NIGHTFALL

A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

NOVEMBER 2024

NOVEMBER'S MEETING SPEAKER

The speaker at this month's meeting is Rob Lorenz who is the Outreach Coordinator at the Vatican Observatory. Rob was born and raised in Fort Thomas Kentucky, a small suburb of Cincinnati, OH. He earned his bachelor's degree at Xavier University in Cincinnati in 2000. He studied biology and theology, a combination which has been a part of his life ever since. His first job after graduating was as an interpretive ranger with the National Park Service, which turned into an 18-year career. He worked at Carlsbad Caverns National Park in New Mexico; Arches and Canyonlands National Parks in Utah; and the National Mall in Washington DC. In 2019, he entered the Society of Jesus (more commonly known as the Jesuits), a Catholic order of brothers and priests that (among many other fields of work and ministry) currently runs the Vatican Observatory, and works in close collaboration with Steward Observatory at the U of A. When the opportunity arose to work at the Vatican Observatory as an outreach coordinator, he jumped at the chance! He's been on the job for about a month and will be there for another 1-3 years before heading off to study theology as part of his formation process with the Jesuits. Mr. Lorenz has not shared the topic of his talk.

The location of the speaker's dinner has not yet been chosen.

WELCOME OUR NEW MEMBERS

Norman Beasley of Fort Huachuca and Ken Roth of Sierra Vista joined at the October Patterson Public Night. Tim Blount & Kristy Gallo of Hereford, Paul Doyen & Louise Wilkenson of Sierra Vista joined as families.

Welcome, we are glad you joined.

HAC DUES REMINDER

Most HAC memberships expire in December. The treasurer will gladly accept your 2025 dues payment at any of the remaining meetings this year for anyone that wants to take care of things early. Dues are $35 Family and $25 Regular ($25 and $20 for active-duty military). Full time students pay $10. There are five options to pay your dues:

1. 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.
2. You can mail your dues check to the Huachuca Astronomy Club PO Box 922, Sierra Vista AZ 85636
3. 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.
4. If you have a Pay Pal account, you can use PayPal Direct to send your payment to paypal@hacastronomy.org
5. If you have a Zelle account with your bank, you can make a dues payment by transferring funds to twforte@powerc.net

2025 BOARD CANDIDATES AND GENERAL ELECTION

BY JAMES REESE

The election for our 2024 Board of Directors is coming soon. The election process is spelled out in the HAC Constitution and By-Laws. In this article, I refer to key sections regarding the election process.

The Nominating Committee (consisting of Mark Orvek and myself) for the 2025 HAC Board is in the process of soliciting candidates for the 2025 Board of Directors.

These are the Board of Director positions to be filled (8 members in total):

- Officer Candidates and Nominees
    - President: Penny Brondum (nominee)
    - Vice President: open to nominations
    - Secretary: open to nominations
    - Treasurer: Ted Forte (nominee)
- Members-at-Large: (4 total)
    - Vince Sempronio (nominee)
    - Mike Morrison (nominee)
    - Gary Grue (nominee)
    - Richard Lighthill (nominee)
- Past President: David Roemer

Nominations for write-in candidates from the floor will be accepted at the November 15th general meeting. If there are additional nominees for any of the Officer positions or more than 4 nominees for Member-at-large positions, we will follow the procedure stated in the Constitution (as noted above). The official vote for the 2025 Board of Directors will take place at the November 15th general member meeting.

President's Constellation Exploration – Serpens

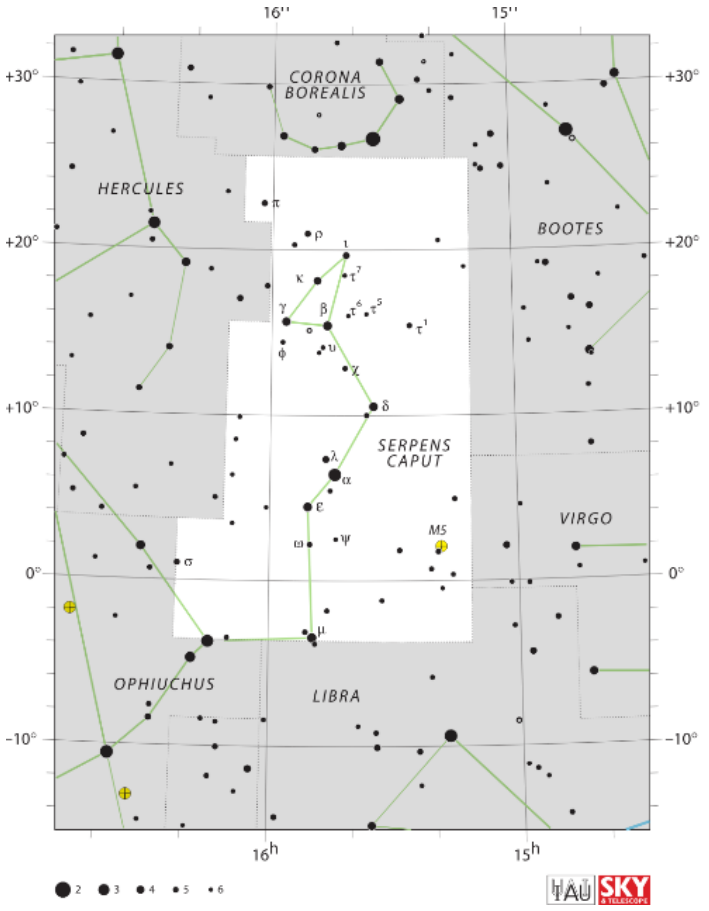
by Penny Brondum

Serpens ('the Serpent') is a constellation in the northern celestial hemisphere. One of the 48 constellations listed by the 2nd-century astronomer Ptolemy. It is unique among the modern constellations in being split into two non-contiguous parts, Serpens Caput (Serpent Head) to the west and Serpens Cauda (Serpent Tail) to the east. Between these two halves lies the constellation of Ophiuchus, the "Serpent-Bearer". The constellation is also unusual in that it depends on another constellation for context; specifically, it is being held by Ophiuchus.

Serpens held by Ophiuchus, as depicted in *Urania's Mirror*, a set of constellation cards published in London c. 1825. Above the tail of the serpent is the now-obsolete constellation Taurus Poniatovii while below it is Scutum

In Greek mythology, Serpens represents a snake held by the healer Asclepius. Represented in the sky by the constellation Ophiuchus, Asclepius once killed a snake, but the animal was subsequently resurrected after a second snake placed a revival herb on it before its death. As snakes shed their skin every year, they were known as the symbol of rebirth in ancient Greek society, and legend says Asclepius would revive dead humans using the same technique he witnessed.

Although this is likely the logic for Serpens' presence with Ophiuchus, the true reason is still not fully known. Sometimes, Serpens was depicted as coiling around Ophiuchus, but most atlases showed Serpens passing either behind Ophiuchus' body or between his legs.



In some ancient atlases, the constellations Serpens and Ophiuchus were depicted as two separate constellations, although more often they were shown as a single constellation. One notable figure to depict Serpens separately was Johann Bayer; thus, Serpens' stars are cataloged with separate Bayer designations from those of Ophiuchus.

In Chinese astronomy, most of the stars of Serpens represented part of a wall surrounding a marketplace, known as Tianshi, which was in Ophiuchus and part of Hercules. Serpens also contains a few Chinese constellations. Two stars in the tail represented part of Shilou, the tower with the market office. Another star in the tail represented Liesi, jewel shops. One star in the head (Mu Serpentis) marked Tianru, the crown prince's wet nurse, or sometimes rain.

There were two "serpent" constellations in Babylonian astronomy, known as Mušḫuššu and Bašmu. It appears that Mušḫuššu was depicted as a hybrid of a dragon, a lion and a bird, and loosely corresponded to Hydra. Bašmu was a horned serpent (c.f. Ningishzida) and roughly corresponds to the Ὄφις constellation of Eudoxus of Cnidus on which the Ὄφις (*Serpens*) of Ptolemy is based.

Serpens covers 637 square degrees total, it ranks 23rd of the 88 constellations in size. It appears prominently in skies of both the northern and southern hemispheres during the northern hemisphere's summer. Its main asterism consists of 11 stars. There are 108 stars in total that are brighter than magnitude 6.5, the traditional limit for naked-eye visibility.

Marking the heart of the serpent is the constellation's brightest star, Alpha Serpentis. Traditionally called Unukalhai, it is a red giant of spectral type K2III meaning it can easily be seen with the naked eye even in areas with substantial light pollution. A faint companion is in orbit around the red giant star, although it is not visible to the naked eye.

Several stars in Serpens have been found to have planets. There are two daytime meteor showers that radiate from Serpens, the Omega Serpentids and the Sigma Serpentids. Both showers peak between December 18 and December 25.

Eagle Nebula composite NASA photo

Part of the Milky Way's galactic plane passes through Serpens Cauda, which is therefore rich in galactic deep-sky objects, such as the Eagle Nebula (IC 4703) and its associated star cluster Messier 16. The nebula measures 70 light-years by 50 light-years and contains the Pillars of Creation, three dust clouds that became famous for the image taken by the Hubble Space Telescope.

The Pillars of Creation, a well-known star-forming region in the Eagle Nebula made famous by this Hubble photograph

The Eagle Nebula also known as the Star Queen Nebula is a young open cluster of stars in the constellation Serpens, discovered by Jean-Philippe de Cheseaux in 1745–46. Both the "Eagle" and the "Star Queen" refer to visual impressions of the dark silhouette near the center of the nebula. The Eagle Nebula lies in the Sagittarius Arm of the Milky Way.

A few structures of the Milky Way Galaxy are present in Serpens Caput (tail), such as Messier 5, a globular cluster positioned approximately 8° southwest of α Serpentis, next to the star 5 Serpentis. M5 is barely visible to the naked eye under good conditions, and is located approximately 25,000 ly distant. Messier 5 contains many of the known RR Lyrae variable stars, and is receding from us at over 50 km/s. The cluster contains two millisecond pulsars, one of which is in a binary, allowing the proper motion of the cluster to be measured. The cluster has been used to test for magnetic dipole moments in neutrinos, which could shed light on some hypothetical particles such as the axion. The brightest stars in Messier 5 are around magnitude 10.6, and the globular cluster was first recorded by William Herschel in 1791.

M5 Globular Cluster- NASA image

Despite the presence of the Milky Way, several active galaxies are visible in Serpens Cauda as well as Hoag's Object. Hoag's Object is located 600 million light-years from Earth in Serpens Cauda (Head) and is a member of the very rare class of galaxies known as ring galaxies. The outer ring is largely composed of young blue stars while the core is made up of older yellow stars. The predominant theory regarding its formation is that the progenitor galaxy was a barred spiral galaxy whose arms

Hoag's Object: NASA Image

had velocities too great to keep the galaxy's coherence and therefore detached.

The Serpens cloud is a massive star-forming molecular cloud situated in the southern part of Serpens Cauda. Only two million years old and 420 parsecs distant, the cloud is known to contain many protostars and it appears that star formation is still continuing in the region of Serpens Cauda called the Westerhout 40 complex, consisting of a prominent HII region adjacent to a molecular cloud. Located around 500 parsecs distant. It is one of the nearest massive regions of star formation, but as the molecular cloud obscures the HII region, rendering it and its embedded cluster tough to see visibly, it is not as well-studied as others. The embedded cluster likely contains over 600 stars above 0.1 solar masses, with several massive stars, including at least one O-type star, being responsible for lighting the HII region and the production of a bubble.

Serpens Cloud: NASA Image

As we "wind and twist" our way through the November and December, take a "break" to enjoy the gathering of friends and families around the table, then invite them to join you in looking up and viewing the wonders in Serpens.

The Bucket List
by Vince Sempronio

An abridged column this month.

IN THE SKY

Occultation of Neptune. On the evening of the 11th, most of North America will witness an evening occultation of planet 8 as it disappears behind the dark limb of the waxing gibbous moon. The event will occur around 6:16:37pm local time in the Sierra Vista area. It will take ~3 seconds for Neptune to disappear. The simulated image shows the position of Neptune at 6:10pm.

The Moon through the Pleiades.

On the evening of the 15th, the Moon will pass through the Pleiades (M45) cluster. Unfortunately, the Moon's phase will be full which will make it difficult to see the stars disappear and reappear. The simulated image shows the moon at 11pm. The red line shows the path of the Moon through the cluster.

NASA Night Sky Notes

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

Snowballs from Space
by Kat Troche

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.

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

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

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 they get.

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.

Coming and Going

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.

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!

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

Images
by HAC Members & Friends

This month we highlight the amazing images that our members and friends shared with us.

Witch Head Nebula
Created by Seven Grey

Seven - I'm fascinated by the Witch Head Nebula and earlier this month setup my telescope outside to capture this image. The Witch Head Nebula is a faint reflection nebula in the constellation Eridanus, bordering Orion. Its appearance resembles the side profile of a Witch's face, complete with a long nose and pointy chin. The dusty areas of this nebula are lit by the nearby star Rigel, a Blue-White Supergiant Star. Cataloged as IC 2118, this nebula is believed to be an

ancient supernova remnant. Radio observations of the Witch Head Nebula indicate the presence of molecular clouds and star formation in the nebula. It is difficult to view this nebula through the eyepiece of a small telescope. Some observers have reported seeing an extremely faint glow from the object using 10 x 50 binoculars under a dark sky.

Comet A3 Tsuchinshan-ATLAS
Created by Max Mirot

Max - I used Pixinsight and aligned/stacked comet and star images separately and then combined them.

Comet A3 Tsuchinshan-ATLAS
Created by Jay LeBlanc

Comet A3 Tsuchinshan-ATLAS & the Milky Way
Created by Mark Orvek

Taken with a Canon EOS Ra, 35mm lens, f/2.8, ISO 6400, 10 second exposure

Comet A3 Tsuchinshan-ATLAS
Created by Richard “Rik” Hill

Galaxy NGC-7497
Created by Glen Sanner

NGC-7497 is a barred spiral galaxy located in the constellation Pegasus. It is ~60 million light years away. This is a composite image of NGC 7497 and MBM 54 in Pegasus taken this past month over 8 nights of imaging with the 8" Visac and the ZWO 533mcpro. 100 x 10 min. (16hrs. 40min.) exposures to bring out the faint IFN (Integrated Flux Nebula) surrounding the galaxy, the galaxy is some 60-70 million light years away, but the IFN is less than 1000 light years away. I found it difficult to get the IFN without blowing out the galaxy, the IFN is quite tenuous. A couple of years ago, in 2020 I took this same field but with my Canon R6 and the WO 81mm APO (13hrs. 20min,) I did bring out some of the nebulosity, but my processing workflow wasn't the best. I re-did the processing of the old data along with my new images of area so I am attaching them both so you can see the difference in the field of view. 3.8° x 2.5° with the 81mm APO and 0.36° x 0.36° with the 8" Visac. This whole area has a lot of IFN so it may appear if you are imaging near Markab in Pegasus.

This Month's Trivia Question

I was born on November 2nd, 1885, in Nashville, Missouri.

I used Cepheid variable stars to determine the shape and dimensions of our Milky Way Galaxy and determined the relative location of the Sun within it. I was the director of the Harvard College Observatory for over 30 years.

In 1953, I proposed the notion of a habitable zone around stars through my "liquid water belt" hypothesis, which is widely accepted to this day. Who am I? Answer can be found at the end of the newsletter.

Galaxy Triangulum Galaxy (M33)
Created by Michael Borland

I finished processing 65.9 hours of R, G, B, Ha imaging for the Triangulum Galaxy, following the very detailed PixInsight found on YouTube. I'm pleased with how much detail I got in the spiral arms. The best part of the tutorial is that it shows how to blend in the Ha without getting weird colors in the rest of the object. The full-size image is on my flickr page.

Thoughtful Quote

"The sun, with all those planets revolving around it and dependent on it, can still ripen a bunch of grapes as if it had nothing else in the universe to do."

-- Galileo Galilei

Club Officers and Contacts

President: *Penny Brondum* ***Vice President:*** *Jim Reese*
Secretary: *Katherine Zellerbach* ***Treasurer:*** *Ted Forte*
Past President: *David Roemer*

Board Members-at-Large
Vince Sempronio Mike Morrison Gary Grue Richard Lighthill

Nightfall Editor: *Vince Sempronio* *nightfall@hacastronomy.org*
Webmaster: *Ken Kirchner*
Facebook Editor: *Richard Lighthill*

Website: *http://www.hacastronomy.org*
Facebook: *http://www.facebook.com/HuachucaAstronomyClub*
Email: *info@hacastronomy.org*

Club Meetings: Monthly at 7pm at the Cochise College Downtown Center at 2600 E Wilcox Drive, Sierra Vista, AZ in Room A102. Refer to the calendar for specific dates.

HAC Calendar of Events (November - December)

SU	MO	TU	WE	TH	FR	SA
Oct 27	**28**	**29**	**30**	**31**	**Nov 1** **5:47 AM** Conscious Child Preschool at Patterson 6:00PM	2 Kartchner Star Party 6:00 - 9:00 PM
3 DST Ends	**4**	**5** Election Day	**6**	**7** Patterson Public Night 6:30 – 8:30 PM	**8** **10:55 PM**	9 Kartchner 50th Annivesrsary Solar Observing Noon - 4:00 PM
10 Saturn / Moon Conjunction 35' @ 7pm	**11** Neptune / Moon Occultation 6:37pm from SV	**12**	**13**	**14**	**15** **2:29 PM** HAC Meeting A102 7:00PM	16 Uranus at Opposition Leonid Meteors
17 Leonid meteors	**18** Leonid meteors	**19**	**20**	**21**	**22** **6:28 PM**	23
24	**25**	**26**	**27**	**28** Thanksgiving Day	**29**	30 **11:21 PM**
Dec 1	**2**	**3**	**4**	**5** Patterson Public Night 6:00 – 8:00 PM	**6**	7 Jupiter Opposition
8 **8:27 AM**	**9**	**10**	**11**	**12** Geminid Meteors	**13** HAC Holiday Party at Brondums Geminid Meteors	14 Solar Saturday SV Library 10:00AM - Noon Geminid Meteors
15 **2:02 AM**	**16**	**17**	**18** Mars / Moon Conjunction 48' @ 2am	**19**	**20**	

All dates and times are local MST
Join the HAC Astro forum to keep up to date with all the Huachuca Astronomy Club events
Send an email to: HACAstro+subscribe@groups.io

Answer to trivia question: Harlow Shapley