Seestar S50   M 33

beelers50/110°W,31°N/2025-11-20 22:48   47min

Party Instead of a Meeting

Once again, this year, in lieu of a December meeting, we will have a club holiday party. Our gracious club president Penny and Thomas will host the event at their home.

Put on your thinking hat, for this year there will be new version of the holiday party trivia game. This time it will be game-show style with a tournament format and button buzzers!

Welcome Our New Members

Chester Snovel of Benson (Pomerene) joined in November. Libby Beatty of Sierra Vista joined at the November meeting. Welcome, we're glad you joined.

2026 Dues

Most HAC memberships come due in December (but there is no December meeting). The treasurer will be collecting dues at the January meeting. Annual dues are $25 regular and $35 family. Active-duty military pay $20 and $25. Full time students: $10. Make checks payable to Huachuca Astronomy Club (not "HAC"). Correct change for those paying cash is greatly appreciated. If you are unsure of your dues status, please contact the treasurer at tedforte511@gmail.com.

You can pay your dues in person by cash or check made out to Huachuca Astronomy Club. See the treasurer, Ted Forte, at a meeting or event.

You can mail your dues check to the Huachuca Astronomy Club PO Box 922, Sierra Vista AZ 85636

You can pay online by visiting www.hacastronomy .org and pulling down the membership menu. You'll be directed to Pay Pal where you can use your Pay Pal account OR your credit card.

If you have a Pay Pal account, you can use PayPal Direct to send your payment to paypal@hacastronomy.org

If you have a Zelle account with your bank, you can make a dues payment by transferring funds to twforte@powerc.net

> "Man must rise above the Earth—to the top of the atmosphere and beyond—for only thus will he fully understand the world in which he lives."
>
> -- Socrates

2026 HAC General Election
By Mark Orvek

Huachuca Astronomy Club Elections for 2025 were held at the November General Member meeting. The following slate of officers, presented by the Nominating Committee. were elected by acclamation. Their term of office is from Dec 1, 2025, through Nov 30, 2026.

Officers:

- President   Penny Brondum
- VP/Programs   Mark Orvek
- Secretary   Katherine Zellerbach
- Treasurer   Ted Forte

Members-At-large:

- Gary Grue
- Richard Lighthill
- Mike Morrison
- Vince Sempronio

Our Past President representative is David Roemer

Thanks go out to Del Gordon for his service to the club in 2025. Congratulations to Katherine Zellerbach for being elected to Secretary for this coming year.

Editor's Corner

As the end of 2025 draws near, your editor would like to thank those (and you know who you are) who were active in supporting the club and the newsletter. Our club hosts many public/private outreach events each year, and they would not be possible without the help of those who donate their time and equipment, Whether the audience is the public attending our monthly public nights, private events held either at the Patterson observatory or at schools, those who attend are always enthusiastic about what they observe. We can always use more help for these events. If you own a telescope and need an excuse to use it, there is always space on the patio.

Don't forget that all club members are welcome at our outreach events, and you don't need to sign up online. This is an easy way to graduate from armchair to observational astronomer without needing to own a telescope.

Our Nightfall newsletter could use more contributions other than those from our usual authors. I'm pretty sure there are members who can write, and your contributions don't have to be technical. Have you read a good astronomy related book? Write a review. Spent a weekend in a very dark sky place? Share your thoughts.

President's Constellation Exploration – Vulpecula

by Penny Brondum

Vulpecula Constellation, known as the "Little Fox," is a faint constellation in the northern sky, notable for its historical significance and celestial objects like the Dumbbell Nebula. The Constellation of Vulpecula is not one of the original 48 Constellations catalogued by Ptolemy. Vulpecula is one of the 12 constellations created by the polish astronomer Johannes Hevelius in the 17th Century and one of the 7 extant (still existing) Hevelius Constellations, of which some are named after hunting animals. Hevelius said that constellation represented a story from Greek mythology where a fox carrying a goose in its mouth to present it to Cerberus who was the dog that guarded the gate to the underworld. (At that time Hevelius also created a Constellation called Cerberus, but this Constellation is now obsolete.)

The constellation, under the full name of "Vulpecula and Anser", can be seen on the bottom of this c. 1825 star map from *Urania's Mirror*.

Originally known as Vulpecula cum ansere ("the little fox with the goose") or Vulpecula et Anser ("the little fox and the goose"), the constellation was illustrated with a goose in the jaws of a fox. Hevelius did not regard the fox and the goose to be two separate constellations, but later the stars were divided into a separate Anser and Vulpecula. Today, they have been merged again under the name of the fox, but the goose is remembered by the name of the star α Vulpeculae: Anser.

The Constellation of Vulpecula has 5 main Stars making up the imaginary outline of the fox holding a goose in its mouth. The brightest stars of Vulpecula can be viewed from Earth, from a northern location, by the naked eye. The brightest star, Alpha Vulpeculae (also known as Anser), is a red giant located about 297 light-years from Earth.

The constellation is a relatively faint one, with no stars brighter than fourth magnitude. It lies in the middle of the Summer Triangle, an asterism formed by the bright stars Vega in the constellation Lyra, Altair in Aquila, and Deneb in Cygnus. The Constellation of Vulpecula is not considered to be a circumpolar constellation as it is not visible for most of the year in Northern latitudes. The best time period to view it is between July and September.

No meteor showers are associated with the constellation and the Vulpecula constellation is not associated with any myths.

One of the first records of groups of Stars in Vulpecula was noted by the Persian astronomer Al Sufi and called 'Al Sufi's Cluster. It was recorded in the year 964, in his publication – the Book of fixed Stars.

In 1967, the first pulsar, PSR B1919+21, was discovered in Vulpecula by Jocelyn Bell, supervised by Antony Hewish, in Cambridge and led to them receiving the Nobel Peace Prize in physics for their discovery. While they were searching for scintillation of radio signals of quasars, they observed pulses which repeated with a period of 1.3373 seconds. Terrestrial origin of the signal was ruled out because the time it took the object to reappear was a sidereal day instead of a solar day. This anomaly was finally identified as the signal of a rapidly rotating neutron star. This pulsar star is around 2,283 light years distant. Fifteen years after the first pulsar was discovered, the first millisecond pulsar, PSR B1937+21, was also discovered in Vulpecula, only a few degrees in the sky away from PSR B1919+21.

Vulpecula is also home to HD 189733 b, one of the closest extrasolar planets studied by the now-retired Spitzer Space Telescope. On 11 July 2007, a team led by Giovanna Tinetti published the results of their observations using the Spitzer Space Telescope concluding there is solid evidence for significant amounts of water vapor in the planet's atmosphere. Although HD 189733b with atmospheric temperatures rising above 1,000 C is far from being habitable, this finding increases the likelihood that water, an essential component of life, would be found on a more Earth-like planet in the future.

Also located in Vulpecula is soft gamma repeater SGR 1935+2154. In 2020 it emitted a fast radio burst, the first one to be observed in the Milky Way.

Dumbbell Nebula (M27) is one of the most famous deep-sky objects in Vulpecula. It is a large, bright planetary nebula which was discovered by the French astronomer Charles Messier in 1764 as the very first object of its kind. It can be seen with good binoculars in a dark sky location, appearing as a dimly glowing disk approximately 8 arcminutes in diameter. The nebula is approximately 9,800 years old. A telescope reveals its double-lobed

Dumbbell Nebula (M27)
Richard Pattie, HAC astronomer

shape, similar to that of an hourglass. The alternate name is the Apple Core Nebula.

Brocchi's Cluster (Collinder 399) is an asterism formerly thought to be an open cluster. It is also called "the Coathanger" because of its distinctive star pattern when viewed with binoculars or a low power telescope.

NGC 7052 is an elliptical galaxy in Vulpecula located 214 million light-years from Earth. It has a central dusty disk with a diameter of 3700 light-years; there is a supermassive black hole with a mass of 300 million solar masses in its nucleus. Astronomers surmise that the disk is the remnant of a smaller galaxy that merged with NGC 7052. Jets can be seen emanating from the galaxy, and it has very strong radio emissions. This means that it is also classified as a radio galaxy.

The eastern part of Vulpecula is occupied by the Hercules–Corona Borealis Great Wall. It is a galaxy filament, with the length of 3,000 megaparsecs, making it the largest known structure in the universe.

Vulpecula contains an OB-association of young stars, called the Vulpecula OB-association or Vul OB1. The association contains nearly 100 OB-stars and over 800 young stellar objects. It lies in the galactic plane, at a distance of about 2300 parsec. (An OB association is a loosely organized, gravitationally unbound group of young, massive, main sequence stars primarily of spectral types O and B, characterized by their high temperatures, blue color, luminous, and massive stars with masses between 10 and 90 times that of the Sun. These associations typically contain 10 to 100 (or more) massive stars alongside numerous lower-mass stars, all sharing common motion vectors, ages, and chemical compositions, indicating a shared origin. Unlike denser star clusters, OB associations lack sufficient gravitational binding and can disperse over millions of years.)

Fun Fact: In old English culture, 'Vulpes' represented the red fox. In Ancient French the word 'goupil' is a derivative of the Latin word Vulpes. The Irish word for fox is sionnach, and the behavior shenanigans (another Irish word) comes from this root meaning to 'play the fox' or get up to high jinx. In German the work 'fukh' has many derivitives in other languages, like 'Fox' in English, Ancient Indo-European word 'puk' means tail. In India 'Puccha is a tail. In Polish 'Puch' means wooly hair, referring to the bushy tail of a fox. The collective term for foxes is a 'Skulk'.

I know many of us have viewed at the "Dumbbell Nebula without recognizing that we are viewing it in the Vulpecula Constellation. I hope this exploration, and all those that came before it, helped with your knowledge and enjoyment of the night sky. I wish all of you a Happy and Healthy Holiday season.

The Bucket List
by V Sempronio

In this month's column, we will look at an interesting upcoming event for the end of 2025.

Predictions are calculated for the southeast area of Arizona, and times are Mountain Standard Time (MST).

An occultation of the Pleiades cluster by the nearly full Moon occurs on the evening of December 3rd. The Moon will pass through the edge of the famous cluster, first covering Electra (17 Tau) around 5:50pm. Look towards the east to find the Moon about 20 degrees above the horizon. Still in twilight, the magnitude 3.7 star should be easily seen though a small telescope. Keep watching as the Moon moves towards the east, hiding even more Pleiades stars as listed in the table below. Note that the times are for Sierra Vista and are rounded down to the previous minute. Your times may vary depending on location. Stars less than magnitude 8 are included and since the stars will reappear on the bright western edge of the Moon, only disappearances are listed. Some events involving dim stars may be difficult to observe.

Name	Magnitude	(MST)
Electra	3.7	5:50pm
Celaeno	5.5	5:56pm
HD 23387	7.3	6;14pm
Maia	3.9	6:19pm
Taygeta	4.3	6:20pm
HD 23463	7.7	6:23pm
HD 23489	7.4	6:28pm
Sterope II	6.4	6:37pm
Asterope (Sterope I)	5.8	6:40pm
HD 23568	6.8	6:51pm
HD 23642	6.8	6:55pm
HD 23763	7.0	7:24pm
HD 23873	6.6	7:54pm

So, why observe these events?

There will be many more Moon/Pleiades encounters in the upcoming months that are always exciting to observe, event if it isn't for science.

These days, lunar occultations don't have as much scientific importance as they did in the 1960's and 70's. Then, the observations helped nail down the orbit of the Moon to support the Apollo missions, but modern technology makes those observations less important.

Lunar occultations are helpful if the involved star is a binary or multiple star system. Close companions can be identified via analysis of video recordings which can aid in refining the orbits of the stars in the system. The separation and position angle can be determined, which is updated in double star catalogs. Many of the Pleiades stars are binary/multiple star systems further adding to understanding the dynamics of stars in M45.

The cosmological distance ladder
by Ted Forte

Ask an astronomer, how far away is that galaxy, and she will most likely give you a number. We constantly hear of objects that are millions, even billions of light years away. How can we possibly know those distances?

Astronomers use a process to determine distance to celestial objects. A series of laddered procedures walk us out to far away galaxies, step by step.

Hold your finger up at arm's length and stare at it with one eye closed. Switch eyes and your finger will appear to shift against the back drop of more distant objects. Each of your eyes sees your finger at a different angle. The shift in the apparent position of your finger is an example of parallax.

Stars do the same thing. That fact provides us with the first rung in the ladder. If we observe a nearby star in June (for example) and again a half a year later in December, we'll detect a shift in its position against the backdrop of more distant stars. (Its parallax).

If we record the angle between our two observations, we can imagine a right triangle (Earth-sun-star) and use trigonometry to compute the height of the triangle (the distance to the star).

While the math is relatively simple, the measurements are not. The stars are so incredibly far away that their parallax angles are quite tiny and the more distant the star, the smaller the angles become. The method works only for the closest stars. With sophisticated modern satellites, we've measured the parallax of stars (and thus their distance) out to about 30,000 light years.

Parallax is the only rung of the ladder that we can measure directly. The next steps in the distance ladder rely on guessing the brightness of objects through theory and models.

We make the assumption that very similar objects should be similarly bright. If we can find a nearby star, for which we have a reliable distance from parallax, that has the same characteristics (type, mass, temperature) as a more distant star, it's reasonable to assume that the two would be the same brightness if they were at the same distance. This way we can guess an intrinsic brightness for the star, (how bright the star really is). Once we know that, and we measure its apparent brightness (how bright it looks to us), and from the difference, we can calculate how far away it is because light is dimmed by distance in a very specific way.

For the next rung, astronomers search for objects that have a known intrinsic brightness, things they call standard candles. For instance, there are a few types of variable stars that display a period luminosity relationship. The time they take to cycle between their brightest and dimmest values reveals their maximum brightness. The most famous of these are the Cepheid variables (named after their prototype star delta Cephei). The distance to the Cepheid, yields the approximate distance for the galaxy in which it resides. Astronomers can detect Cepheids out to about 160 million light years.

For more distant galaxies, we need to find brighter standard candles. The most useful of these has been type 1a supernovae. These supernovae are the explosions of white dwarfs that accumulate so much material from a companion star that they explode. The explosions are the result of the white dwarf attaining a critical mass. That mass is always the same and, consequently, the brightness of the explosion is always the same. They are bright enough to detect out to about 3.3 billion light years.

There are other standard candles. They all rely on how bright certain objects can become. Essentially any object for which brightness can be deduced through theory or models and that can be detected at great distances can be used as standard candles.

For the final rung, astronomers rely on cosmological redshift. Due to the fact that the universe is expanding, distant objects seem to be racing away from us. The more distant an object is, the faster it seems to recede from us. We can determine this recessional velocity by taking a galaxy's spectrum (passing its light through a prism to spread out its light) and noting how much certain spectral features shift to longer wavelengths due to the stretching of its light. Distance estimates through redshift are dependent on the expansion rate of the universe, a value known as the Hubble Constant (H0). The value of that "constant" is still a matter of debate, so the derived distances are very dependent on the value of H0 one uses.

There are more than a dozen methods employed to estimate distances, and they are constantly being refined and calibrated against each other. Therefore, derived distances are approximations that are only as accurate as the underlying assumptions they rely on.

DAMIT Jim, I'm a doctor, not an astrophysicist.
By V Sempronio & AI

What is DAMIT?

The Database of Asteroid Models from Inversion Techniques (DAMIT) is a database established to provide the astronomical community with access to reliable and up-to-date physical models of asteroids, including their shapes, rotation periods, and spin axis directions.

It was created to centralize models derived from various inversion techniques, primarily the lightcurve inversion method, which uses time-resolved photometry data to reconstruct asteroid shapes and spin states. Simply stated, many images of asteroids are taken and the brightness of each is determined using the same type of techniques used by the variable star observation community. These observations are combined to create a 3D model of the asteroid.
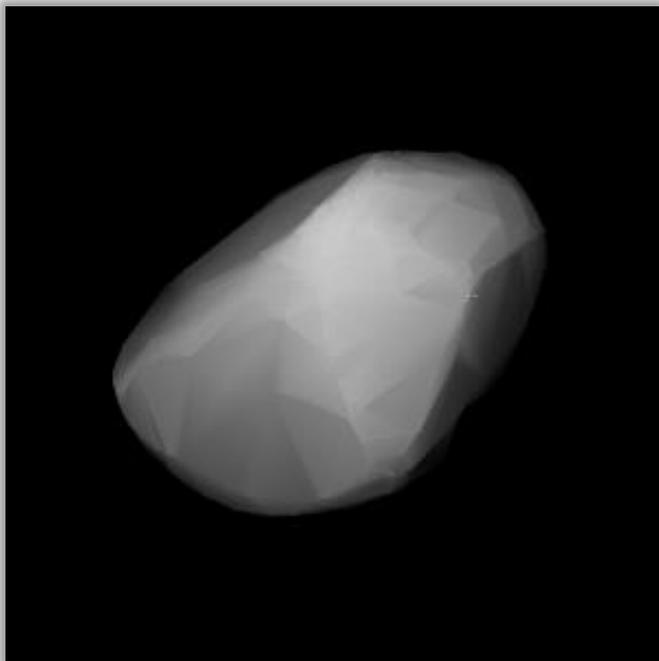

3D representation of the asteroid (243) Ida.
Credit DAMIT database.

DAMIT also incorporates models refined with additional data such as adaptive optics images, infrared observations, or occultation data.

The database contains polyhedral shape models (usually based on triangles), sidereal rotation periods, spin axis orientations, and the photometric data used for inversion for over one hundred asteroids. An example of one of the models is shown above.

Occultations to the rescue

The models are typically scale-free, meaning they are arbitrarily scaled to unit volume since photometry alone cannot determine absolute size; however, models scaled to real dimensions are noted when additional data like occultations or high-resolution imaging are available. Occultation observations, next to actually sending a space probe to an asteroid, provide the most accurate method in determining the size of an asteroid, albeit being only able to provide the width of a chord of the silhouette that is facing us. But the DAMIT database works in four dimensions, as it can rotate a 3D model to appear as it would for any date and time. Since every occultation observation undergoes vigorous scrutiny before the data is deemed useful for publication, while processing occultation results, reviewers use the final timings to add to the correct scaling in the DAMIT model.
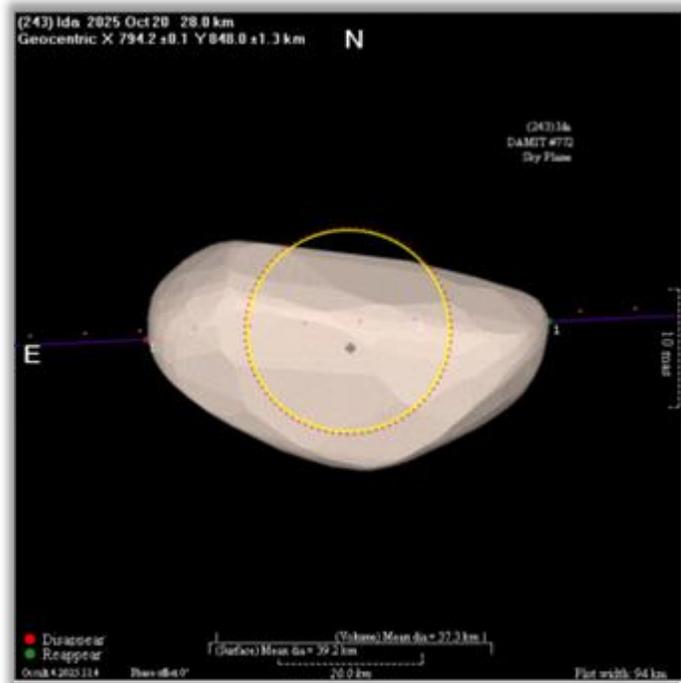
DAMIT model of (243) Ida as rendered using occultation processing software. The asteroid is shown in the predicted orientation at the time of a stellar occultation.
Credit: Occult 4.

The initial size of asteroids is estimated by using their distance brightness and estimated albedo. The distance brightness is easy to determine since if we know the orbit of the asteroid, we can determine its distance. As stated before, adding occultation observations greatly help narrow down the size. A resent study compared the estimated size of DAMIT entries before and after adding

occultation timings. The results showed that the photometric method of sizing asteroids only varied by 10%-15% from what the occultations measured. Not bad at all.

On a personal note, the study used several of my occultation observations because the asteroids I observed were already present in the DAMIT system.

Below is one of my recent observations that involved the asteroid Ida, which is in the DAMIT system (see image above). The images above don't appear to match because they aren't rotated and scaled to the same orientation and date/time.

The database is maintained and is updated when new models are published, or existing ones are refined.

DAMIT is accessible online at http://astro.troja.mff.cuni.cz/projects/asteroids3D and is hosted by the Astronomical Institute of Charles University in Prague, Czech Republic.

The database is also connected to the French scientific institute IMCCE's Virtual Observatory Solar System portal to compute physical ephemerides of the models.

The project has been instrumental in advancing asteroid shape modeling, with over 500 asteroid models derived using the lightcurve inversion method, many of which are publicly available through DAMIT.

There are other 3D models of asteroids such as the 3D Asteroid Catalogue, located here. https://3d-asteroids.space/

Disclaimer: Open-source large language models, including Mixtral 8x7B, Mistral 7B, Llama, and Qwen were used to synthesize data from many sources.

For Sale

Zane Landers has some equipment for sale. If you are interested in any of the items, please contact him via email (zdlanders@gmail.com).

- Celestron Ultima Flat UFF 24mm 65-degree 1.25" eyepiece - same as APM UFF, a really nice eyepiece but I already have a pair for Binoviewing. $180 ($290 retail)
- GSO 9mm Plossl 1.25" eyepiece - Excellent condition. $20 ($35 retail)
- 18.75" f/6 primary mirror - decent figure, no astigmatism, would be great for a homemade Dobsonian. 1" thick plate glass. $500

About the Cover

Harold Baillie use a Seestar S50 to capture the Triangulum galaxy (M33). M33 is located about 3 million light years away from our Milky Way galaxy but is only 750,000 light years away from the Andromeda Galaxy (M31). M33 is the third largest galaxy in our local cluster and is about half the size of the Milky Way. Because both M31 and M33 are gravitational bound, they both are approaching the Milky Way. Come back a few billion years and oh what a difference the sky will be!

Anniversaries this month of famous astronomers

Johannes Kepler, born on December 27, 1571, in Weil der Stadt, Germany

Tycho Brahe, born on December 14, 1546, at Knutstorp Castle in Denmark

Annie Jump Cannon, born on December 11, 1863, in Dover, Delaware

John Flamsteed, died on December 31, 1719, buried in Burstow, Surrey, Englan

Edwin Hubble announces the existence of other galaxies on December 30, 1924.

HAC Calendar of Events (December 2025 – January 2026)

SU	MO	TU	WE	TH	FR	SA
30	Dec 1	2	3 Moon occults the Pleiades (M4)5	4 ○ 4:14pm	5 HAC Holiday Party at the Brondum's	6
7 Mercury (GWE) Moon near Jupiter	8	9	10	11 ◐ 1:52pm Patterson Public Night 6pm	12	13 Solar Saturday 10am to 12pm Geminid Meteors
14 Geminid Meteors	15 Geminid Meteors	16	17 Church Group at Patterson 6pm	18	19 ○ 6:43pm	20
21 December Solstice	22 Ursid Meteors	23	24	25	26	27 ◑ 12:10pm
28	29	30	31	Jan 1, 2026	2 HAC Meeting (1)	3 ○ 3:03pm Quadrantids Meteor Shower
4 Quadrantids Meteor Shower	5	6	7	8	9 Mars at solar conjunction	10 ◐ 8:48 AM Solar Saturday 10AM to 12pm Jupiter at Opposition
11	12	13	14	15	16	17
18 ○ 1:52 pm	19 γ-Ursae Minorid meteor shower	20	21 Mercury at superior conjunction	22 Patterson Public Night 6pm	23	

All dates and times are local MST
Astronomy events listed are those visible in the Southwestern, USA

(1) HAC meeting location: Cochise College Downtown Center at 2600 E Wilcox Drive, Sierra Vista, AZ in Room A102

(GWE) – Greatest Western Elongation. A morning event

Join the HAC Astro forum to keep up to date with all the Huachuca Astronomy Club events
To join, send an email to: HACAstro+subscribe@groups.io