out how much magnification an eyepiece provides for a given telescope, divide the focal length of the eyepiece into the focal length of the telescope. For instance, a telescope with 1000 mm focal length will yield 100X magnification with a 10 mm eyepiece. Use this formula when shopping for your next eyepiece. Check it out:

- Let’s use the example of the 1000 mm focal length telescope, and then let’s say you have a 30 mm eyepiece (33X), a 10 mm eyepiece (100X) and a 2X Barlow, which would give you 66X with the 30 mm eyepiece and 200X with the 10 mm eyepiece. Since you know that you have four magnification choices (33X, 66X 100X & 200X), you might want to buy something that alone, would give you about 150X, and doubled, 300X. That would be either a 6 mm eyepiece (167X & 333X) or a 7 mm (143X & 286X). The idea is to fill in gaps in magnification without going too high.
- How Much is Too Much? Wait, what do you mean, too high? Sorry, but Earth-based telescopes have their limits. We have this pesky thing called the atmosphere, and it isn’t completely transparent, even though we humans tend to think so until we try looking through it with a telescope. This is why space telescopes are so important; they don’t have the atmosphere to deal with and can provide much clearer pictures of the Universe.

- The basic formula for the limits of magnification on a given telescope has to do with its aperture. The larger the optics are on a telescope, the more magnification it can handle...to a point. That point depends on, you guessed it, seeing conditions. That is why astronomers build big telescopes on the tops of mountains out in the middle of nowhere because those locations have a topography that tends to produce better seeing.
- Here’s the rule for max magnification: Approximately 50X per inch of aperture. That means a 4” telescope will max out at about 200X, and an 8” telescope will max out at about 400X. These rules are super variable, however. Sometimes the seeing is so good a 4” telescope can easily do 400X, etc., so what’s a person to do if they want to figure out what their telescope can really handle?
- Get out there and observe, and while you are enjoying the wonders of our Universe, pay attention. If you do, you will figure out quickly enough what seeing conditions tend to be in your area, and what kinds of magnifications the combination of your telescope and your location will support. If you have an eyepiece that gives you 200X, and when you put it in the Barlow you can only achieve focus about 50% of the time, then you will know that while 400X is doable, 500X will be way less likely, and you might not want to spend a good deal of money on an eyepiece that gives you that much magnification.
- We also recommend you find a [local astronomy club near you](#) and plan to attend a star party. It may not be your cup of tea, but you should check it out and see. Besides the social aspect, a great benefit of observing in a group is the ability to try other people’s accessories on your telescope, or at least see how well you like them on someone else’s telescope! Also, if you have questions or problems with your telescope, there’s a good chance someone is nearby that can help you

Events and Outings

Club Meetings:

Our December indoor meeting will be held on Thursday, December 4, at 7:00 PM via zoom. The zoom link will be provided by email, but it is also on the club's website: gsastro.org under events.

Club Outings:

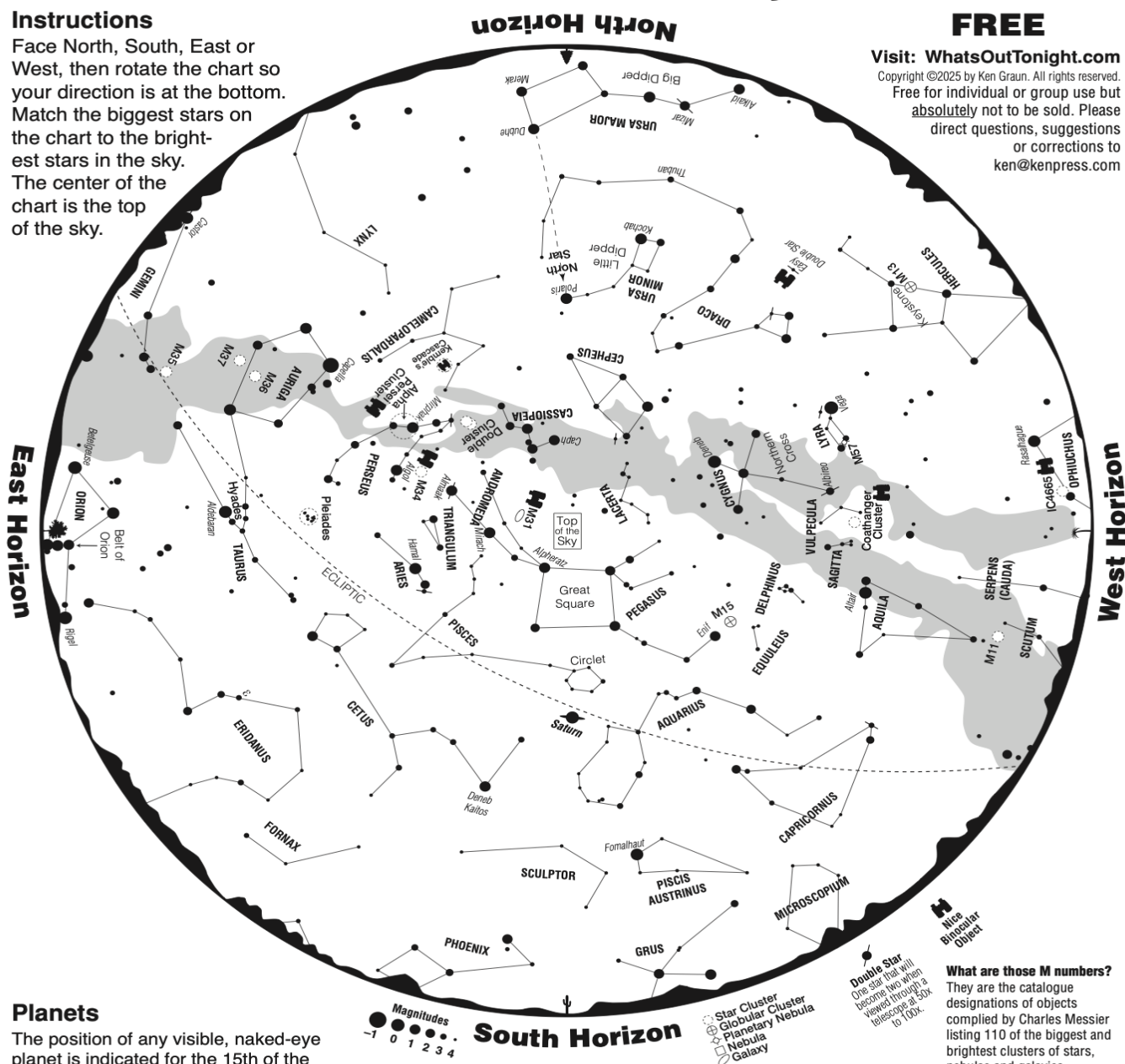
Our next Hampton Plantation outdoor observing event is Scheduled for Saturday, December 20 at sundown. This of course is weather dependent.

Comments and suggestions for the newsletter are welcomed. Send comments to gsastro@info.com

Face North, South, East or West, then rotate the chart so your direction is at the bottom. Match the biggest stars on the chart to the brightest stars in the sky. The center of the chart is the top of the sky.

Visit: WhatsOutTonight.com

Copyright ©2025 by Ken Graun. All rights reserved.
Free for individual or group use but
absolutely not to be sold. Please
direct questions, suggestions
or corrections to
ken@kenpress.com



The position of any visible, naked-eye planet is indicated for the 15th of the month. If the planet moves significantly during a month, other positions will be noted with dates. The **ECLIPTIC** is the path of the Sun through the sky but the planets and Moon move along it, too. It passes through the constellations of the zodiac.

Venus, at magnitude -3.9 , rises with the Sun so it is not visible. **Mars**, at magnitude $+1.3$, in Sagittarius, sets with the Sun so it is not visible. **Jupiter**, at magnitude -2.6 , in Gemini, rises in the east 2 hours after sunset. **Saturn**, at magnitude $+1.1$, in Aquarius, sets around midnight.

Distances planets are from the Earth on the 15th of this month:
Venus: 158,000,000 miles, **Mars:** 225,000,000 miles,
Jupiter: 402,000,000 miles. **Saturn:** 878,000,000 miles.

December Notes

The Summer and Winter constellations teeter-totter on opposite horizons. In the west, the setting bright stars, *Deneb*, *Vega* and *Altair* form the **Summer Triangle**. At the bottom of Cygnus, the **Northern Cross**, is *Albireo*, a beautiful blue/gold double star, as seen in a telescope. In the middle of the sky is Pegasus, and its **Great Square**, with the Andromeda Galaxy nearby. In the east, the **Pleiades** are gaining height with red *Aldebaran* below and *Capella* to its left. The **Belt of Orion** hugs the horizon with *Sirius*, the brightest star rising in an hour's time.

SELECTED **Clusters, Nebulae, Galaxies** +

ly = Light year, a unit of distance. 1 ly = 6 trillion miles.
Our Moon (and Sun) spans 30' (30 arc minutes) or 1/2°

Albireo. This 3rd magnitude stars becomes two stars, a blue and gold splendor, in a telescope with just 50x. In CYGNUS.

Alpha Persei Cluster. Distance: 600 ly / Diameter: 31 ly / Mag 1.2 / Spans 3° / 30 stars. In PERSEUS.

Andromeda Galaxy. Companion to our Milky Way Galaxy. Distance: 2,400,000 ly / Diameter: 120,000 ly / Mag 3.5 / Spans 3° x 1°. In ANDROMEDA.

Coathanger Cluster. 10 stars shaped like a bar-type coathanger. It spans 2° and it stars are 150 ly away. In VULPECULA near CYGNUS.

Double Cluster. Two side-by-side clusters. Distances: 7,200 ly / Diameters: 63 ly / Mag 3.5 / Span 1° / 320 stars total. Best in a telescope. In PERSEUS.

Great Orion Nebula. A birthplace of stars. Distance: 1,500 ly / Diameter: 30 ly / Mag 4 / Span 1x1° / Best in a telescope. In ORION.

M15. Globular Cluster. Distance: 34,000 ly / Diameter: 122 ly / Mag 6.2 / Spans 13'. In PEGASUS.

M34. Large Cluster. Distance: 1,400 ly / Diameter: 14 ly / Mag 5.2 / Spans 35' / 60 stars. Try with binoculars, too. In PERSUS.

M35. Large Cluster. Distance: 2,800 ly / Diameter: 23 ly / Mag 5.1 / Spans 28' / 200 stars. In GEMINI.

M36. Cluster. Distance: 3,700 ly / Diameter: 13 ly / Mag 6.0 / Spans 12' / 60 stars. Try with binoculars, too. In AURIGA.

M37. Cluster. Distance: 4,200 ly / Diameter: 29 ly / Mag 5.6 / Spans 24' / 150 stars. Try with binoculars, too. In AURIGA.

M57. Ring Nebula. Planetary Nebula that looks like a smoke ring. Smaller than what you might think. Estimated to be 1 ly in diameter and 2,000 ly away. Mag 9 / Spans 76" or 1.3'. In LYRA.

Observing Tips for above Objects

If possible, observe at a dark location and when the Moon is not bright. A bright Moon will make it more difficult to see the stars and impossible to see clusters, nebulae and galaxies. Only a small telescope at lower magnifications, around 50x, is required to see the objects listed above. The planets and Moon are best observed with a telescope around 50x or more! To get a feel for the size of objects, the Moon extends 30' (30 arc minutes). The binocular objects are best with binoculars because these objects are large in size—telescopes have too much magnification.

Meteor Showers

GEMINIDS. Peaks around **December 14** with 120 meteors/hour.

URSIDS. Peaks around **December 22** with 10+ meteors/hour.

Brightest Stars

Aldebaran. In TAURUS. Magnitude +1. Distance: 65 ly. Diameter: 36 times the Sun's. Orange Giant.

Altair. In AQUILA. Magnitude +0.9. Distance: 19 ly. Diameter: 1.9 times the Sun's.

Capella. In AURIGA. Magnitude +0.1. Distance: 42 ly. Diameter: 15 times the Sun's. It's actually 4 orbiting stars.

Deneb. In CYGNUS. Magnitude +1.3. Distance: 3200 ly. Diameter: 222 times the Sun's. Blue-White Supergiant.

Fomalhaut. In PISCIS AUSTRINUS. Magnitude 1.2. Distance: 25 ly. Diameter: +1.9 times the Sun's.

Mirach. In ANDROMEDA. Magnitude +2.1. Distance: 199 ly. Diameter: 89 times the Sun's.

Mirfak. In PERSEUS. Magnitude +1.8. Distance: 592 ly. Diameter: 64 times the Sun's.

Polaris. In URSA MINOR. Magnitude +2. Distance: 431 ly. 2,400 times brighter than the Sun. Supergiant Star.

Vega. In LYRA. Magnitude +0.02. Distance: 25 ly. Diameter: 2.4 times the Sun's.

Mythology

FOR THE CENTRAL CONSTELLATIONS, NORTH TO SOUTH

Arcas and his beautiful mother, Callisto were turned into the Little and Big Bears, **URSA MINOR** and **MAJOR** because of jealous Juno, wife of promiscuous Jupiter, who favored Callisto. During an early war between the Titans and Olympians, **DRACO**, the Dragon was flung to the North and frozen in place by the cold.

King **CEPHEUS** and Queen **CASSIOPEIA** ruled Ethiopia. Their daughter **ANDROMEDA** is being rescued by **PERSEUS** from the Sea Monster, **CETUS**. Andromeda was to be sacrificed to Cetus because Cassiopeia boasted of her and her daughter's beauty.

CAPRICORNUS is a "Seagoat," the partially transformed, half-goat, half-fish body of the god Pan who got scared and hurriedly escaped the monster Typhoon in order to warn Jupiter. The word panic is derived from Pan. **AQUARIUS** is the Water and Cup Bearer, a servant of the gods. **PEGASUS**, the Winged Horse is the deliverer of Jupiter's thunderbolts. **CYGNUS**, the Swan helped Helios find the pieces of his son, having fallen from the chariot that pulls the Sun across the sky. **AQUILA** is Jupiter's Eagle that carries out tasks. **LYRA**, the Lyre was invented by Mercury and mastered by Apollo's son, Orpheus whose music had magical powers. **PISCES** represents Venus and Cupid who changed themselves into Fishes tied with a length of string to stay together and escape the monster Typhoon. **ARIES**, the Ram with the golden fleece, could fly and was used by the goddess of the Nebulous Cloud, Nephele to rescue her children.

Moon Phases

○ **Full Moon**. Thursday, **December 4**, 5:14 pm, CT

◑ **Third or Last Quarter**. Thursday, **December 11**, 2:51 pm, CT

● **New Moon**. Friday, **December 19**, 7:43 pm, CT

◐ **First Quarter**. Saturday, **December 27**, 1:09 pm, CT

What's Out Tonight? December 2025 Sky Chart

Visit: WhatsOutTonight.com

Copyright ©2025 by Ken Graun. All rights reserved.
Email: ken@kenpress.com • Phone: (520) 743-3200