



The W.A.S.P.



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The Warren Astronomical Society Publication



The WASP

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The Warren Astronomical Society, Inc., is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first Monday and third Thursday of each month, starting at 7:00 p.m.

First Monday meeting:	Third Thursday meeting:
Cranbrook: Institute of Science	Macomb Community College
1221 North Woodward Ave	South campus, Bldg. E, Room 208
Bloomfield Hills, Michigan	14600 Twelve Mile Rd.
	Warren, Michigan

Membership and Annual Dues

Student	Individual	Senior Citizen	for families
\$17.00	\$30.00	\$22.00	add \$7.00

Astronomical League (optional) \$9.00

Send membership applications and dues to the treasurer:

c/o Warren Astronomical Society, Inc.

P.O. Box 1505

Warren, Michigan 48090-1505

Pay at the meetings

Also via PayPal (send funds to treasurer@warrenastro.org)

- Among the many benefits of membership are
- Loaner telescopes (with deposit). See 2nd VP.
- Free copy of each WASP newsletter.
- Free use of Stargate Observatory.
- Special interest subgroups. See chairpersons.

The Warren Astronomical Society Publication (WASP) is the official monthly publication of the Society.

Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the end of each month. Any format of submission is accepted. Materials can either be transmitted in person, via US Mail, or by email (publications@warrenastro.org)

Disclaimer: The articles presented herein represent the opinion of their authors and are not necessarily the opinion of the Warren Astronomical Society or this editor. The WASP reserves the right to edit or deny publication of any submission.

Stargate Observatory is owned and operated by the Society. Located on the grounds of Camp Rotary on 29 Mile Road, 1.8 miles east of Romeo Plank Road, Stargate features an 8-inch refractor telescope under a steel dome. The observatory is open according to the open house schedule published by the 2nd VP.



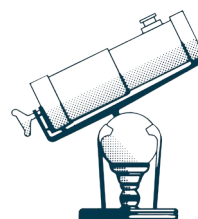
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About the Cover

The Warren Astronomical Society wishes you and yours the very best this holiday season.

The cover features another capture of the aurora by Adrian Bradley. Despite rumors of the current solar cycle waning, old Sol keeps pumping out flares that illuminate our nights.





Field of View

Terms I've never heard

I watch for new papers published by Vatican Observatory staff and adjunct scholars, and post them on the Vatican Observatory Foundation's [site](#). I read their abstracts, and can actually understand some of the words used! I frequently hear astronomical/research terms I've never heard of before, like: [Jordan and Einsteinian Frames](#), [Hamiltonian](#), and [time projection chamber](#).

A new term from a [recent paper](#) was 'decretion disk.' It's a rotating disk of gas and material that forms around a star from material the star ejects from its equatorial region. Unlike an accretion disk, which pulls material into the star, a decretion disk builds up outward from the star's own ejected matter. These disks are most often associated with fast-rotating B-type stars and are thought to prevent the star from breaking apart by carrying away angular momentum. *Got it?*

The other term new to me was 'disk-to-disk accretion,' this is where the material streaming off of the fast-rotating B-type star and forming a decretion disk, is being sucked into the accretion disk of a companion white dwarf star. In an interesting twist, the companion star in a disk-to-disk accretion system can become the most massive star of the pair!

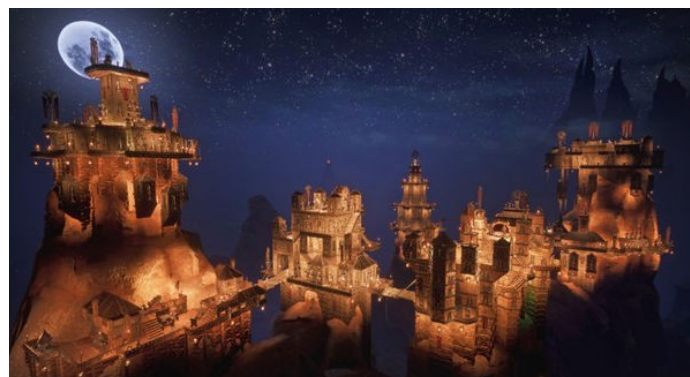


Screenshot from Dune Awakening

Many games show the night sky as a random splash of stars, with a density that could only be seen from deep within a globular cluster! Occasionally you'll even see the Earth's Moon thrown in too!



Disk-to-disk accretion Credit: Google Gemini



Castle and night sky from Conan Exiles - that's Earth's Moon, but not our sky!

The sky in games

I may have mentioned that I play a lot of computer games... One I've been playing since the summer is Dune Awakening - an open-world, survival-crafting game set on Frank Herbert's world of Arrakis. One thing that makes me chuckle is the size of one of the moons at night. If our Moon appeared this big in the sky, the Earth would be tearing itself apart!

Very few games show the actual night sky - one that does is Kerbal Space Program; I was pleasantly surprised to discover this by seeing a familiar pattern of three stars, and then zooming-out and seeing the entire constellation of Orion.

**Bob Trembley,
President**

Warren Astronomical Society Annual Awards Banquet

Thursday, December 4th, 2025

from 6:30 PM to 11PM.

Ukrainian Cultural Center

26601 Ryan Road

Warren, MI

Prices

By December 2nd (Cranbrook meeting): \$35.00.

At the door: \$40.00.

Cash Bar

Door Prizes

STARGATE OBSERVATORY

Dinner will consist of Meatballs w/ Mushroom Sauce, Boneless Breaded Chicken w/ Lemon Piccata Sauce, Roast Baron of Beef Au Jus, Green Beans w/ Almonds, Normandy Blend (Broccoli, Carrots, Cauliflower, Yellow Squash, Zucchini), Rosemary Roasted Redskin Potatoes, Seasoned Whipped w/ Gravy, Salad w/ Relish Tray, Mostaccioli w/ Marinara Sauce, Rolls/Butter, Apple Pie.

A minimum of 35 attendees needed to ensure we have a banquet

Special guest speaker: Glen E. Swanson

*"The Making of an Enterprise:
How NASA and the Aerospace Industry Helped Create Star Trek"*

Pre-orders payable by check
(To Warren Astronomical Society, PO Box 1505, Warren MI 48090)
or

PayPal (send to treasurer@warrenastro.org)

2026 Calendars

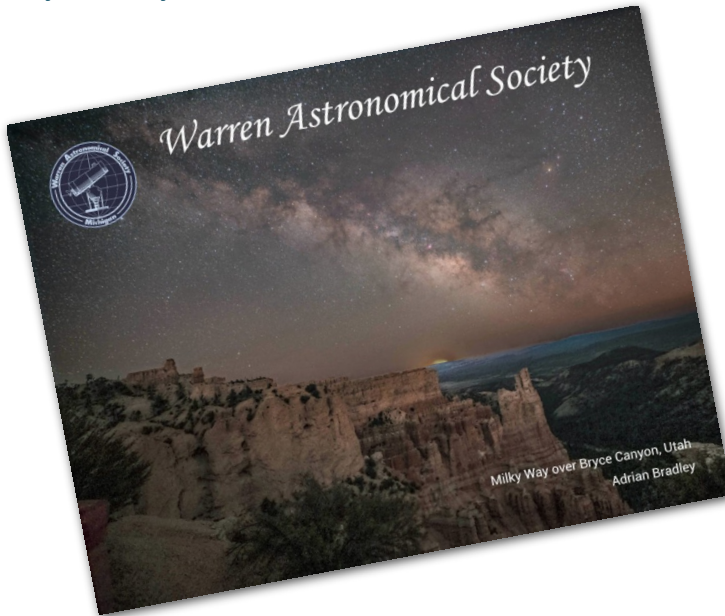
Want to keep track of W.A.S. meetings and exciting astronomical events next year?

**Order your 2026
Warren Astronomical Society calendar
now, supplies are limited!**

These beautiful calendars feature W.A.S. member astrophotography photos, including:

- Elephant's Trunk Nebula by Dale Hollenbaugh
- Thor's Helmet by Bob Berta
- Horsehead Nebula by Doug Bock
- Solar Eclipse sequence by Vatshalya Dandibhotla
- IC 342 by Rik Hill
- Comet C 2023 A3 by Steven Tennenberg
- Computer Generated Galaxy Formation by Jeff MacLeod
- M8 (Lagoon Nebula) by Rik Hill
- Aurora by Vatshalya Dandibhotla
- NGC6946 (Fireworks Galaxy) by Steven Tennenberg
- The Moon by Peter LeMere
- SH2-174 (Sharpless 174) by Bob Berta

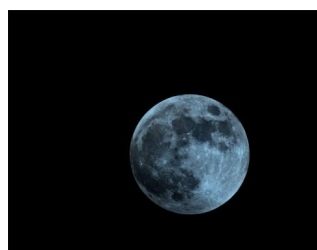
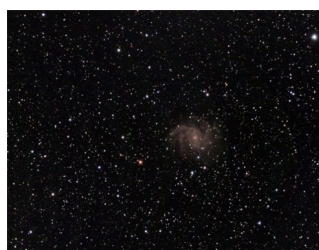
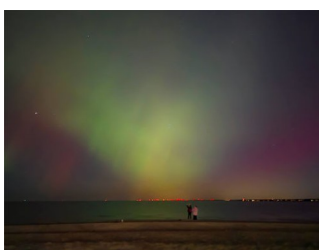
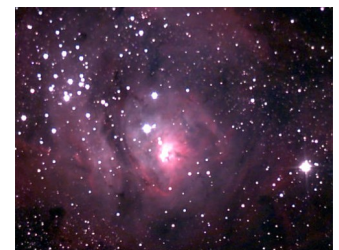
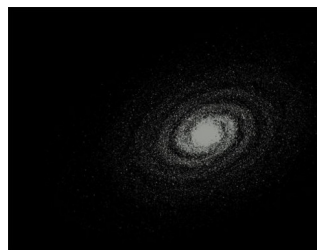
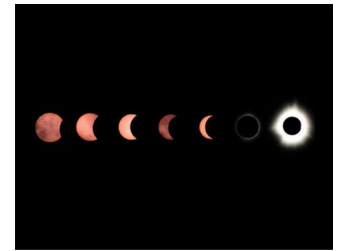
And the Milky Way over Bryce Canyon taken during the Astronomical League convention by Adrian Bradley on the cover.



Two ways to get your calendars

If you can pick up your calendar at a Cranbrook or Macomb meeting, you can pre-order on PayPal (send to treasurer@warrenastro.org) or pay by check or cash at the meeting for **\$20** each.

If you need your calendars mailed, then the cost is \$20 + \$5 flat rate shipping per order (regardless the calendar count) via PayPal or by sending a check to Treasurer, Warren Astronomical Society, PO Box 1505, Warren MI, 48090. Be sure to include your mailing address so we can get them to you.



WAS Apparel Price List

T-SHIRTS

Black – Navy – Gray (Pink or Yellow if desired) – one imprint

Small – XL	\$15.00
2XL	\$18.00
3XL	\$19.00

LONG SLEEVE T-SHIRTS

Black – Navy – Gray - one imprint

Small – XL	\$19.00
2XL	\$21.00
3XL	\$22.00

IMPRINT LOCATIONS:

Front left chest (3 ¼" logo)

Front or back (9" or 10" logo)

Back (12" logo for jackets or sweater)

Combination front left chest (3 ¼" logo) and back (9", 10" or 12" logo) – add \$7.00

Choose when placing order

HOW TO ORDER:

Place order at the Cranbrook meeting on the first Monday of month –

Select garment type - color of garment – logo imprint and color scheme –

Pay in full for order to be placed –

Your order will be ready for pickup at next Cranbrook meeting –

(Your order may possibly be ready for the Macomb meeting following the Cranbrook meeting of that month – you will be notified if that is the case)

Contact Mark Kedzior @ bazonga952@hotmail.com with any questions

CREW NECK SWEATSHIRT

Black – Navy – Gray - one imprint

Small – XL	\$22.00
2XL	\$24.00
3XL	\$25.00

HOODIE W/Pockets

Black Only (at this time) – one imprint

Small – XL	\$27.00
2XL	\$33.00
3XL	\$34.00

LOGO COLOR SCHEMES:

Black background with gold/yellow artwork and lettering

Black background with blue lettering and gold/yellow artwork

Choose when placing order

IMPRINT ON YOUR OWN CLOTHING ITEM: Logo + Imprint Charge

3 ¼" Logo - \$8.00

9" – 10" Logo - \$12.00

12" Logo - \$15.00

LOGO COLOR CHOICES



Gold/Blue



Gold-3D



Legacy



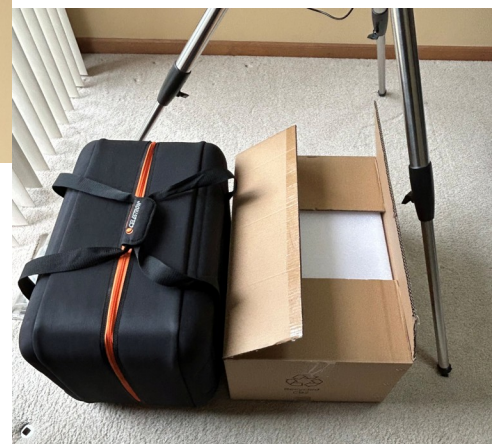
For Sale

Celestron NexStar 6se.

Like new, purchased in August 2024 - used only a couple times, hence the sale! Includes tripod, erecting prism, 25mm eyepiece, carrying case, AC adapter, Red Dot Star Pointer Finder, original packing for tube and manuals (As seen in photos). \$700.

timbonmi01@gmail.com

586-745-7558



WAS Merchandise

Available at Cranbrook
and Macomb meetings

WAS Logo Stickers



\$1.00 ea.
\$5.00 for 7

WAS Pins



\$2.50
Each

WAS Bandana



\$5.00
Each

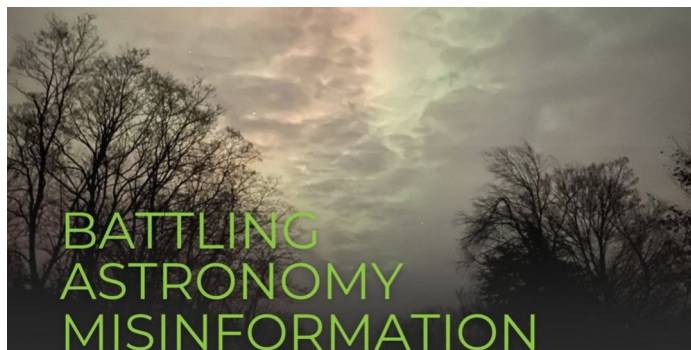
Astronomical Bandanas at an astronomically low price, just \$5! featuring 33 Glow in the dark constellations and a WAS logo.

Endorsed by
the Unicycle
Cowboy!



DETROIT
PUBLIC
LIBRARY

KNAPP
BRANCH
PRESENTS



Tuesday

DECEMBER 16TH

6:00PM - 7:30PM



Adrian Bradley, amateur astronomer and writer, will discuss recognizing astronomical misinformation and countering it effectively.

Detroit Public Library is partnering with Wayne State University's planetarium, and local astronomy enthusiasts, on these talks related to astronomy.

As usual, the presentation will be available on Zoom, but Adrian will be presenting from the Knapp Branch of Detroit Public Library. You are welcome to join us in person or online.

Knapp Branch

13330 Conant
Detroit, MI
(313) 481-1771



www.detroitpubliclibrary.org

Where was W.A.S.?

Tina Wong, Field Reporter

At Cranbrook Institute of Science for their Leonid Meteor Shower Overnight Event.

11/15/2025

A family-friendly event where 52 guests spent the night at the museum exploring exhibits, attending Planetarium shows, and participating in a scavenger hunt!

Unfortunately, for us stargazers/meteor chasers, the skies did not cooperate. Winds kept the clouds rolling in, shielding any Leonids from sight (usually 10-15 per hour). However, an extremely persistent WAS team found Saturn, Neptune, the Owl Cluster, the Andromeda Galaxy, Epsilon Lyrae (aka "Double-Double" near Vega) and the Pleiades in between breaks in the clouds.

During cloudy periods where we couldn't see a thing, Jim Lawlis talked about the team's three telescopes & how they work and Dave Noble shared beautiful images he has captured with his Seestar.

A huge THANK YOU to Cranbrook for providing us with hot coffee & cookies and to our volunteers for sharing their love of Astronomy: Marija Bognar, Jim Lawlis, Ken Lord, Jeff MacLeod, Dave Noble, & Tina Wong.



Jim Lawlis sharing the night sky with Cranbrook guests



WAS team members: Jeff MacLeod, Dave Noble, & Marija Bognar

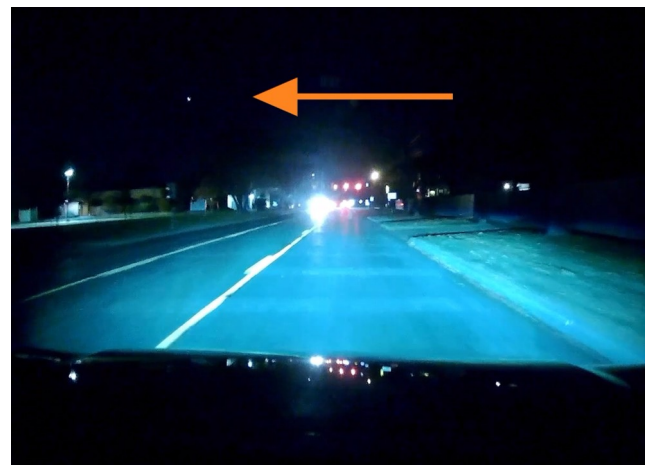


Ken Lord & Cranbrook guests taking pics through the eyepiece in between breaks in the clouds

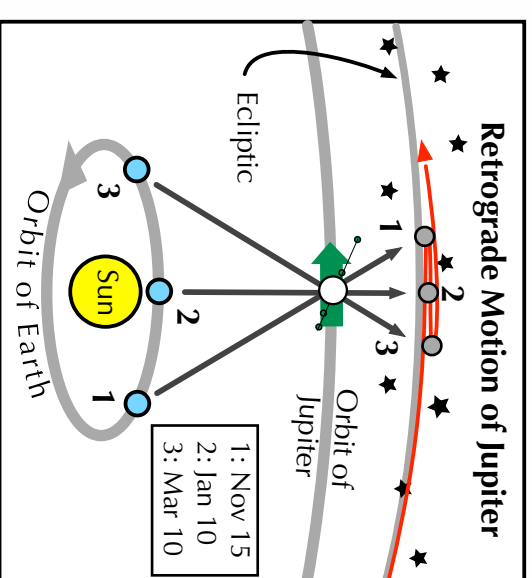
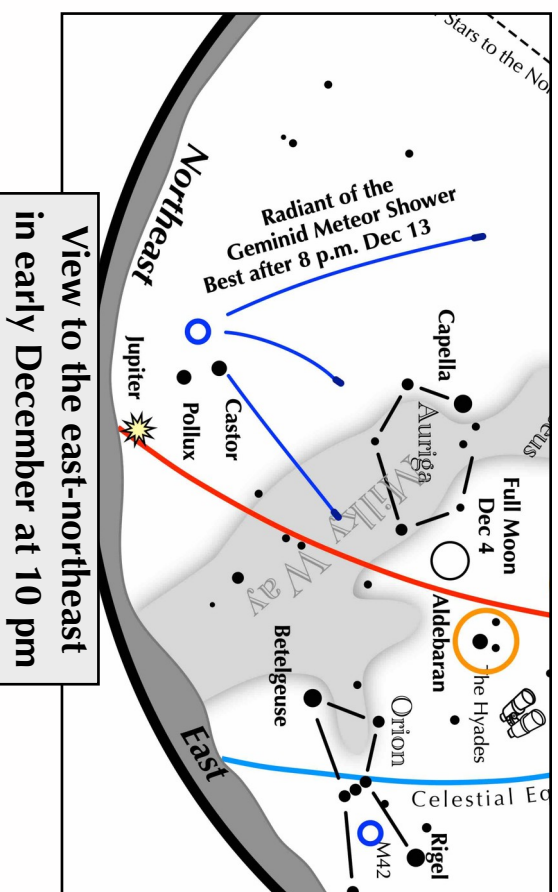
Bonus pic!

Picture at right:

On the way home, Dave Noble's dash cam picked up a fireball, shooting across the sky. He posted a [video](#) to the WAS Facebook group.



On evenings in December (and January), try this challenge:

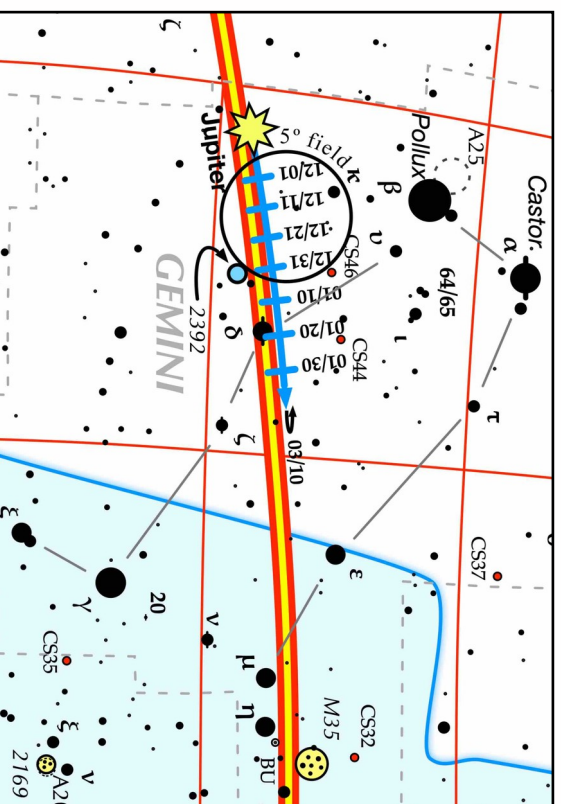


Jupiter moves in retrograde

On evenings in December, the Giant Planet slides westward in central Gemini to the lower right of Castor and Pollux.

Observe, then plot its motion in the heavens. It continues its westward journey in January, but begins to slow in February. On about March 11, it halts and reverses direction.

The passing bright moon will hamper observations on December 4-8.



Presentations

Cranbrook

7:00 pm, December 1, 2025

Main Talk

Brahe and Kepler

By Buddy Stark

Often as we learn about the history of astronomy, or any scientific endeavor, a person is remembered through the lens of the few meaningful contributions they made to the field. In a subtle way this becomes a reduction of the humanity of these people and does a disservice to what makes their accomplishments so extraordinary. It's easy to forget that these heroes of our past experienced the daily frustrations that we experience. This talk will strive to look at two well known figures in the history of astronomy, Tycho Brahe and Johannes Kepler, and paint a picture of who they were as individuals, not only through their scientific contributions, but also through the gulf of disparity between their two lived experiences.

About the Speaker

Starting in 2021 Buddy Stark has been the manager of the University of Michigan's Museum of Natural History. Before that he managed the Longway Planetarium in Flint, Michigan, the planetarium at the Michigan Science Center and worked at the Strickler planetarium in Bourbonnais, Illinois. His academic background is in science education and science communication. He holds a Master's in Science Education and will be awarded his Ph.D. in the field just a couple weeks after this presentation. In his free time he enjoys woodworking and computer programming, having built several dining tables, bookshelves, and pieces of planetarium software.



Short Talk

Radio Astronomy

By Tom Hagen

Tom's presentation will cover galactic neutral hydrogen detection at the microwave wavelength of 21 cm. This is one of the most important methods of radio astronomy and in recent years, software and equipment advances have brought this technique within the reach of the amateur radio astronomer.

About the Speaker

Tom Hagen has been an amateur astronomer on and off since his high school years in the 1970's. Tom's a member of several astronomy groups besides WAS: McMath-Hulbert Astronomical Society, Oakland Astronomy Club, and the Society of Amateur Radio Astronomers. Tom (ham radio call NE9Y) is a retired electrical engineer who worked in the automotive industry battling electrical noise issues on a car you may be driving. He lives in Rochester MI with his wife Kathy and cat Anna. In his spare time he rides his bike across Kansas.



Annual Banquet

6:30 pm, December 4, 2025

Feature

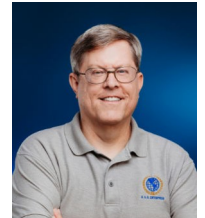
The Making of an Enterprise How NASA and the Aerospace Industry Helped Create Star Trek

By Glen E. Swanson

The connections between NASA and Star Trek during the show's original creation will be examined. In addition, this talk will explore how the larger aerospace community of the 1960s also helped by providing technical advice, influence and support to Gene Roddenberry during Star Trek's initial airing on NBC from 1966-1969.

About the Speaker

Glen E. Swanson holds a B.S. in History and an M.S. in Space Studies. From 1998 to 2002, he served as Chief Historian of NASA's Johnson Space Center, where he edited the anthology "Before This Decade Is Out..." Personal Reflections on the Apollo Program (1999). He also co-authored Fifty-five Trips Around the Sun: The History of Smiths Industries Information Management Systems in Grand Rapids, Michigan (1999).



Next Month

Cranbrook

Pizza Party and Astro Quiz

Macomb

Which Eyepiece?

WAS PRESENTATIONS

If you would like to present either a short talk (10-15 minutes) or a full-length talk (45-60 minutes) at a future meeting, please email Dale Partin at: firstvp@warrenastro.org.



David H. Levy

As tho' a star, in inmost heaven set,
Ev'n while we gaze on it,
Should slowly round his orb, and slowly grow
To a full face, there like a sun remain
Fix'd--then as slowly fade again,
And draw itself to what it was before;
So full, so deep, so slow, ...
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Tennyson,--*Eleanore*, circa 1830.

This Christmas article begins with an excerpt from *Eleanore*, one of the early poems written by Alfred Tennyson. It is one of the finest pieces of verse I have ever encountered. The poem tells a story about a youthful *Eleanore*, who falls in love. But at a point in the final third part of this poem, he turns his tale into a sermon about variable stars. How could young Tennyson possibly know anything about stars that change in brightness? The American Association of Variable Star Observers, better known by its famous acronym AAVSO, would not be founded for 81 years, in 1911.

Young Tennyson was almost certainly familiar with the work of Friedrich Wilhelm Argelander, who today is accredited with launching the study of variable stars. It is probably that familiarity that led the young poet to insert his little lecture on variable stars.

Some of Tennyson's early poetry, published in the early 1830s, was reviewed in the *Journal Quarterly Review*: It went badly:

"We pass by two - what shall we call them? - tales, or odes, or sketches, entitled "*Mariana in the South*" and "*Eleanore*", of which we fear we could make no intelligible extract, so curiously are they run together into one dreamy tissue - to a little novel in rhyme, called "*The Miller's Daughter*". Miller's daughters, poor things, have been so generally betrayed by their sweethearts, that it is refreshing to find that Mr. Tennyson has united himself to his miller's daughter in lawful wedlock, and the poem is a history of his courtship and wedding."

Apparently Tennyson was sensitive to this sarcastic and negative criticism, and he was so affected and hurt by this review that he stopped publishing for almost a decade. His colleagues and friends feared that he had given up writing, and possibly his life, but, as he later told his son Hallam, he was busy revising his older poems, and "in silence, obscurity, and solitude he perfected his art."

I believe that the 1830s review was grossly unfair. It was mean. I suspect that these reviewers were using poetry they didn't like to demonstrate how brilliant they were.

These reviewers are all long forgotten; I know of nobody who has not heard of Tennyson. I know of many people, besides me, who are just as sensitive to criticism as he was. (By the way, partly as a result of this, I am not an objective reviewer. I think that if someone has the guts to write for publication, she or he deserves every possible encouragement.)

When I recited this extract to my friend Jean Mueller, a well-known discoverer of 15 comets and 107 supernovae during the 29 years she worked at Palomar Observatory, she noticed the variable star connection the minute I read it to her. She agrees: "Was there a specific variable star that he might have had in mind?" These lines teach their readers about variable stars, stars that change in brightness. Such a star does "slowly grow/To a full face" (its maximum brightness) and then "fade again,/And draw itself to what it was before" (its minimum).

I have been an active observer of variable stars for many decades. As Leslie Peltier wrote on page 69 in his autobiography *Starlight Nights*, "A variable star was a completely new experience; it was not just something that was THERE, it was something that was HAPPENING!" On the evening of 30 August, 1975, my interest in variable stars entered a new high when I independently discovered Nova Cygni, a 1.6 magnitude exploding star, and then three years later a second Nova Cygni. Variable stars are magical to me, but this little poem from Tennyson is the first one I have found that directly addresses the observation of stars that regularly change in brightness.

In a way I wish I had known Tennyson. But I am glad I do not, because that would mean that I am at least 175 years old. But I do know the famous and highly regarded astrophysicist Jonathan Tennyson, Alfred's great, great, grandson, and we have been friends since I met him at University College London a number of years ago. The Tennyson family is warm and friendly, and I think the poet from long ago would have enjoyed that, and that an appreciation for science still runs in his family. Alfred Lord Tennyson had the ability to take a scientific fact, that some stars vary in brightness, and turn it into a verse that etches itself forever into our hearts.



The picture shows several telescopes at our Adirondack Astronomy Retreat. Some of the telescopes are quite small, the size of the telescope that Tennyson owned and used regularly as he was an accomplished amateur astronomer.



Observer Safety

By Brad Young, Astronomy Club of Tulsa

I think it's important to mention safety and astronomy. Part of observing visually is finding the darkest skies you can which is becoming harder. So, we are forced to drive to remote areas that are sometimes not improved and do so even in cold weather. Such conditions and locations can lead to significant risk. So can other people who don't understand what you're doing or are just untrustworthy.

A tried-and-true tool is the buddy system. My personal preference is to observe at one of our dark sky sites either at a scheduled event or with one or two observing buddies. They're simply safety in numbers, and if someone finds two or three men or women together, they may think twice before messing with them. One of you may get sick and need assistance from the others; if nothing else, they can call for police or ambulance. It's just a good policy to always try to have another person there with you, especially in cold weather when things can creep up on you fast.

Let someone at home or one of your friends know where you are at. That way, if you don't show up to work the next day or something, they will at least know where to start looking. If it is possible let them know the path you plan to take there unless it is already well established.



Another real problem is sleep deprivation. When the sky is nice and the views may not come again for months, we try to see as much as we can and stay up as late as we can. This is great but can lead to a sleepy driver. I know about this problem very well. Although I had not observed that night, just getting my telescope ready to go to a star party, on the way home I fell asleep and totaled my car into a tree. I lay there by the road until my wife came and got me. Somehow due to the airbag I was uninjured, but sore from head to toe. Only bright spot was when I left the telescope back at the observatory. Otherwise, it would have been destroyed too.

Unfortunately, that was nowhere near the first time I had been sleepy and driving. Our club used to visit Adams Ranch, an even darker site that was three hours from my home. Even though it had a great bunkhouse, sometimes I would observe there and then drive back home. There were many times when if there hadn't been an upbeat song on the radio, I don't know...

If you're tired, stay at the site or pull over and take a little nap. You can always start home later after you have a little rest.



Speaking of roads, I just had a fantastic blowout on one of our freeways coming home when a piece of debris in the road tore an inch wide hole in my tire. If there had been more traffic my severe turn to the right trying to get off the highway onto the shoulder might have been resulting in an accident. Luckily, I was unhurt again and had a good spare. Unfortunately, the trucker who stopped after seeing all this and tried to help me could not figure out the jack either. So, I called my road assistance service through my insurance, and they were able to come help me.

That's not the first time something like that happened either. One time I went to see the Capulin Volcano in New Mexico while I was at OkieTex in the Oklahoma Panhandle. It's about a 3-hour drive there and back and there are modern highways to take you the entire way. Of course, I didn't want to do something that simple, so I took my rental car down extremely worn-out roads that were apparently U.S. 66 at one time. They were horrible and then on the way back I was late for dinner, so I ran along them as fast as a hundred. Sure enough, by the time I got back to the campsite I had a flat. Once again, I called roadside assistance and was fine but just imagine if it had gone flat about a hundred miles earlier. I don't even know if I had cell service at that point. If you think it's just because I'm a lousy driver, one



of our local weathermen just had the same thing happen here in 2025. He made it back to camp also, barely.

Your safety and well-being is paramount because if you do suffer an injury, it may limit what you observe in the future. My fear is falling off ladders observing with big telescopes. I try to use my step ladder as little as possible with my 22-in UC, but on occasion there are bigger telescopes (= bigger ladders). I try to avoid those as much as possible. And again, if you're sleepy you may fall off the ladder which I have done more than once. My rule about that is the same as at the bar if I fall off the stool, it's time to go home.

The weather is not our friend. Even though it may be very clear and nice when you start, winter storms and cold fronts come in faster than predicted, leading to all kinds of problems if you're out too far. It's always tempting to try to go and look when it's crystal clear and very cold, but exposure can be fatal. And don't forget summer, when you can become dehydrated and overheated, especially setting up during twilight, which may be the hottest and most humid part of the day.

Choose your site carefully. Most of the time as I've grown older, I've been smart enough to go to our observatory, established star party or Adams Ranch. When I was younger, I would often just go out to the middle of nowhere, find the end of a road and set my telescope up. So far, I haven't been approached by anyone about trespassing, but I was scared out of my mind by a deer coming up behind me in the woods a long time ago. If you do need to go to a new site, try to contact the landowner or the park service etc., and make sure they know ahead of time and agree that you can observe there.

While the trucker and I were working on my tire, the people on the highway were not getting over in the other lane or giving us any room to work at all. Many people have been injured trying to change a tire on a highway and luckily, we weren't part of that count. This is another risk that amateur astronomers take, they often go to dark sites on the weekends and return at wee hours. So, beware of the people around you on the road and try to anticipate that all of them

are drunk and that you're going to have to adjust your driving to suit.

And it's half past four and I'm shifting gears. "Radar Love", Golden Earring

Worst of all is getting older. As we grow older our responses slow and sometimes our ability to stay awake in boring situations like long expressway drives can occur. Again, don't think of yourself as bulletproof. Turn up the radio, drink some coffee or pull over and take a little nap if you have to it's not worth getting home 30 minutes earlier if you're going to risk running off the road or having some other kind of accident or mishap. Gene Shoemaker is the most famous example of an astronomer that has been lost due to an accident on a long, lonely road, but I'm sure there are many more that we just haven't heard of. Don't add yourself to the list.



WAS Name Tags

Name tags are back. If you wish to have one and are a dues paying member, contact publications@warrenastro.org and we'll get one printed up for you.

Join the Astronomical League



The mission of the Astronomical League is to promote the science of Astronomy. The major benefit of belonging to this organization is receiving the quarterly newsletter, The Reflector, which keeps you in touch with amateur activities all over the country.

Also:

- Participate in the Observing Program
- Avail yourself of the League Store
- Astronomy Books at a discount
- Attend Astronomical League Conventions



Only \$9.00 annually,
(Membership starts July 1)

alcor@warrenastro.org



Over the Moon



With Rik Hill

Copernicus

When your observing site is blessed with just the right colongitude, about 3 days past First Quarter Moon, so this grand crater Copernicus (93km in diameter) is just clear of the terminator you cannot help but be drawn to this sight. I know of observers, a good deal younger than me that claim they can see this crater with the naked eye at such times. The central peak of this monster crater rises 4,100m or 13,500 feet above the surrounding crater floor.

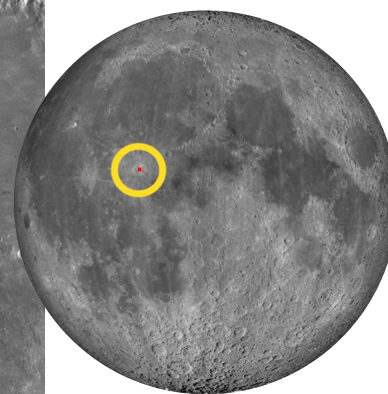
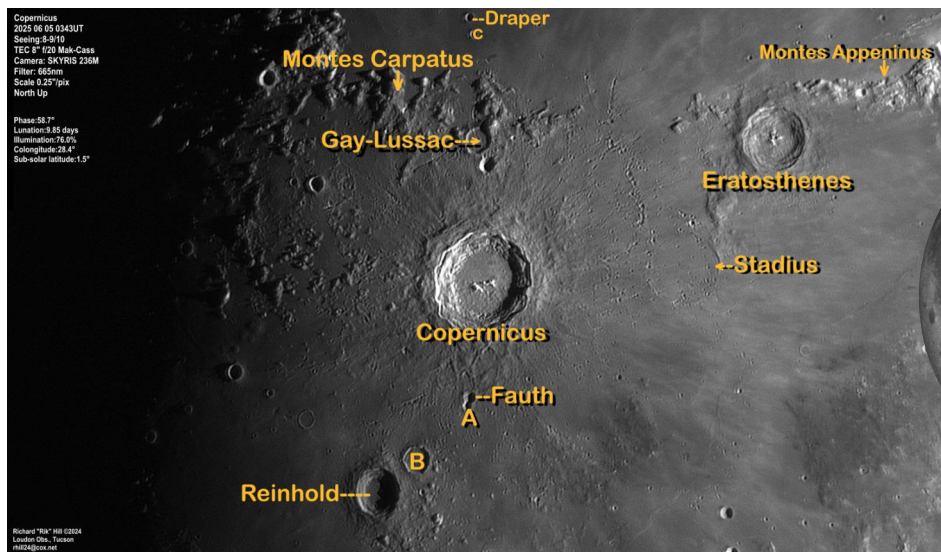
At the bottom of the image is another good sized crater, Reinhold (48km) and above it the shallow (infilled) crater Reinhold B (26km). Then to the right (east) of Copernicus is the crater Eratosthenes (60km) holding down the south end of the Montes Apenninus. Between Eratosthenes and Copernicus the ghost crater Stadius can just be made out under a peppering of small secondary craters made from the ejecta of the Copernicus impact only North of Copernicus are the Montes Carpatius and north of them, directly north of Copernicus, are the twin craters Draper C (7.4km) and above that Draper itself (9km).

South of Copernicus is another pair of small craters, Fauth (12km) to the north and south. Fauth A (8.7km). If you were following space activities in the 1960s you may recall the Lunar Orbiter II image of Copernicus from Nov.24, 1966 that ran in in many newspapers as "Photo of the Century".



In the foreground of the photo were two seemingly large craters as seen from the orbiter altitude of 28 miles. These fascinated me and I took pains to figure out which ones they were. These were Fauth and Fauth A and I have remembered this first sight of them every time I see them in a photo of this region.

This image is made from 4 AVIs stacked with AVIStack2 and then assembled with MS-Ice. Final processing was done with GIMP 2 and Irfanview.



Location Maps by Ralph DeCew



History S.I.G.



December 1995

The big story covered in this issue is the discovery of Comet Hale-Bopp, detailed in "A Tale of Two Comets" (By various authors (identified where known), edited for the WASP from electronic media) by Douglas E. Goudie. That story shares the front cover with Larry Kalinowski's "Computer Chatter". In Louie the Librarian's Book of the Month, we have Build Your Own Telescope by Richard Berry, getting a full four star rating by Louie. The issue wraps up with "Masterpieces Messier Missed" by Jeff Bondono: NGC 891 at 02h23m +42_21'

December 2005

Larry Kalinowski's "Astro Chatter" does the heavy lifting in this issue as the only article. In it, he reports Pluto's moon count is growing, a meteorite report and a bit on sunspots. He also covers WAS events and activities.

In "Note from the President", Ken Bertin acknowledges the work of fellow officers. Board Meeting Minutes of 11/07/05 at Cranbrook are provided by Bob Berta.

NASA Space Place rounds off the issue with "Voices from the Cacophony" By Trudy E. Bell and Dr. Tony Phillips.

From the Scanning Room

During the process of digitizing the old WASP issues, I got into the mindset that this was digging through ancient history. Then it dawned on me that, in less than two years after this December 2005 issue, I became a member. Maybe I am the fossil...

Dale Thieme,
Chief Scanner



Congratulations to our friends at Observable Space (formerly PlaneWave) for receiving the John G. Thodis Michigan Manufacturer of the Year - Small Tier award for 2025

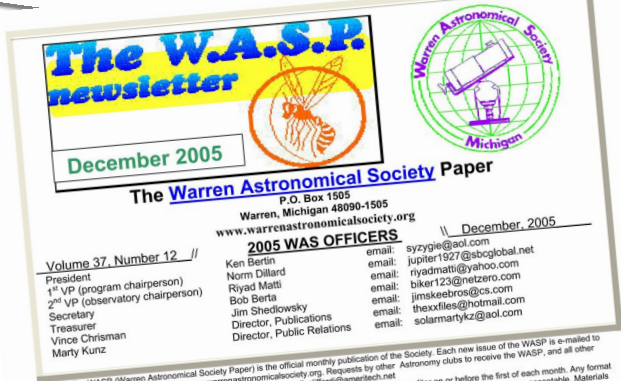


A Tale of Two Comets
By various authors (identified where known)
Edited for the WASP from electronic media

COMPUTER CHATTER
Larry F. Kalinowski

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The WASP (Warren Astronomical Society Paper) is the official monthly publication of the Society. Each new issue of the WASP is e-mailed to each member and is available online www.warrenastronomicalsociety.org. Requests by other Astronomy clubs to receive the WASP, and all other correspondence should be addressed to the editor, Cliff Jones, email: cliffj@earthlink.net.

Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the first of each month. Any format of submission is acceptable, however the easiest form for this editor to use are plain text files. Most popular graphics formats are acceptable. Materials can be submitted either in printed form in person or via US Mail, or preferably, electronically via direct modem connection or email to the editor. The WASP reserves the right to deny publication of any submission.

Astro Chatter by Larry Kalinowski

Looks like Pluto, our unresolved asteroid or planet, has more than one moon. The Hubble telescope has spotted two more moons. With three spotted two more moons. With most moons it could be the most populated asteroid that we know about. Several asteroids have moons, but none have three. It wouldn't surprise me if more were found around that planet. There has been a moon population explosion over the last ten years or so.

How would you like to find a meteorite the size of the one pictured, being held by Steve Arnold in Kansas. Weighing in at 1,400 pounds, it's a stone-metal composite that has been known since the late 1800's. Others have been found in the same area. It's called a Brenham meteorite, named after the area where they've been found in the

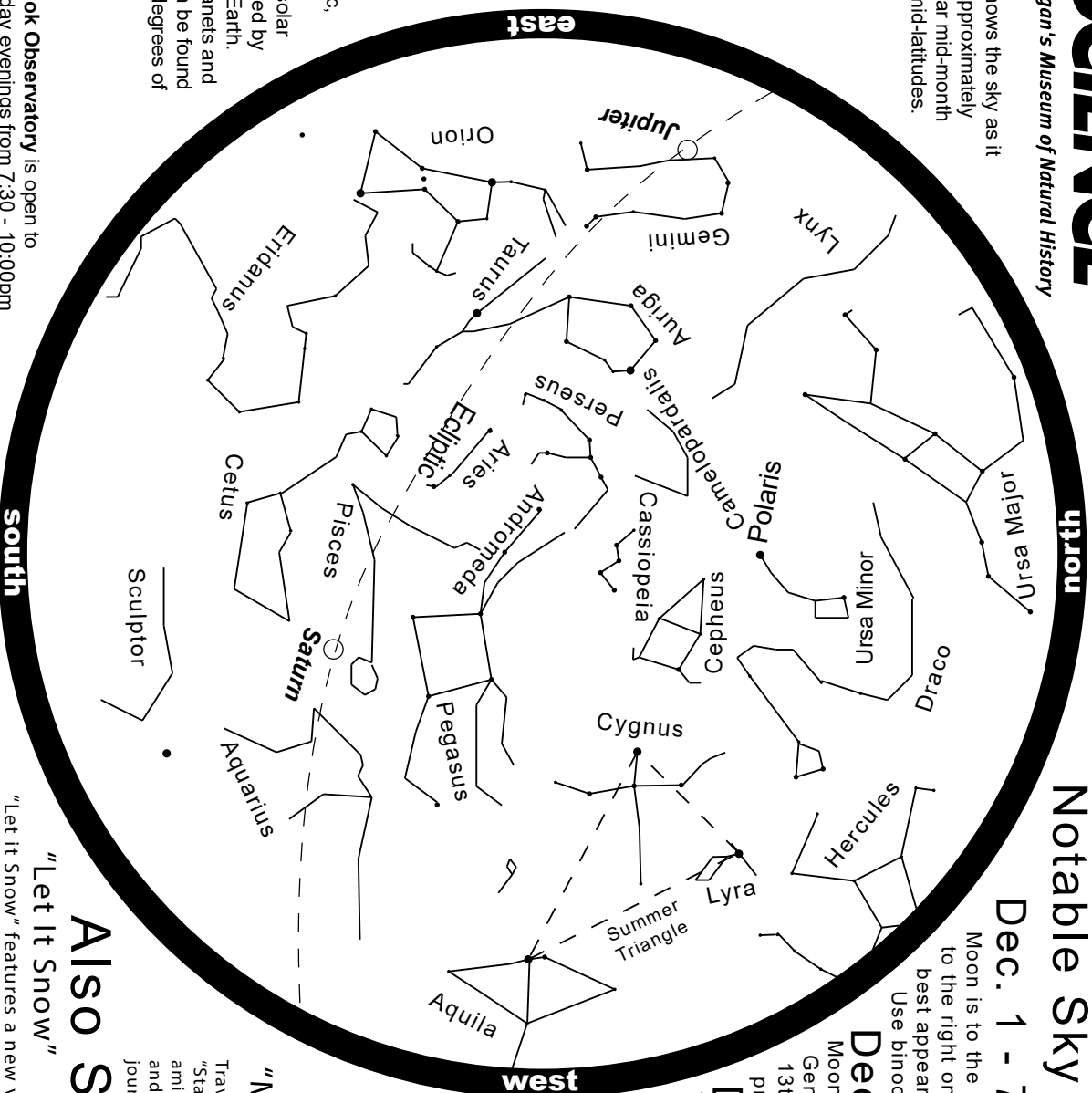
past. This one is the third largest one known and was detected by sensitive instruments while it laid seven feet underground.



Sunspot number 822 is shown in the solar picture. The date is November 17 and it has just moved far enough around the Sun's photosphere to provide easy viewing for white light telescopes. It too, is larger than the planet Jupiter, as other prominent spots have been in the past. Just why these large spots are appearing so late in the Sun's cycle is puzzling to astronomers.

NASA has just finished making measurements of the space around the Earth to help determine if space is actually curved and affected by the Earth's rotation as predicted by Albert Einstein. Earth's rotation should have a little twist in it. Space-time should have a little twist in it because of the rotation and the Gravity Probe B (GP-B) should be able to detect it. If space-time is twisted, it should effect super sensitive gyros within the probe. These gyros are accurate

This chart shows the sky as it appears at approximately 8pm EST near mid-month at northern mid-latitudes.



DECEMBER 2025

Notable Sky Happenings

Dec. 1 - 7

Moon is to the right of Jupiter. Pollux is above and Castor is to the right on the 7th (W morning). Also, Mercury makes its best appearance for the year in the ESE morning twilight. Use binoculars and look about 45 minutes before sunrise.

Dec. 8 - 14

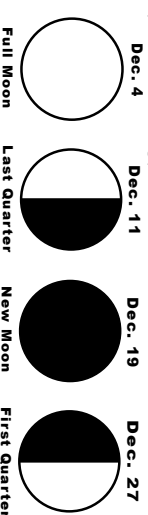
Moon is to the left of Regulus on the 10th (S morn.). Geminid Meteor Shower peaks on the night of the 13th-14th. One of the best showers of the year, it produces up to 60 meteors per hour on average.

Dec. 15 - 21

The December (winter) solstice occurs at 10:03 AM EST on the 21st. The Ursid Meteor Shower peaks on the evening of the 21st to 22nd. This minor shower produces only about 5-10 meteors per hour.

Dec. 22 - 31

The Moon is to the right of Saturn on the 26th (SW morning).



Now Showing

"Mystery of the Christmas Star"

Travel back in time 2,000 years to explore the nature of the "Star" that guided the wise men to Bethlehem. We will examine astronomical events that were occurring at the time and see if any were remarkable enough to have sparked the journey. (Extra shows are presented during the holidays.)

Also Showing

"Let It Snow"

"Let it Snow" features a new variety of festive classics from Frank Sinatra and Chuck Berry to Burl Ives and Brenda Lee, and includes a finale by the Trans Siberian Orchestra. The soundtrack is visually enhanced with thematic animation and all-dome scenery. This 32-minute program is a fun and entertaining experience for all ages, especially families.

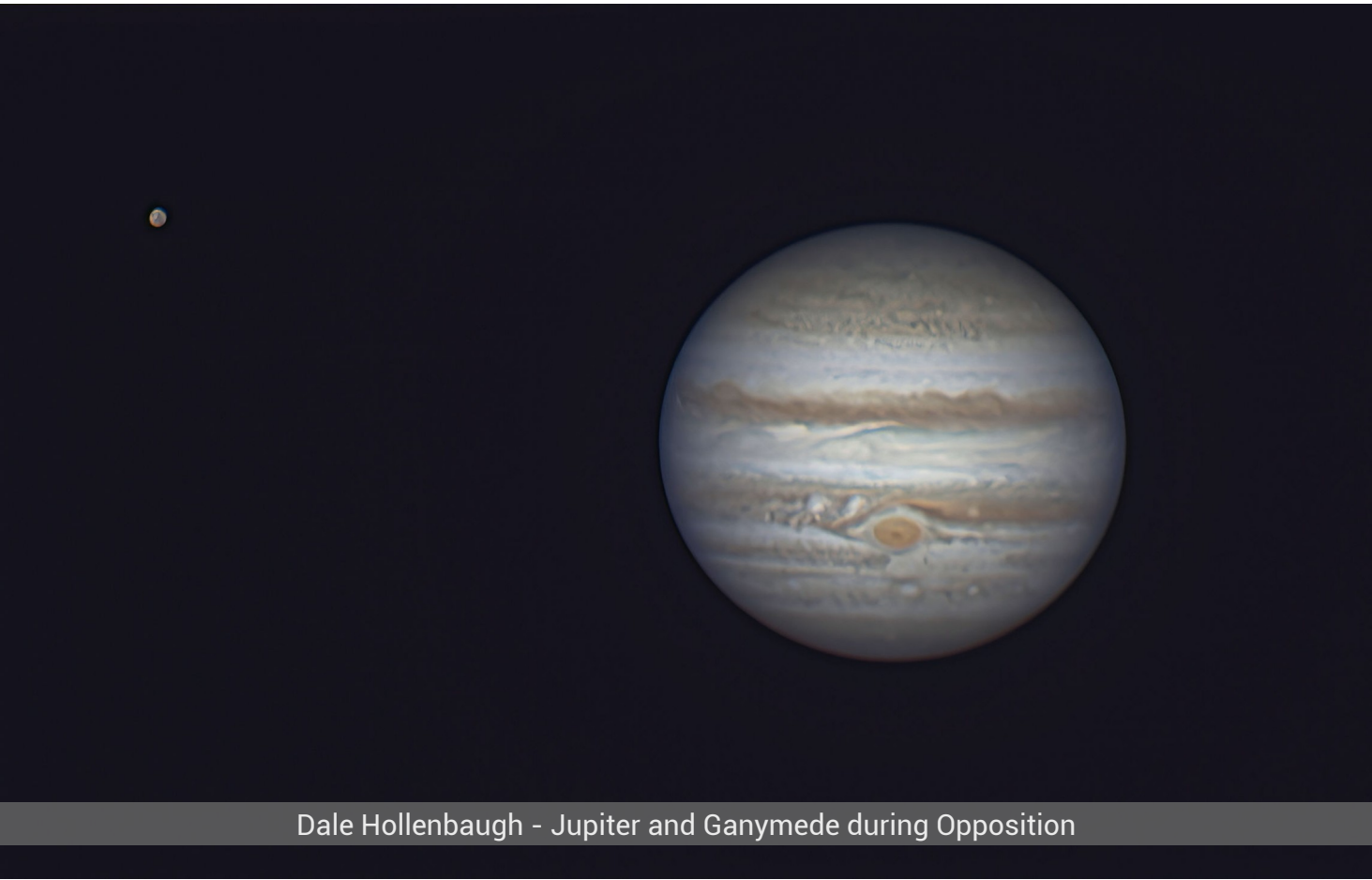
For astronomy information visit <http://science.cranbrook.edu>

What is that dashed line? It's the ecliptic, the reference plane of the solar system, defined by the Sun and Earth. The major planets and the Moon can be found within a few degrees of this plane.

The Cranbrook Observatory is open to the public Friday evenings from 7:30 - 10:00pm EST, and the first Sunday of the month from 1:00 - 4:00pm for solar viewing.

For observatory information visit <http://science.cranbrook.edu/explore/observatory>





December

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4 Banquet Moon at Perigee: 356962 km FULL MOON	5	6
7	8 Cranbrook	9	10	11 LAST QUARTER MOON	12	13
14 Geminid Meteor Shower	15 Chanukah/ Hanukkah (first day)	16	17 Moon at Apogee: 406324 km	18	19	20 Stargate NEW MOON
21 Winter Solstice	22 Last Day of Chanukah Ursid Meteor Shower	23	24	25 Christmas Day	26	27 FIRST QUARTER MOON
28	29	30	31 New Year's Eve			



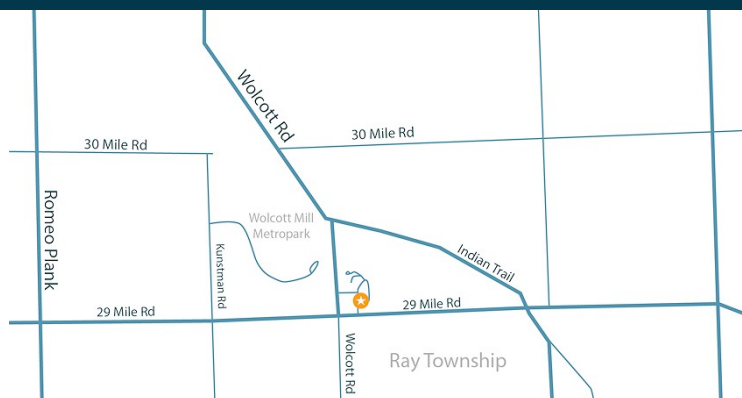
Stargate Observatory

Monthly Free Astronomy Open House and Star Party
5:30 PM, December 20

Wolcott Mill Park - Camp Rotary Entrance

Advisory: Concerns are circulating in the amateur astronomy community about a possibility of COVID-19 being passed from one person to another via contact of different persons' eyes with a telescope eyepiece. Sharing telescopes may be considered by some to be high-risk due to the possibility of eyes touching eyepieces. Masks are encouraged, mandatory for children.

- Sky tours.
- See different telescope types in operation.
- Get help with your telescope.
- We can schedule special presentations and outings for scouts, student or community groups.
- Contact: outreach@warrenastro.org
- Find us on Meetup.com



20505 29 Mile Rd (1.8 miles east of Romeo Plank Rd) Ray, MI 48096
82° 55'04" West Longitude, 42° 45'29" North Latitude

Observatory Rules:

- Closing time depends on weather, etc.
- May be closed one hour after opening time if no members arrive within the first hour.
- Contact the 2nd VP for other arrangements, such as late arrival time. Call 586-909-2052.
- An alternate person may be appointed to open.
- Members may arrive before or stay after the scheduled open house time.
- Dates are subject to change or cancellation depending on weather or staff availability.
- Postings to the Yahoo Group and/or email no later than 2 hours before starting time in case of date change or cancellation.
- It is best to call or email the 2nd VP at least 2 hours before the posted opening with any questions. Later emails may not be receivable (secondvp@warrenastro.org).
- Generally, only strong rain or snow will prevent the open house... the plan is to be there even if it is clouded over. Often, the weather is cloudy, but it clears up as the evening progresses.

Stargate Report

November Open House

11/22/2025

The Observatory opened at 5:05 pm. The sky was mostly cloudy and remained so for the rest of the night.

WAS members and visitors attended the open house. A few telescopes and one radio telescope were set up outside the observatory. Unaffected by the cloudy conditions, the radio telescope was able to detect the hydrogen emissions from the Milky Way.

A new member checked out one of the 8-inch reflectors. Currently, we have most of our loaner telescopes checked out.

The observatory closed at 8:00 pm after everyone left.

December Open House

The next open house is scheduled to start at 5:30 pm on Saturday, **December 20**. The open house has been moved to the 3rd Saturday in December due to the holiday season.

Riyad I. Matti
2025/2026 WAS 2nd VP
Observatory Chairperson

Treasury Report

For November 30, 2025

BOA Checking/cash box

Balance..... ~\$20,710

Income

Donation for Stargate 120.00

Memberships..... 44.00

Calendars 250.00

Banquet Tickets..... 140.00

Expenses

Pad locks for Dob trailer 59.33

Snacks..... 42.57

Credit Card

Balance..... \$916.16

Expenses

Ukrainian Cultural Center 904.74

Hallmark 11.42

PayPal

Balance..... \$629.63

Astronomical Events For December 2025

Add one hour for Daylight Saving Time

Source:

<http://astropixels.com/almanac/almanac21/almanac2025est.html>

3	21:54	Pleiades 0.8°S of Moon
4	6:06	Moon at Perigee: 356962 km
4	18:14	FULL MOON
7	10:48	Jupiter 3.7°S of Moon
7	11:21	Pollux 2.9°N of Moon
7	16:00	Mercury at Greatest Elong: 20.7°W
10	1:32	Regulus 0.8°S of Moon
11	2:35	Moon at Descending Node
11	15:52	LAST QUARTER MOON
14	2:00	Geminid Meteor Shower
14	11:27	Spica 1.4°N of Moon
17	1:09	Moon at Apogee: 406324 km
18	7:29	Antares 0.4°N of Moon
19	20:43	NEW MOON
21	10:03	Winter Solstice
22	11:00	Ursid Meteor Shower
25	17:03	Moon at Ascending Node
26	22:24	Saturn 4.0°S of Moon
27	14:10	FIRST QUARTER MOON
31	8:21	Pleiades 0.9°S of Moon

Income

Memberships..... 35.77

Calendar sales 141.13

Banquet..... 306.28

Membership

Members: 124

Reminder

Don't forget to renew your membership.

Dave Baranski,
Treasurer

Meeting Minutes

Warren Astronomical Society

Board Meeting

October 27, 2025

Bob Trembley called the meeting to order at 7:00pm

Officer Reports

President: Bob Trembley mentions attending the Windy County science fiction convention in Chicago from November 7 to 9, expressing hope for good weather.

Spoke of the Elections in Nov... and that Mark K. said he would officiate. Bob discusses issues with the Tent company and the need to find a new supplier for next year, preferably closer.

Bob Trembley recounts the disappointing experience at the Michigan Gem and Mineral Show, which was poorly planned and had long lines.

First VP: Dale Partin expresses the need for more short presentations and suggests rescheduling a pizza party. Dale confirms that Tom Hagan will give a presentation on radio astronomy at Cranbrook. He pointed out that we need to publish the proposed bylaw amendment in the newsletter and ensure members have the text prior to the membership vote.

Observatory Chair: Riyadh Matti reports on a successful open house at the observatory, with around 50 attendees and clear skies for observing. Riyadh spoke about the Perseids event at Stargate. It went awesome, except for the few clouds and a little rain. Riyadh described the various telescopes used, including the 8-inch refractor and 10-inch Dobsonian, and mentions observing the comet Lemon.

Riyad Matti mentioned a \$100 donation and a potential purchase of a 12-inch telescope for \$800 from Greg. Accept and arrange sale/transfer of the 12" scope to Greg for the offered \$800 (coordinate logistics).

Dale moves to authorize up to \$500 to go with the 100 donation to proceed with purchasing observatory items (right-angle finder, zoom eyepiece, or tools) using the \$100 donation plus up to \$500 club authorization (total up to \$500 from club). Riyadh seconds it. All in favor. Yes - unanimous.

Bob Trembley and Riyadh discussed the feasibility and purchase and the need for the telescope to be used regularly. Bob Trembley and Riyadh discuss the possibility of setting up a radio astronomy SIG, with Bob mentioning a presentation on radio astronomy in December. Research radio-astronomy equipment (costs/specs) and draft a short proposal for establishing a radio SIG and potential purchase of gear for Stargate.

Treasurer: Dave reports that we have \$20,289 in the checking account, PayPal, we got about \$54.32 in there. Our cash box has a little over \$381 in there.

Secretary Report Charlie Strackbein is designing board-service certificates (template and distribution plan) under Publications and present options. 2025 Beg Letters went out 10/21/25. Spent \$29.20 on stamps and have 17 forever (.73) stamps

Follow up with the architect contact (— continue correspondence, request a sketch/site plan and discuss potential pro-bono or reduced-fee support for grants and Contact the Grand Rapids amateur astronomy club (or their board) to ask about access to a grant writer or grant-writing resources. Visit Stargate during daytime to take photos and measurements to produce an as-built sketch for site and design planning.

Charles Strackbein discussed his health issues and potential resignation as secretary.

Outreach Report: Jeff MacLeod reports on hosting events at Metropark Nature Center. Picnics done. So it's ALL astronomy at the beach. We've assembled a decent list of volunteers, so he thinks this will probably be one of the best years we've had in a while, in terms of both presence and managing all the simultaneous activities that occur during Astronomy at the Beach.

Jeff requested astronomy promotional materials through Sky and Telescope. They should come to the PO Box.

Publications Report: Calendars are delivered, sold three already. Dale T will bring them to the Cranbrook meeting for purchase, Mark Kedzior assisting.

Send out an email blast to the membership about the Cranbrook event/overnight and club participation needs.

Provide or confirm the Paul Strong scholarship write-up/content to be posted on the website.

Publish the proposed bylaw amendment in the newsletter and ensure members have the text prior to the membership vote.

Old Business

By-Laws update read, motion by Dale, second by Riyadh: Approved: Section 7.05. Compensation of Employees. Section 7.05a Waving of Directors Membership Fees

Certificates for board member service (motion by Charlie). Approved by all.

Charlie to mock-up a few designs complementary to past club standards and present them to the October Board Meeting.

Website updates included Info on the Paul Strong Scholarship and a new Light Pollution Page

Stargate Observatory Progress update: Charles Strackbein is actively working on this, and several promising options are now in motion. He is in ongoing communication with multiple architectural professionals who may be able to support our project within the current \$20,000 budget, with the flexibility to expand their scope if grant funding becomes available. One architect may even be able to provide services independently of his firm, which could offer a more cost-effective path forward depending on how our grant funding is structured. In addition to this design work, Charlie is prioritizing the need for a new sidewalk around Stargate that will provide a much safer walking surface than the existing rocks, and this improvement should be completed as soon as possible.

His goal remains clear: to secure an architect who can meet the project's design needs, assist in pursuing appropriate grant opportunities, and help us move forward

responsibly with the sidewalk safety upgrades. This initiative represents a strong opportunity to collaborate with a professional committed to supporting nonprofit work, and he is continuing to explore all viable resources to ensure the project advances effectively and without delay.

New Business

Stargate: we're going to have another meeting. Charlie will be able to give a good update at that time.

Riyad expressed concern that we make certain we don't ask for too much from the Metro Parks.

We need officer candidates for next year.

Existing Officers and the elections are discussed. There will be at least three positions open. Bob recommends that we send an email to the membership a month early (in October), as the elections are approaching. Here are the positions that will be open, along with their corresponding responsibilities.

Dave says that if you send out that email, you should note that we made some changes this year: if you become a board member, membership is included.

Bob questions writing that into the bylaws. Who does that and how?

Jeff offers that changing the bylaws requires a simple majority of the membership.

We need to finalize the verbiage and send it out to the membership ahead of the voting.

A discussion of a SE Michigan Astronomy Night hosted by WAS was held.

7:41 PM Everyone called to adjourn,

Warren Astronomical Society Cranbrook Meeting November 3, 2025

Bob Trembley began the meeting at 7:00pm. There were 29 at Cranbrook, 10 on Zoom, and 5 on YouTube.

Bob introduced himself and led roll call.

Elections followed, officiated by Mark Kedzior:

Mark Kedzior read the following into the record: the Warren Astronomical Society, annual election of our board of directors for the year 2026. The bylaws of article four for the board of directors, section 402, The Board of Directors shall consist of seven officers. Directors shall be elected by a simple majority of members present at this meeting. Section 4.03, Director shall be elected at the first regularly scheduled membership meeting in November of each year. Directors elected at this meeting will assume office starting January 1, 2026, bylaws, Article Five, section 5.01, the qualification of officers. They must be at least 18 years of age, must have been a member in good standing for one year. Must maintain his or her membership in good standing during their term of office.

The chairperson has received names of candidates willing to serve for the Office of President, First Vice President, second vice president, secretary, outreach director and publications director, no nominations received for the office of treasurer.

Dale Partin nominated Diane Hall to run for the office of president. Diane Hall nominated Jonathan Kade for

the role of Vice President.

The positions of 2nd Vice President, Secretary, and Publication were retained by Riyad Matti, Charles Strackbein, and Vatsalya Dandibhotla, respectively. Treasurer remains open.

Congratulations to our 2026 Board.

Following the break, Dale Partin introduced the feature speaker, Rik Hill, and his presentation "Solar Cycle 25 - Where we've been, where we are, and where we hope to go."

The meeting concluded shortly after 9 pm.

Respectfully submitted by:
Charles Strackbein
WAS Secretary 2024, 2025

Warren Astronomical Society Macomb Meeting Nov 20, 2025

Bob Trembley began the meeting at 7:00pm. There were 23 at Macomb, 9 on Zoom, and 3 on YouTube. Bob introduced himself and led roll call.

Officer Reports

1st Vice President: Dale Partin mentioned the need for presentations for future meetings and detailed upcoming presentations at Cranbrook. He solicited presentations for club meetings after April.

2nd Vice President: Riyad Matti reported on the last open house, including presentations and telescope observations. He suggested we investigate the DIY radio telescope observed at the open house and report feasibility/costs for Stargate.

Treasurer: Dave Baranski reported the treasury is in good shape with \$20,000 in the checking account and no balance on the credit card and \$323 in the cash box. Members to pay banquet fees via PayPal as instructed. Send banquet payment instructions (PayPal).

Outreach: For the upcoming Selfridge airshow this summer, Tina Wong will coordinate volunteer sign-ups, group tour scheduling, and background check logistics with Selfridge Air Museum. Notify Tina if you are interested in attending the Selfridge tour/air museum events so she can finalize group numbers.

Future Presentations and Collaborations: Jonathan updated the group on a collaboration with the Media City Film Festival and Trina Self Projects, involving internationally recognized filmmaker Kevin Jerome Everson. Jonathan mentions the possibility of Stargate being used for filming a celestial event. Continue collaboration with Media City Film Festival.

Publications: The November Newsletter is published, and several website updates have been published. Working on integrating social media into our programs workflow.

Observing Reports

Dale H mentioned Comet C/2025 K1 Atlas, which appears to be disintegrating or separating into multiple chunks. Bob Trembley shared a space.com image of the comet breaking apart. Dave Noble shared a TikTok video of the comet, narrating the recording process. Bob Trembley and others discussed the comet's brightness compared to previous comets.

Bob Trembley introduces NASA Eyes, an interactive, 3D website with 302 planets, 60 dwarf planets, moons, comets, and 170 spacecraft. Bob Trembley mentions various NASA Eyes apps, including ones for asteroids, Earth science, and exoplanets. Dave Noble maps out the path of Comet C/2025 K1 Atlas and shares a still image with his followers. Dale H shares his experience searching for the aurora and finally seeing it in Dryden, Michigan. Bob Trembley recalls seeing a green flash while driving home after visiting family in Flint. Dave Noble shares a dash cam video of the aurora, narrating the recording process.

Main Presentation

Following the break, Vice President Dale Partin introduced Bob Trembley, who gave a presentation: Interplay of Science Fiction and Astronomy.

The meeting concluded shortly after 9 pm.

Respectfully submitted by:

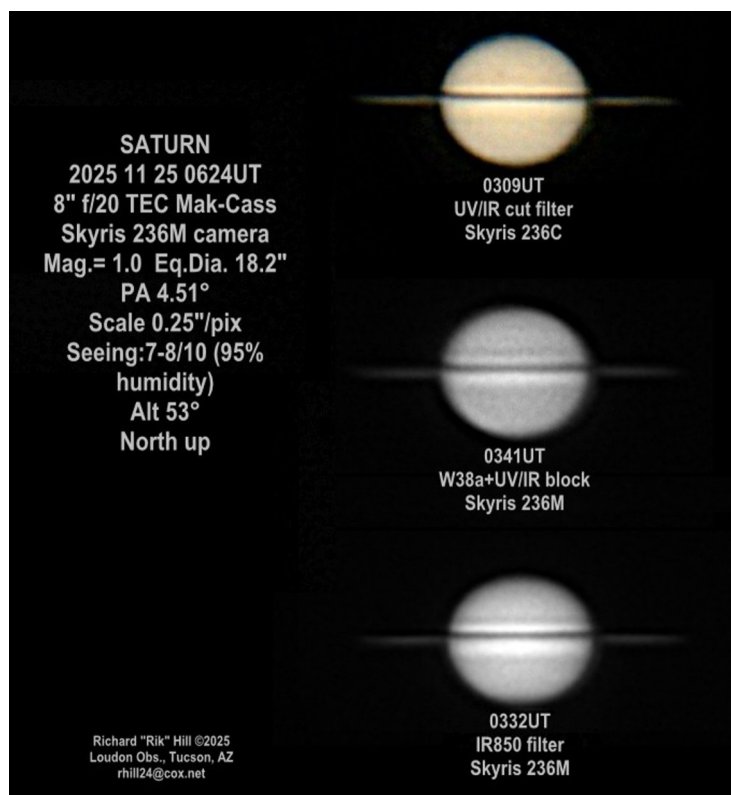
Charles Strackbein
WAS Secretary 2024, 2025



WAS Astrophotos

Saturn, in a different light

Here are some different versions (filters) of Saturn, taken by Rik Hill. Of the series, he says, "The humidity was 95% but I went ahead anyway trusting the nice deep dew cap on the 8" Mak-Cas."



SATURN
2025 11 25 0624UT
8" f/20 TEC Mak-Cass
Skyris 236M camera
Mag.= 1.0 Eq.Dia. 18.2"
PA 4.51°
Scale 0.25"/pix
Seeing: 7-8/10 (95% humidity)
Alt 53°
North up

0309UT
UV/IR cut filter
Skyris 236C

0341UT
W38a+UV/IR block
Skyris 236M

0332UT
IR850 filter
Skyris 236M

Richard "Rik" Hill ©2025
Loudon Obs., Tucson, AZ
rhill24@cox.net

The Warren Astronomical Society is a proud member of the

Great Lakes Association of Astronomy Clubs

GLAAC is an association of amateur astronomy clubs in Southeastern Michigan who have banded together to provide enjoyable, family-oriented activities that focus on astronomy and space sciences.

Club Name and Website	City	Meeting Times
Astronomy Club at Eastern Michigan	University Ypsilanti/EMU	Every Thursday at 7:30PM in 402 Sherzer
Capital Area Astronomy Club	MSU/Abrams Planetarium	First Wednesday of each month 7:30 PM
Farmington Community Stargazers	Farmington Hills	Members: Last Tuesday of the month Public observing: 2nd Tuesday of the month
Ford Amateur Astronomy Club	Dearborn	Fourth Thursday of every month (except November and December) at 7:00 PM
McMath-Hulbert Astronomy Society	Lake Angelus	Board and paid members-First Sunday of the month
Oakland Astronomy Club	Rochester	Second Sunday of every month (except May)
Seven Ponds Astronomy Club	Dryden	Monthly: generally the Saturday closest to new Moon
Sunset Astronomical Society	Bay City/Delta College Planetarium	Second Friday of every month
University Lowbrow Astronomers	Ann Arbor	Third Friday of every month
Warren Astronomical Society	Bloomfield Hills/Cranbrook & Warren/MCC	First Monday & third Thursday of every month 7:30 PM

Club and Society Newsletters

Warren Astronomical Society:	http://www.warrenastro.org/was/newsletter/
Oakland Astronomy Club:	http://oaklandastronomy.net/
McMath-Hulbert Astronomy Club	http://www.mcmathhulbert.org/solar/newsletter/
Ford Amateur Astronomy Club:	http://www.fordastronomyclub.com/starstuff/index.html
University Lowbrow Astronomers:	http://www.umich.edu/~lowbrows/reflections/

WAS Member Websites

Steven Aggas: <http://apache-sitgreaves.org/>
Jon Blum: [Astronomy at JonRosie](#)
Doug Bock:
Facebook: Northern Cross Observatory: <https://www.facebook.com/NorthernCrossObservatory>
Boon Hill and NCO Discussion <https://www.facebook.com/groups/369811479741758>
Flickr (astrophotography album): <https://www.flickr.com/photos/141833769@N05/>

YouTube channel: <https://www.youtube.com/channel/UC-gG8v41t39oc-bL0TgPS6w>
Bob Trembley:
<https://www.vaticanobservatory.org/profile/rtrembley>
Vatican Observatory Foundation Blog