M111

November 2024

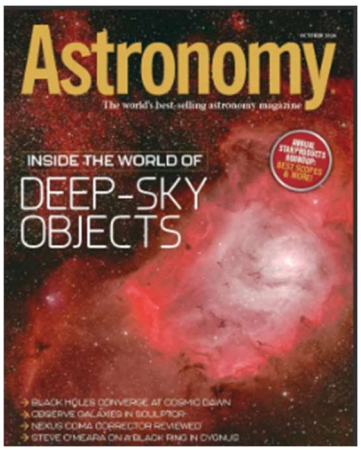
The newsletter of the Richland Astronomical Society and Warren Rupp Observatory

Dues for 2025

As a reminder, all memberships expire at the end of the year and renewals must be made by January 31st. Treasurer Pat Everly will be able to take payment at the November and December meetings. Individual $50, Family $70, and $25 for students. Please let the secretary know if you have family members that need badges/membership cards. Dues payments can also be sent to the RAS post office box: Richland Astronomical Society, PO Box 700, Bellville, OH 44813

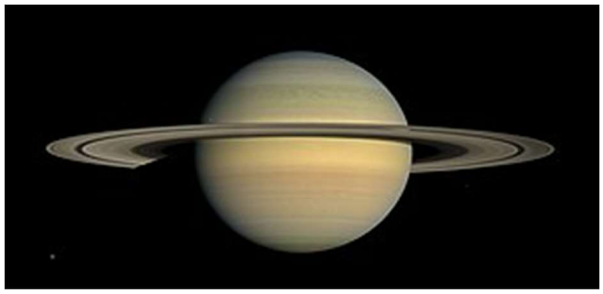
Magazine Discount Subscriptions

Discounted subscriptions to Sky and Telescope and Astronomy are available to members at the following link: https://nightsky.jpl.nasa.gov/news/17/ Additionally, StarDate magazine published by the McDonald Observatory will be available soon at the same link.

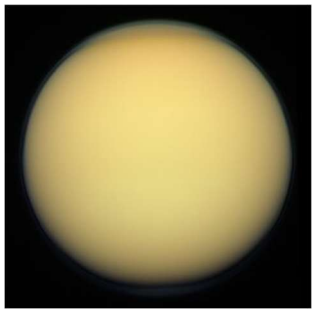


Big Blue Targets for November

M2 is a globular cluster in the constellation Aquarius, five degrees north of the star Beta Aquarii. It was discovered by Jean-Dominique Maraldi in 1746, and at 175 light-years in diameter it is one of the largest known globular clusters. M2 contains about 150,000 stars and is about 55,000 light-years distant from Earth.



Saturn is the sixth planet from the Sun and the second largest in the Solar System, after Jupiter. It is a gas giant, with an average radius of about nine times that of Earth. It has an eighth the average density of Earth but is over 95 times more massive. Even though Saturn is almost as big as Jupiter, Saturn has less than a third the mass of Jupiter. Saturn orbits the Sun at a distance of 9.59 AU (1,434 million km), with an orbital period of 29.45 years. Saturn's rings extend from 6,630 to 120,700 kilometers (4,120 to 75,000 mi) outward from Saturn's equator and average approximately 20 meters (66 ft) in thickness. They are composed predominantly of water ice.



Titan is the largest moon of Saturn and the second largest in the Solar System after Jupiter's Ganymede and is larger than the planet Mercury. It is the only moon known to have an atmosphere denser than the Earth's and is the only known object in space—other than Earth—on which there is clear evidence that stable bodies of liquid exist. Frequently described as a planet-like moon, Titan is 50% larger in diameter than Earth's Moon and 80% more massive.

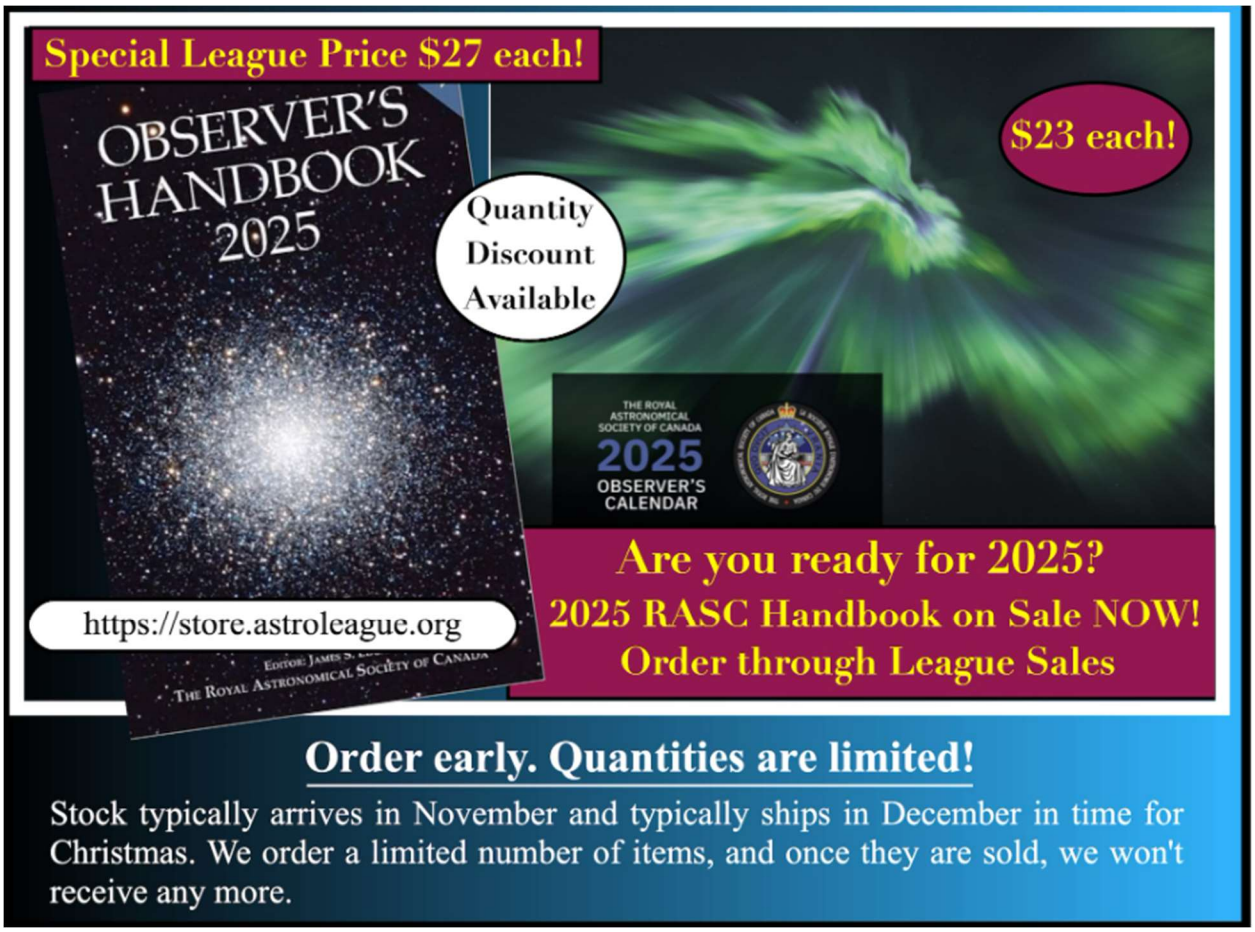
NGC253 (the Sculptor Galaxy) The Sculptor Galaxy (also known as the Silver Coin Galaxy, Silver Dollar Galaxy, NGC 253, or Caldwell 65) is an intermediate spiral galaxy in the constellation Sculptor. It is a starburst galaxy, which means that it is currently undergoing a period of intense star formation. The galaxy is estimated to be 11.4 million light-years distant from Earth and 120,500 light-years in diameter.

NGC891 NGC 891 (also known as Caldwell 23, the Silver Sliver Galaxy, and the Outer Limits Galaxy) is an edge-on unbarred spiral galaxy about 30 million light-years away in the constellation Andromeda.

How to submit content and suggestions

Please send any content submissions, questions, or suggestions to the RAS secretary at secretary@wro.org.

Your Astronomical Photo Here



The *Observer's Handbook* is a 352-page guide published annually since 1907 by The Royal Astronomical Society of Canada. With the expertise of more than 75 contributors, the *Observer's Handbook* is regarded as the standard North American reference for data on the sky. The USA Edition continues to be a popular addition, using American cities for examples of sunrise and moonrise, solar ephemeris, etc. Star Parties and Planetaria are for US locations, and we have partnered with the Astronomical League for a section written by their President Carroll Iorg. The various sections in the *Observer's Handbook* are of two kinds:

Upcoming Astronomical Events

Events that occur during the current year, such as:

- times of sunrise and sunset and moonrise and moonset (for latitudes 20º to 60º N);
- Moon phases and other lunar phenomena;
- conjunctions, elongations, etc. of the planets;
- eclipses, transits, occultations by the Moon and by planetary bodies;
- location of the planets, dwarf, and minor planets and returns of periodic comets;
- times of meteor showers;
- the orbital positions of the brighter satellites of both Jupiter and Saturn; and
- predictions of the cycles of many variable stars.

The Sky Month By Month section gives an extensive listing of events throughout the year.

Astronomical Reference Information

Astronomical data and other static information (although revisions are made annually to ensure that the information is the best available) includes:

- a section on observing artificial satellites;
- an annual feature starfield
- advice on using the *Observer's Handbook* for teaching astronomy;
- orbital and physical data on the planets and their satellites;
- astronomical and physical constants;
- some optical properties of telescopes and binoculars;
- a section on the electromagnetic spectrum;
- information on filters for astronomical observing;
- light pollution and sky transparency;
- a description of the various systems of specifying time;
- information on the Sun including sunspots and aurorae;
- sections on solar and lunar observing;
- sections on astronomical sketching and digital photography;
- essay on deep-sky objects;
- section and observing list "Wide-Field Wonders"
- a list of meteorite craters in North and Central America;
- sections on fireballs and meteorites;
- information on the Gegenschein and zodiacal light;
- a section on sky phenomena;
- 40 pages of authoritative tables dealing with stars, star clusters, nebulae, and galaxies; and
- maps of the Moon and of the entire stellar sky

Focus on Observing Programs

Jim Kvasnicka,
Prairie Astronomy Club, Lincoln, NE

Lunar Observing Program

Most of us plan our observing around dark skies when the moon is not up. The **Astronomical League Lunar Observing Program** gives us amateur astronomers something to do when the moon is up, and we don't have the dark skies we long for.

The Lunar Program allows observers in heavily light polluted areas to participate in an observing program. Since no special observing skills are required, the Lunar Program is well suited for the observer just getting started into the hobby of astronomy. It is well balanced because it develops naked eye, binocular, and telescopic observing skills. The program can easily be done by school children, especially those in the inner city.

To qualify for the Astronomical League Lunar Program, you need to be a member of the Astronomical League.

• The Lunar Program includes 100 features on the moon to observe, which are divided into three groups: 18 naked eye features, 46 binocular features, and 36 telescopic features.

• Any pair of binoculars and telescope will do, as all features can easily be seen with a pair of 7x35 binoculars and a 60mm refractor.

• If you have trouble with the naked eye features you can use binoculars, and if you are having trouble with the binocular features you can use the telescope.

Go to the Astronomical League website and go to Observe, once you are there find the Lunar Program and you can print out the observing log that has all 100 features. The observing log is easy to use, just check off when you observe a feature and list the date and time.

It helps to have a good lunar map to use when doing the Lunar Program. There are some good maps you can purchase or you can find some on line to download.

When you complete the Lunar Program, you will need to submit a copy of your observations to the Lunar Observing Program Coordinator along with your name, address, email, phone #, club affiliation, and to whom to send the certificate and pin.

For complete details:

https://www.astroleague.org/lunar-observing-program/

2405

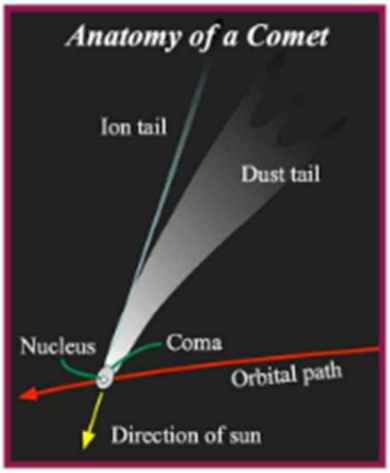
Comet Observing

Focus on Observing Programs

Jim Kvasnicka – Prairie Astronomy Club Observing Chair

Comet Observing Program from the ASTRONOMICAL LEAGUE

To some astronomers, there are no more wondrous and beautiful objects in the heavens as comets. Since the invention of the telescope, astronomers have searched the skies for these mysterious visitors. Comets are invisible – except when they are near the sun. As they approach it, they become active and exhibit several distinct features:



- **Nucleus:** About 10 km in diameter and relatively solid and stable. Composed mostly of ice and gas with a small amount of carboneous and silicate dust.
- **Coma:** Up to 80,000 km wide dense cloud composed of water, carbon dioxide, and other gases sublimed from the nucleus.
- **Dust tail:** Up to 10 million km long. Composed of dust particles driven off the nucleus by escaping gases.
- **Ion tail:** As much as a few hundred million kilometers in length. Composed of ionized gas and laced with rays and streamers caused by interactions with the solar wind.

As of February 2024, 4571 comets have been cataloged and their orbits at least roughly calculated. Of these, 471 are periodic comets (with orbital periods between 3.2 and 366 years). Some of the remainder are no doubt periodic as well, but their orbits have not been determined with sufficient accuracy to tell for sure.

Comets are sometimes called "dirty snowballs". They are a mixture of ices (both water and frozen gases) and silicate dust that wasn't incorporated into planets when the solar system formed. This makes them very interesting as samples of the early history of the solar system.

The Comet Observing Program has two levels of recognition:

Silver level: Observe at least 12 different comets. Two of them can have been observed prior to January 1, 2001.

Gold level: Observe at least 18 additional comets. Two of them can have been observed prior to January 1, 2001.

Your observations should include the standard information: Your name, date & time, comet name, telescope aperture, observing location, observing notes, and a sketch or image of the comet.

For complete details of Comet Observing Program from the Astronomical League:
https://www.astroleague.org/comet-observing-program/

Barnard's E: Two Dark Nebulae

Test your observing skill with binoculars

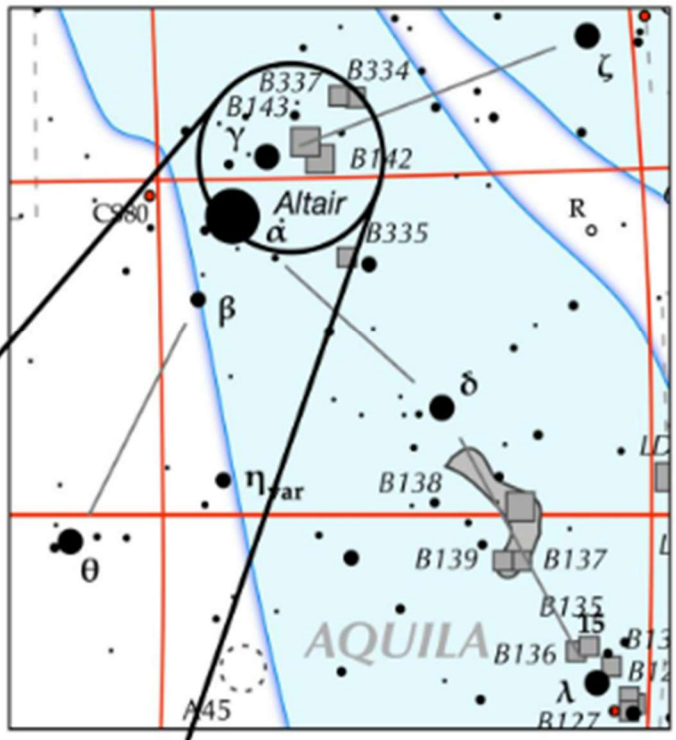
B142 & B143 are a pair of dark nebulae with relatively high opacity. Together, they form the letter "E" showing themselves as a dark area in front of a lighter Milky Way background.

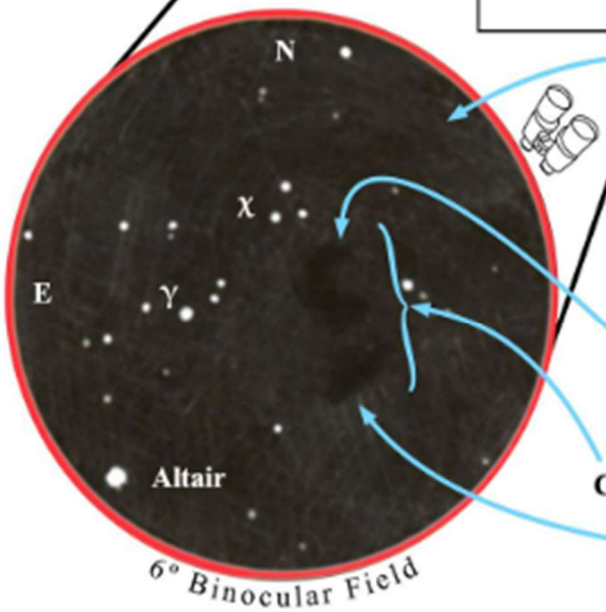
How to find B142 & B143:

1. Look for the bright star Altair, the southernmost member of the Summer Triangle.
2. Identify 2.7 magnitude Gamma Aquilae two degrees northwest of Altair.
3. One degree directly west of Gamma are B 142 and B 143.

How to view B142 & B143:

- Suitable for 10x50 binoculars.
- Dark skies are a must.
- Transparent skies are a must.
- Must be able to distinguish small differences in contrast.
- View when no moon is present.
- Best seen near culmination.





Bonus: B334 & B337, dark nebulae

- 2 degrees northwest of B142/143 lies B334/337.
- Much more of a challenge to distinguish from the Milky Way background than B142/143.
- Less opaque than B142/143.

B143

Can you spot the "E"?

B142

A lonely planet & dark world

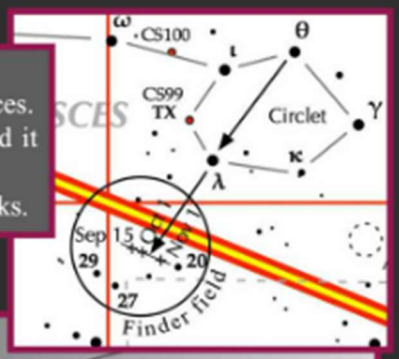
Neptune

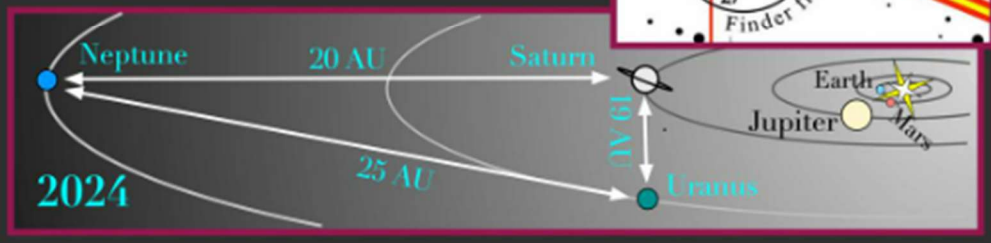
Neptune's maximum angular diameter
- equals 2.4 sec = 0.00067°
- equals that of a golf ball viewed at 2.3 miles.

NEPTUNE
Diameter : 30,600 miles

2.7 billion miles = 29 AU = Light time of 4.1 hours

How to locate Neptune in 2024:
- Find Theta and Lambda Piscium in the Circlet of Pisces.
- Draw a line from Theta through Lambda and extend it for the same length.
- The line ends near where 7.8 magnitude Neptune lurks.





Neptune's nearest planetary neighbors:
In 2024 and for the next 6 years, Neptune's nearest planetary neighbor is the 6.6 magnitude Saturn, not the 6.9 magnitude Uranus. Both planets are farther from Neptune than Uranus is from Earth. Strangely, 3rd-6th magnitude Jupiter becomes Neptune's nearest neighbor in 2032.

Consequences of Diminished Sunlight at Neptune:
Because it orbits at 30 AU, it receives 1/900 the amount of sunlight as Earth.
- Illumination on Neptune is about the same as on Earth 40 minutes after sunset.
- Sun is magnitude -19.3, still far too bright to look at directly.
- The feeble amount of sunlight warms the planet to -346° F.
- Neptune's largest moon, Triton, appears the same size as our full moon, but nearly 150 times fainter, making it a dim orb floating in the darkness.
- Its 15 other moons are too dim and too small to easily see.
- Neptune's tenuous ring segments are largely too faint to see.

With no bright moons nor planets dotting the sky, Neptune is, indeed, a lonely planet.

Earth's Diameter:
7,917 miles

2409

The most distant of the visible planets

Uranus

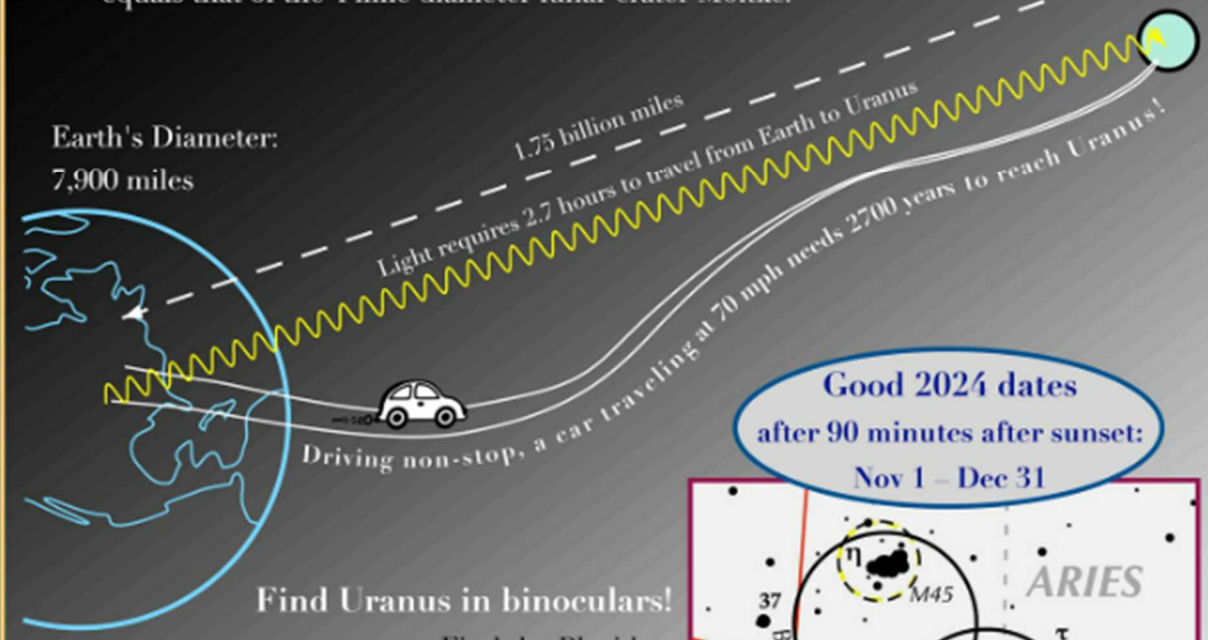
At magnitude 5.8, it is barely visible to people with keen eyesight and viewing from a dark location.

Uranus' maximum angular diameter

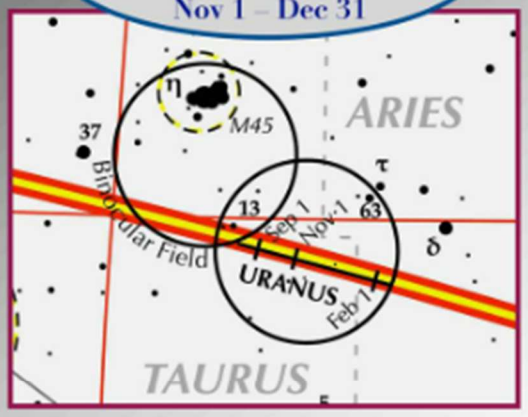
- equals 3.8 sec = 0.0011°
- equals that of a golf ball viewed at 1.5 miles.
- equals that of the 4 mile diameter lunar crater Moltke.

URANUS
Uranus' Diameter:
32,000 miles

Earth's Diameter:
7,900 miles



Good 2024 dates
after 90 minutes after sunset:
Nov 1 – Dec 31



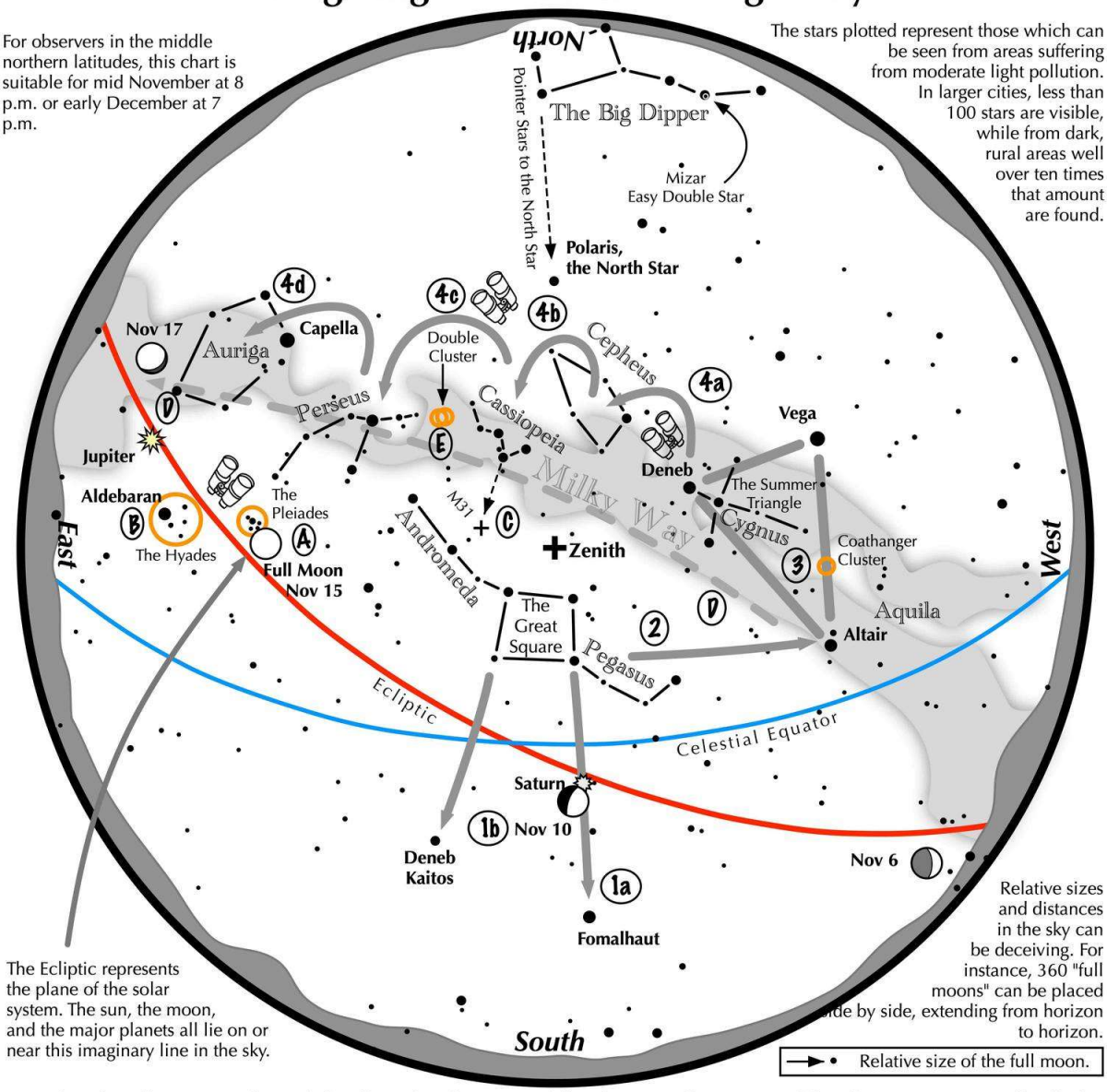
Find Uranus in binoculars!

- Find the Pleaides.
- Aim binoculars two fields southwest of M45.
- Locate 13 Tau and 63 Ari,
- then triangulate to Uranus.
- The planet appears starlike and is about 5.8 magnitude, the same brightness as 13 Tauri.

Relative orbital spacing of the major planets beyond Earth

2407

Navigating the November Night Sky



Navigating the November night sky: Simply start with what you know or with what you can easily find.

1. Face south. Almost overhead lies the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend a line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the south. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second brighest star in the south.
2. Draw a line westward following the southern edge of the Square until it strikes Altair, part of the "Summer Triangle."
3. Locate Vega and Deneb, the other two stars of the Summer Triangle. Vega is its brightest member, while Deneb sits in the middle of the Milky Way.
4. Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, then to Perseus, and finally to Auriga with its bright star Capella.

Binocular Highlights

A and B: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas. **E.** The Double Cluster.

This article is distributed by NASA's Night Sky Network (NSN)

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

November's Night Sky Notes: Snowballs from Space

By Kat Troche

If you spotted comet C/2023 A3 (Tsuchinshan-ATLAS) in person, or seen photos online this October, you might have been inspired to learn more about these visitors from the outer Solar System. Get ready for the next comet and find out how comets are connected to some of our favorite annual astronomy events.

Comet Composition

A comet is defined as an icy body that is small in size and can develop a 'tail' of gas as it approaches the Sun from the outer Solar System. The key traits of a comet are its nucleus, coma, and tail.

The nucleus of the comet is comprised of ice, gas, dust, and rock. This central structure can be up to 80 miles wide in some instances, as recorded by the Hubble Space Telescope in 2022 – large for a comet but too small to see with a telescope. As the comet reaches the inner Solar System, the ice from the nucleus starts to vaporize, converting into gas. The gas cloud that forms around the comet as it approaches the Sun is called the coma. This helps give the comet its glow. But beware: much like Icarus, sometimes these bodies don't survive their journey around the Sun and can fall apart the closer it gets.

The most prominent feature is the tail of the comet. Under moderately dark skies, the brightest comets show a dust tail, pointed away from the Sun. When photographing comets, you can sometimes resolve the *second* tail, made of ionized gases that have been electronically charged by solar radiation. These ion tails can appear bluish, in comparison to the white color of the dust tail. The ion tail is also always pointed away from the Sun. In 2007, NASA's STEREO mission captured images of C/2006 P1 McNaught and its dust tail, stretching over 100 million miles. Studies of those images revealed that solar wind influenced both the ion and dust tail, creating striations – bands – giving both tails a feather appearance in the night sky.

Comet McNaught over the Pacific Ocean. Image taken from Paranal Observatory in January 2007. Credits: ESO/Sebastian Deiries

Coming and Going

Comets appear from beyond Uranus, in the Kuiper Belt, and may even come from as far as the Oort Cloud. These visitors can be short-period comets like Halley's Comet, returning every 76 years. This may seem long to us, but long-period comets like Comet Hale-Bopp, observed from 1996-1997 won't return to the inner Solar System until the year 4385. Other types include non-periodic comets like NEOWISE, which only pass through our Solar System once.

But our experiences of these comets are not limited to the occasional fluffy snowball. As comets orbit the Sun, they can leave a trail of rocky debris in its orbital path. When Earth finds itself passing through one of these debris fields, we experience meteor showers! The most well-known of these is the Perseid meteor shower, caused by Comet 109P/Swift-Tuttle. While this meteor shower happens every August in the northern hemisphere, we won't see Comet Swift-Tuttle again until the year 2126.

A view of the 2023 Perseid meteor shower from the southernmost part of Sequoia National Forest, near Piute Peak. Debris from comet Swift-Tuttle creates the Perseids. Credit: NASA/Preston Dyches

See how many comets (and asteroids!) have been discovered on NASA's Comets page, learn how you can cook up a comet, and check out our mid-month article where we'll provide tips on how to take astrophotos with your smartphone!