

Capitol Skies

Solstice Issue, June 2026



The Newsletter of the
Madison Astronomical Society

Image of the Hogback Prairie in SW Wisconsin by Dick Wieboldt. See Dick's article on page 6.



President's Report to Members

By Kevin Santulis

Thank you MAS members for placing your trust in me as your new president. I hope to live up to the legacy of those that came before me, especially Laurence Mohr, who served as MAS President for eight years. I ask for your perseverance as I will undoubtedly stumble at times trying to deal with the many transitions we undertake. Our membership has grown to record levels and we are seeing great levels of engagement. I appreciate all the Board and committee members who have agreed to continue in their roles for at least another year; that will make my life easier. And I welcome our new Board members, Rick Wayne and Alex Samuel, who have already contributed to MAS in many ways.

We face many changes and challenges at this time. We inaugurated our new meeting place at Vel Phillips Memorial High School for our June meeting after the closing of Space Place, our home for the past 30 years. Our partnership agreement with Madison Metropolitan

"Thank you for placing your trust in me as your new president."

School District has been finalized and offers many opportunities for both members and students. Besides a meeting venue, we have access to the Planetarium under the direction of MAS members Ben Senson and Anne Wilcox Panzer. We look forward to better AV equipment and a venue

more suitable for guest speakers than Space Place. We envision many opportunities to work with students by inviting them to our lectures, joining them in star parties in multiple venues and providing a path for youth involvement in our core mission of exploring the universe.

Thanks to Rick Wayne and many volunteers on our Outreach Committee, we have greatly expanded our community engagement in creative ways in the last year. This includes Schumacher Farms and Anderson Dog Park star parties and even taking the antique Starliner Train in New Freedom with the public to a dark sky area for viewing. All of these events promise to be recurring each year and will fill our

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calendars in addition to our traditional events like Moon Over Monona, Devils Lake State Park and Donald Park. Rick has done a great job in accommodating many other individual requests for lectures and viewing.

Our Yanna Research Station (YRS) updates are in Phase III after our electrical upgrades and new observing pads. Our Observatory Director, Dave Leiphart, has been working hard on various upgrades, both physical and electronic. He will be providing reports to membership in meetings and other forums, so I won't steal his thunder here. We are hopeful that TDS will soon provide rural, fiber-optic internet service to YRS; that will greatly increase capabilities for our members.

We look forward to Phase II of our website rollout with a password secured member's section soon. We believe this will greatly increase our member communication without bombarding members with unwanted email traffic. This website section will allow us to communicate information to members only, such as Board agendas, minutes,

instructions for outreach events and other information that is not for general public consumption. Our treasurer, Jurgen Patau, and webmaster, Dave Leiphart, are also working on creating a method for electronic payment of dues and donations before next fall's renewal. To do this in a secure manner that retains the integrity of our member roles has its complications, but we are determined to get this to our members as soon as possible.

Many of our members have taken advantage of our decision to reinstate MAS in the Astronomical League. Recently the North Central Region of the Astronomical League recognized the excellent work of Jack Fitzmier, our Astronomical League Correspondent, for our MAS Newsletter available on our website.

We appreciate the level of commitment we are seeing from our membership and expect the quality of our offerings to our members, our new partners and the community to only increase in the coming year.

Regional Star Parties, Fall 2026

MAS is part of the North Central Region of the Astronomical League. Many of its clubs are holding holding star parties this fall:

- **Northern Nights Star Fest (Minnesota):** September 9–14, 2026
- **Northwoods Starfest (Wisconsin):** September 11–13, 2026
- **Eastern Iowa Star Party, IA:** September 11-13, 2026
- **Illinois Dark Skies Star Party, IL:** October 8-10, 2026
- **The 2026 Iowa Star Party, IA:** October 8-11, 2026

Interested in attending? For more information, see the Events page of the NCRAL website at <https://ncral.org/events/>

Capitol Skies is the quarterly newsletter of the Madison Astronomical Society. Members of the Editorial Committee include Jack Fitzmier (Editor), Bob Hamers, Alex Langoussis, John Rummel, Alex Samuel, Rob Strabala, and Rick Wayne. Interested in contributing? We'd love to have you participate! Contribute an essay, an equipment review, a book review, or another piece of astronomy-related material. And feel free to send comments, feedback, or other ideas along as well. Contact [Jack Fitzmier](#) for more information.

MAS Leadership

Board of Directors

President

Kevin Santulis
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Vice President

Rick Wayne
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Treasurer

Jurgen Patau
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Secretary

Dan Hyslop
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Observatory Director

David Leiphart
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At-Large Directors

Alex Samuel
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Martin Mika
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Non-Board Positions

Astronomical League Liaison

Jack Fitzmier
jfitzmier@gmail.com

Outreach Coordinator

Rick Wayne
fewayne@gmail.com

Webmaster

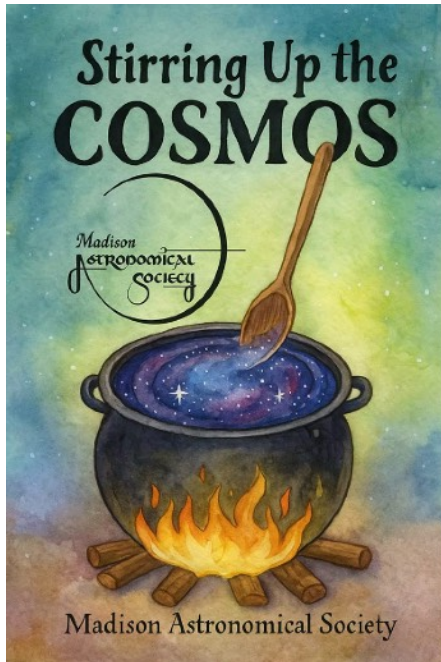
David Leiphart
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YRS Grounds Manager

Chris Zeltner
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Program Coordinator

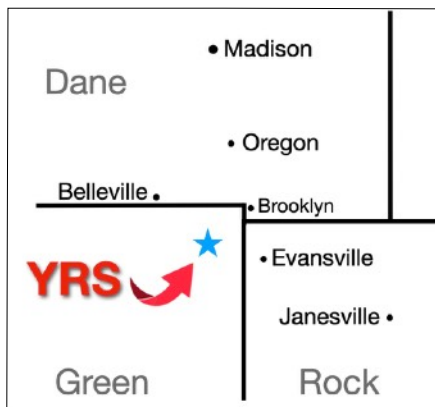
John Rummel
darksky2500@gmail.com



MAS is publishing a cookbook! There's still time to submit a recipe and have it appear in this inaugural volume. Contact Jamie Orlando: graffias79@gmail.com

What is YRS?

YRS stands for *Yanna Research Station*, which is our Society's dark sky site. It is in northeastern Green County, about a 30 minute drive south of Madison. It has a heated and air conditioned clubhouse, a pit-toilet, several observatories, and plenty of concrete pads with electrical service for setting up equipment. There is no water available on site. It is for MAS members and their guests, and it is where we hold our star parties and other events. If you'd like to visit, send a message to madisonastro.info@gmail.com.



MAS Member Spotlight: Jurgen Patau

Interview by Alex Samuel



Tell us about yourself.

I was born in Germany and immigrated to the United States when I was four years old. I grew up in Madison. I studied physics in school and then joined the service. Afterwards, I returned to Madison and worked at the University of Wisconsin running computer networks.

How did you become interested in astronomy?

I was a kid and my father bought a two-inch telescope, I think it was a Tasco. I saw the moons of Jupiter through it. Also, in the 1970s there was a Northern Lights display here in Madison. I woke up at 2 AM in the morning and looked out the kitchen window and there were curtains of light, just sheets of color. It was amazing and that got me back into looking at the sky.

How long have you been a member of MAS?

I have been a member since 2011.

What is your favorite astronomical object or phenomenon?

I can get pleasure out of just looking at the sky at a dark sky site.

What equipment do you currently use for observations?

I use a Tele Vue-85 on an alt/az mount the most. I also have an Astro-Physics 130 mm refractor and an Astro-Physics Traveler. I have an Astro-Physics Mach1 mount.

Have you had any memorable observing experiences or "wow" moments when stargazing?

The three places I remember seeing the best skies were: 1) I lived on a farm for one year in Wisconsin. No lights, and looking up, the skies were absolutely black. I could see the Andromeda Galaxy with my naked eyes. 2) When I was in the service outside of San Antonio, Texas, there is a plateau, and when you stood there, you were above the sky glow. The sky was just inky black. 3) I was in Arizona and I visited a place called Canyon de Chelly. I've always characterized it as a humanly comprehensible Grand Canyon. Those were the darkest skies I have ever seen.

Are there any specific projects or goals you have in the world of astronomy that you're currently working on or that you would like to achieve?

I want to get back into astrophotography.

Outside of astronomy, what are your interests?

I like to read about science, history, biographies of the right people, and science fiction. I also do photography. I take pictures of things that interest me including birds, flowers, and people.

Do you have any advice for new members of MAS?

Don't be shy in talking to people. Talk to people and seek advice. The social aspect of the club is not to be overlooked.

Astronomical League Outreach

By Craig Jewell



I am a member of MAS and of the Astronomical League. If you flip through the AL's *Reflector* magazine, you can see a list of AL members who have completed AL Observing Programs. I have discovered several programs in which I am interested and learned, to my surprise, that I already qualified for an award!

It turns out the the AL has an award program for Outreach. I've been a member of the MAS Outreach Committee for about a year, and have participated in numerous events in that time. If you have an interest in spreading the joy of astronomy to people who are curious and have never had the opportunity, then outreach is where it's at. Bigger events, like Moon over Monona, attract over a thousand people and can be a great evening of joy and excitement under the stars. But smaller events offer the opportunity to spend more time with individuals who have that spark of curiosity and the desire to take in the night sky. At a smaller event, you might have the same people return again and again to your scope, bringing someone new each time to share a moment of discovery. There's a priceless value in evenings spent this way.

Once you attend five of these evenings totaling 10 hours or longer, and describe them in a single document (a spreadsheet, actually), you qualify for the Astronomical League Outreach Award. To determine how easy it is to meet this goal, I've stepped through the process in preparation for this article. In early June, I went to [https://](https://www.astroleague.org/outreach-award/)

www.astroleague.org/outreach-award/ and downloaded the spreadsheet. I filled out the first five outreach events I participated in, following the provided instructions, and submitted it to Krista Lemoine, the outreach coordinator for this award. I heard back from her in about an hour, letting me know she received it. The whole process was easy, with very clear instructions. Krista sent me my award certificate and letter in about a week.

The Program has three levels: I achieved the Bronze level, by participating in 5 events totaling 10 or more hours. To earn Silver you need 50 additional hours of outreach, and to earn Gold, another 100 hours above Silver. Initially those numbers seemed large to me, but after totaling up the number of events I've done in the last 15 months or so, Silver isn't that far off.

If this is the first you've heard of the Outreach Committee, then I'd like to take a moment and encourage you to look into it further. You don't need to be an expert in your knowledge or setup. On the contrary, there's no better way to get comfortable with your gear than to set it up for a bunch of interested strangers. My gear failed me at my first event, and before anyone arrived, someone helped me get it working. Amateur astronomers tend to look out for each other. And it doesn't take long before you feel like an old pro.

If you have questions about this award or others, reach out to Jack Fitzmier, our Astronomical League liaison. If you're interested in the MAS Outreach Committee, contact Rick Wayne or have Jurgen Patau add you to the outreach mailing list.



Next MAS Meeting

Friday, July 10, 2026
7 pm, Memorial High School, Theater 300

Zoe Todd

UW Madison, Assistant Professor of
Chemistry and Astronomy

Life in the Universe



Looking further ahead

Aug 14	Nebula Noir: Hunting the Ghosts of Dead Stars	MAS Member Zachary Holcomb
Sept 11	Building a Collapsible Telescope	MAS Member Keith Swartz
Oct 9	The Music of the Spheres—Peering Inside Stars with Asteroseismology	Richard Townsend, UW Professor of Astronomy
Nov 13	Topic: TBA	Stephen Meyers, UW Professor of Geosciences

Jack Fitzmier 2026 NCRAL Newsletter Editor Award

Presented at the NCRAL 2026
Conference in Cedar Rapids, IA



Capitol Skies Wins NCRAL Newsletter Award

Congrats to Jack Fitzmier for his recent recognition as our newsletter editor. Thanks to Jack’s efforts, we can now say “award-winning MAS newsletter.”

Here’s a word from the man himself:

“It is a genuine honor to have been given this award, which came as a total surprise! I am flattered to think my efforts as the *Capitol Skies* editor got some recognition. But I think of *Capitol Skies* as a “team sport,” and the real credit for our newsletter’s excellence belongs to the MAS members who write for *Capitol Skies* and who help prepare it for distribution. Since its rebirth in the fall of 2024, more than twenty MAS members have written articles, reviews, and reports for the newsletter. I won’t mention them by name; I think they know I am grateful for their work. Two MAS members deserve special attention, however. Without John Rummel and Rob Strabala, there would be no *Capitol Skies*. Plain and simple. They wrangle content, ask great editorial questions, do the graphics legwork, and see that the newsletter gets out on time. Great colleagues and friends. They have my gratitude as well.”

— Jack Fitzmier



A Night on the Hogback

By Dick Wieboldt

About 10 years ago, I got back into photography as a hobby because I had become enamored with what the new cameras could capture of the night sky. After weeks of research, I choose equipment that had enough light sensitivity, low noise, fast wide-angle lenses, intervalometers, and all that other good stuff.

I needed practice, so using social media and light pollution maps, I found plenty of interesting places to shoot in our Driftless region and along the lower Wisconsin waterway. I discovered the Steuben area with its darks skies, and that is where I came across the Hogback



Dick's camera setup showing the morning fog.

Prairie State Natural Area. It's a steep sided ridge about 300 ft above the valley floor and its elevation makes it less susceptible to morning river fog.

My plan was to take a timelapse all night long, but overnight camping is prohibited. So I contacted the person in charge of the area and explained what I had planned. He was intrigued and granted me permission to spend the night. I needed to let him know when I'd be there and leave the permission letter on my dashboard.

I was all set; I just needed a clear, moonless night. My weather apps aligned nicely for the night of June 25th, 2017. So I took off to give it a try.

I got there in the afternoon and hiked around the Hogback exploring the

views. I use PhotoPills and its Night AR feature to see where the Milky way will be during the night. I wanted to include the valley floor and use the road as a leading line. There are no trees on top, and the rock formations do not really work with the angles. So, I decided to use the prairie vegetation as my foreground. This meant setting up my tripod as low to the ground as possible and shooting up thorough the grasses. I set up my tent, watched the sunset, and waited for dusk. A top notch way to enjoy the evening!

After dark, I could see exactly where the skyglow from Steuben would be and made my final adjustments. At full astronomical night, I started the timelapse going. The camera was stationary, with exposures taken every 20 seconds. As the night progressed, the stars and Milky Way rose and moved across the sky. I had a supplemental power bank wired into the camera so there was enough power to keep taking images all night. Instead of a dew heater, I taped hand warmers



Golden time at dawn. The bottom half of the composite.

around the lens to keep it from fogging up.

Once everything got going, I sat back, watched the sky, and listened to the night sounds. At one point the fog rolled in and completely enveloped the top of the Hogback. I could still see the Milky Way, but towards the end of the night I changed the camera exposure to ramp up the shutter speed to better capture the morning light. I kept going until dawn, which turned out to be lucky because I was able to get the "day" part of the image.

I hope you enjoy the photo as much as I enjoyed taking it!



The final composite. Also featured on the front page of this issue.

Communicating Within the Club

An update by Jurgen Patau, Treasurer



We have added two new special interest email discussion groups to our offerings. Both groups were started to relieve some pressure from the sometimes overused MAS Observers list. All of our email groups rely on Google Groups services. You do not need to be a Gmail user to participate.

The two new groups are:

MAS Outreach

This outreach discussion group was initiated by Rick Wayne when he took over supervising our participation in outreach activities. All chatter about outreach events, including event announcements and scheduling information, calls for volunteers, locations, event status (including bad weather alerts) and so on are typically covered. To be added to this list, contact Rick at fewayne@gmail.com or me at jrpatau@wisc.edu.

MAS AP

This is our astrophotography discussion group, initially set up by Bob Hamers. All discussions related to astrophotography are appropriate here. To be added to this list, contact Bob at rjhamers@gmail.com or me at jrpatau@wisc.edu.

Our other two lists are:

MAS Members

This group is used *exclusively* by the MAS Board to send information of interest to all members. This includes the *Capitol Skies* newsletter, monthly announcements and (rarely) other

brief emails. This is a low-bandwidth but important list. Members cannot respond to these emails.

MAS Observers

Our general discussion group available to all MAS members. All astronomy-related topics are appropriate for discussion here.

We try to make sure that all MAS members are on the MAS Members and MAS Observers list. If you are not receiving emails from either group, contact me to be added.

A final note about our email groups: If you use a Gmail email address, we can add you directly to these groups. If you do not use a Gmail address, you will be invited to join by responding to an invitation email we send you. We have seen these emailed invitations diverted to spam and trash folders, so check there if you don't receive the invitation. This is a Google rule.

MAS Social Media

Our social media presence also includes Facebook and YouTube; see our website at www.madisonastro.org for more information about them.

MAS General Inquiries

We also have a general contact email address: madisonastro.info@gmail.com.

Use it for any questions you may have that you feel aren't appropriate for any of our other lists. It's monitored by the Board and messages are routed appropriately.

Frequently Asked Questions

Where does MAS meet?

We meet at Memorial High School on Madison's west side. Located at 201 S. Gammon Road, the school is kitty-corner across the Gammon Rd/Mineral Point Road intersection from West Towne Mall. Complete parking instructions and directions can be found on our website [here](#).

Memorial High School is where the planetarium is, right? Is that where our meetings are held?

Sometimes, but not usually. Very few MAS meetings require the capabilities of the planetarium, and more importantly, the planetarium's seating capacity is limited. MAS meetings will usually be held in a Memorial classroom called "Theater 300." It's located just down the hall from the planetarium, has larger seating capacity and perfect physical space for our talks and social time before and after the main presentation.

When does MAS meet?

Our standing meeting date is the 2nd Friday of every month.

What happens at MAS meetings?

Most meetings start with either a 'newcomers orientation' or a quasi informal time to interact with board members at 6:45, a social time for meet and greet from 7-7:15, announcements and welcome visitors at 7:15, and the main presentation at 7:30.

What are the presentations like?

Our presentations are of two main types: talks by our own members about the stuff we do (observing, photography, gear, etc.) and presentations by astronomers and other professionals about their research.

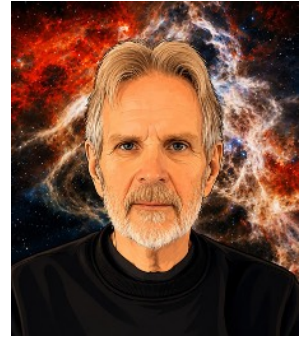
Do I need any special knowledge to be a member?

Not at all. Our members come from all walks of life and education levels. All you need is a curiosity about the universe and a desire to learn.

From Smart Telescope to Serious Astrophotography

A Natural Upgrade Path from SeeStar to ZWO ASI AIR

By Wil Cox



The rise of smart telescopes like the **ZWO SeeStar** has fundamentally changed how people enter astrophotography. With its all-in-one design, automated alignment, and app-based control, SeeStar has made capturing deep-sky objects accessible to almost anyone.



I purchased my own SeeStar S30 last year after repeated mount failures of my NexStar Evo 8 resulted in long turnaround times at the Celestron service center. I was immediately amazed at how quickly I could begin imaging with the SeeStar. The app guided me through equatorial mode setup and after choosing a target, it would self-align and begin stacking images in about the same time I would be still assembling my Celestron!

The SeeStar's appeal is straightforward: everything is integrated.

- Mount, optics, and camera in one unit
- Fully automated alignment and tracking
- App-based control with minimal learning curve
- Real-time stacking and image processing

This “push-button astrophotography” lowers the entry barrier dramatically. ZWO has designed this small compact system to make imaging easy and fun for beginners while still offering room for advanced users to experiment with raw data at a later time.

However, that simplicity comes with limits:

- Fixed optics and image sensor
- Limited upgrade flexibility
- Constraints on exposure depth and image resolution

Eventually, many users may want more control, better image quality, and the ability to customize their setup. The 30mm aperture of my SeeStar was no match for the 8-inch Celestron. You can't just download more aperture! So, I began searching for how I could incorporate the technology and automation of the SeeStar into a more conventional modular telescope and came across this YouTube video on the Space Koala channel:

[“Build Your Own Smart Scope! Easy as a SeeStar, Pro results!”](#)

The ASI AIR solution outlined in this video seemed to offer a familiar, but expandable path forward. ASI AIR acts as a compact wireless controller that connects and manages all your

astrophotography gear through a mobile app—much like the SeeStar experience, but modular. I was sold on the idea, and when Celestron refunded my purchase price of the Evo 8 due to backordered parts, I began to build my ASI AIR system.

My Journey Building a Modular Smart Telescope

I started with the basics by selecting (actually, fully replicating) the Space Koala's recommendations:

- A small 80mm refractor telescope (Askar V) \$1,000
- A wireless smart camera with integrated ASI AIR and guider (ASI585MC-Air) \$1,000
- A tracking mount (AM3) with tripod (TC40) \$1,800

Cost \$3,800

This system worked beautifully. Setup was a little more time consuming than the S30 due to generating calibration files and adjusting guiding. But I was imaging at YRS in no time and getting better images. And the ASI Air made quicker work producing the stack.

I was now eager to add more capabilities incrementally to my new imaging system. Over the next few weeks, I added the following:

- Autofocus motor (EAF Pro) \$300
- Pier Extension (PE160) \$100
- Camera angle Adjuster (CAA) \$350
- Filter drawer with duo-band filter \$250

The cumulative cost is \$4,800, or 12x cost of a \$400 SeeStar!

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What are the benefits of such an upgrade? Is it worth 12x the cost of a SeeStar? Let's assume something like my configuration:

- 60–80 mm APO refractor
- ZWO AM3 or similar equatorial mount
- ASI585MC Air wireless color camera with guide scope

For a comparison to the SeeStar S30, see Fig. 1 below at right.

There is certainly a point of diminishing returns moving away from a SeeStar to a more “state-of-the-art” astrophotography rig. The user will need to justify this expenditure by their own metrics and sensibilities. The price, performance, portability and convenience of the SeeStar may be the end-game scope for some. I must note that the system I have built seems like a starting point for some of the more seasoned astrophotographers at MAS, so each person must chart their own journey. For this novice astrophotographer, I’m definitely enjoying the journey!



Wil's 80mm + ASI585MC Air rig with the SeeStar in the background.

Editor's Note

By Jack Fitzmier



Members assembled at the June meeting; our first ever meeting at Vel Phillips' Memorial High School, in Theater 300. At least 60 attended our kick-off meeting there!

Things are hopping at MAS! Just in time for the Summer Solstice we have lots of “new.” Kevin Santulis, our newly elected President, will lead a Board of Directors with two new members, Alex Samuel and Rick Wayne. Thanks to our Board, to Ben Senson, and to Anne Wilcox Panzer, we have a new home for our monthly meetings at Memorial High School in Madison. For the first time ever, MAS members are earning awards in Astronomical League Observing Programs (congrats to Craig and Danny). Our re-energized outreach programs are blossoming. Things are looking up at YRS. We are preparing to publish our first astro cookbook. And our AL region recognized *Capitol Skies* at its annual meeting this spring. Great stuff!

Your CS crew tries to include material in each issue that appeals to every

level of amateur astronomy. This quarter we have “club stuff” from Kevin, Rick, Alex Samuel, and Jurgen Patau, “AP stuff” from John Rummel, Alex Langoussis, and Dick Wieboldt, “Figuring out where we sit in the Milky Way from my backyard” stuff from Bob Hamers, and “Podcast News” from Craig Jewell. The entire gamut.

At the June meeting Kevin asked me to describe another “new” – a group AP project for smart scopes called the “Madison Deep Field Project.” We are aiming to collect as much data as possible on a deep field object, NGC 6166. With hours of data, we will stack and process the images and hope to see lots of ordinarily invisible stuff. More than a dozen members have already signed on, and we are happy for others to join the effort. More details [here](#). Questions? Reach out to me at jfitzmier@gmail.com

Metric	Seestar S30	80mm + ASI585MC Air	Improvement
Aperture	30 mm	80 mm	7.1× more light
Resolution	2.1 MP	8.3 MP	4× more pixels
Sensor area	IMX662	IMX585	~4×
Guided tracking	No	Yes, <1 arc-second	Major
Long exposures	Limited	Longer exposures become routine	5–10× longer
Storage	64 GB	256 GB	4×
Upgradeability	Fixed	Modular	Unlimited

Fig. 1: Wil's system compared to the SeeStar S30.

Outreach Update

By Rick Wayne



Things seem to have slowed down a bit for your outreach crew, we only had a handful of events in the spring. However, a great new trend is rising: repeat customers! We are developing a cadre of organizations that like us well enough to want us back several times a year, in fact.

One of those is Horizon School in Sun Prairie, whose third-grade teachers get us a big, reliably enthusiastic crowd. We had seven MAS members running scopes, and there were lines at each. We also got a really touching envelope full of thank-yous from the kids the next day.

Schumacher Farm Park in Waunakee is also becoming a fast friend. Oddly, despite the beautiful May weather, attendance was much lighter than at our famously frigid January star party. Go figure. That just meant the crowd/astronomer ratio was low enough that everyone got a custom telescope session.

Sadly our Devil's Lake event on Memorial Day weekend was weathered out with a vengeance.

But there is more in store: we are making plans for a July 18 star party hosted by a big family gathering, the annual observing party in Donald Park is August 15, and another repeat gig with Madison City Parks, date TBA but around the same time to try and bag some Perseids observations.

As always, if this sounds like fun you'd like to be having, just contact me at fewayne@gmail.com.

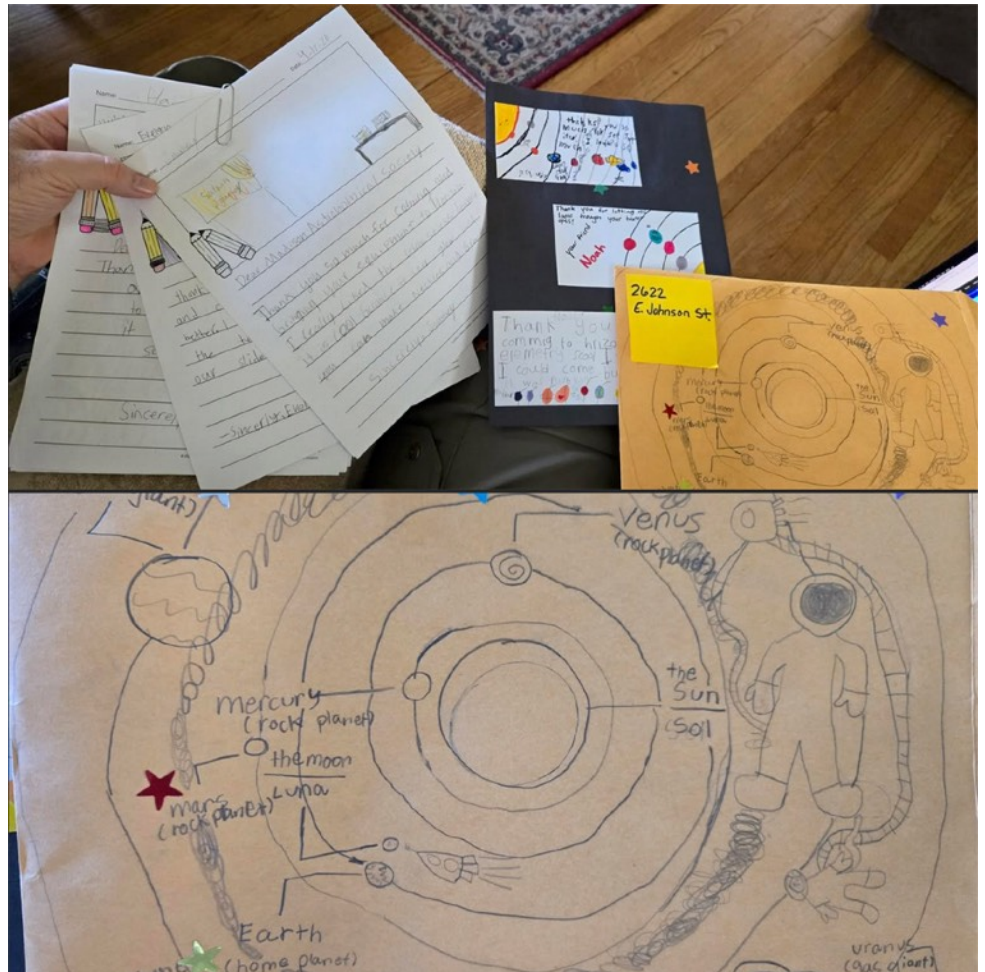
MAS Star Party Dates



Star parties are held at the Yanna Research Station, MAS's dark sky site about 20 miles south of Madison.

MAS will always make a "go/no go" call by 5 PM on the day of the event by posting to the MAS Observer's email list.

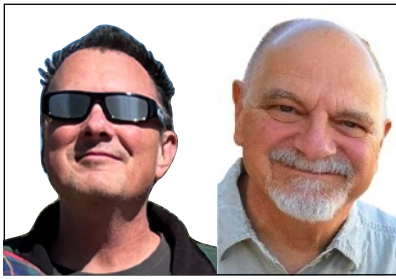
<u>Dates</u>	<u>Notes</u>
July 11	Dusk - at YRS
Aug 8	(Moved due to Donald Park Public Event on the 15th)
Sept 12	(In conjunction with the annual MAS picnic)
Oct 10	Dusk - at YRS
Nov 7	Dusk - at YRS



Above: A sample from the Horizon kids' thank-you package.

Left: As we packed up at Schumacher, a Chinese satellite gave a spectacular display in the northern skies by venting propellant. Rick Wayne caught a couple snaps with his cell phone.





Dodging Javelinas, Processing Pixels: An Astrophotography Collaboration

By John Rummel and Alex Langoussis

John: During a trip to dark sky Wyoming last October, I had several nights of imaging time on Comet Lemmon using my DSLR camera and a simple equatorial drive. I spent some time processing my shots in Photoshop, but it became evident that this subject could greatly benefit from more advanced astro image processing techniques, including stacking. I considered my options: Pixinsight was widely regarded as the gold standard, but demanded an initial investment of hundreds of dollars and presented a steep learning curve. Siril, on the other hand, is free and, while still a complex program to master, offers a more streamlined and unified approach.

John: I've had lots of experience choosing the cheapest option first, regretting it later, and spending even more money (and time) as a result. So I decided to jump right in with Pixinsight. I also immediately purchased the highly regarded Russell Croman plugins: Blur-, Star-, and NoiseXterminator (all widely considered essential). For a few weeks, I pattered around with some images taken by others with their Dwarfs or SeeStars, and even dipped my toe into the world of HST and JWST imagery. But the learning curve is STEEP. Since I didn't have my own astrophotography rig, what I really needed was a partner who was a dedicated imager who could supply me with a steady stream of data. That's where Alex came in.

Alex: I've always been more of a visual observer. Over the years, I'd noticed how imagers spent half their time lugging gear, setting up, and polar aligning, which didn't seem like my idea of fun. But I live in Tucson, AZ, for half the year, and one night last year, a neighbor showed me his SeeStar. The next day, I visited Starizona and bought the S50.

John: So I was in Madison itching for images to process, and Alex was in Arizona dying to get his money's worth out of that SeeStar.

Alex: My money's worth not just from the SeeStars (I also got an S30 Pro this year), but from my investment in my Arizona home, chosen solely for its astronomy possibilities. With an average five clear nights a week, I used to waste a lot of good nights. Instead of doing visual observing two or three nights a week and blowing off the other clear nights, I was now utilizing almost every clear night. There were nights when both SeeStars were running while I was observing with a visual scope or trying my hand at planetary imaging.

John: While Wisconsin was hunkered down under clouds and frigid temps.

Alex: Of course, there was still a bit of effort involved. Even though I could get down to 10 degrees elevation at the house, I often had to drive to the neighborhood garden to catch southern targets down to five degrees, sitting in the car for hours while the SeeStar did its thing skimming the chollas. At home, I couldn't just go to bed while the exposures ran. I had to be alert for the occasional squadron of javelinas (a bristly pig-like desert mammal) passing through, and shoo them off before they knocked over the tripod. (Their vision is very poor!). Several targets couldn't be shot until the predawn hours. Still, it was all worth it. I really enjoyed taking the images. And as an added bonus, I was seeing things in the images that had escaped me in over 40 years of visual observing.

Alex: But image acquisition is still only half the battle; I want to learn the processing side too. I found image processing to have an equally steep learning curve for me. I did not enjoy

From Top:

IC 342, 6.23 hours, S50

Elephant Trunk (IC 1396A), 3.45 hours, S50

NGC 891, 2.6 hours, S50



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wading through poor documentation, or rewinding YouTube videos a hundred times.

John: Since I also wanted to learn processing, specifically PixInsight, it made perfect sense for us to team up. Alex would capitalize on those clear Arizona nights to capture lots of imagery and I would focus on the processing piece.

Alex: Our collaboration was simple: I would feed John raw images from Arizona so he could master PixInsight, and upon my return to Madison, he would teach me the software side by

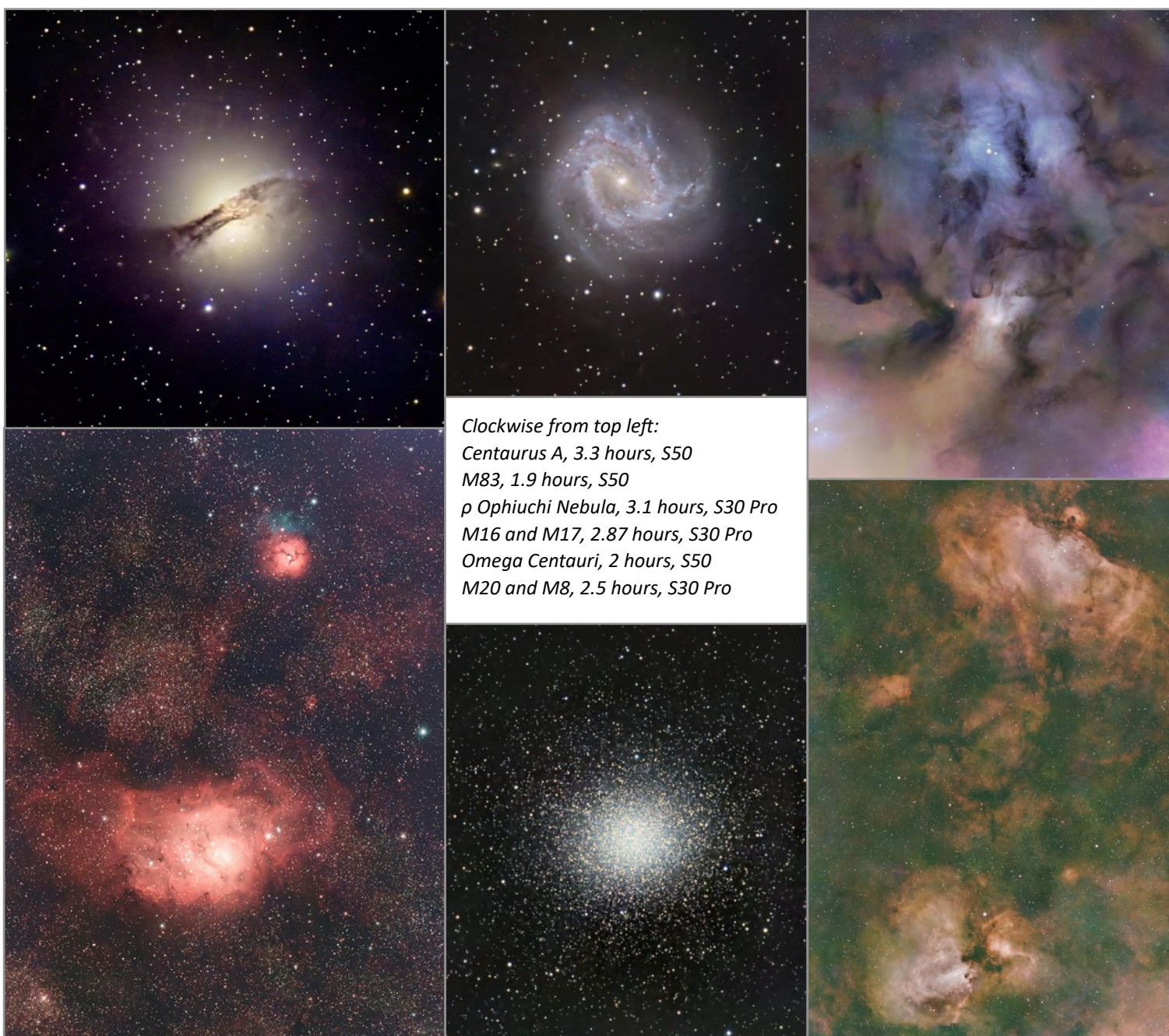
side. For someone like me who struggles with online tutorials, having someone show me the ropes in person is ideal. It was a true win-win.

John: And we weren't just after pretty pictures. Alex and I are both interested in exotic and extreme objects too. We shot some comets, a handful of quasars, several supernovae, a few asteroids, and Pluto (the latter two with repeat exposures to illustrate solar system motions).

Alex: As time went on, John got very good at processing, and I took longer and longer exposures to get the best

data possible for him. This often meant having to email multi gigabyte files, and occasionally getting cut off by Gmail! But I think we are very pleased with the results, and I look forward to learning the software myself. Astronomy is always more enjoyable shared, and we both learned an incredible amount over the winter.

John: We've included here a selection of our favorite objects from this past winter. For me, this collaboration was particularly enjoyable because it's fun to work with someone who shares my interest in challenging astronomical objects and esoteric science trivia.



*Clockwise from top left:
Centaurus A, 3.3 hours, S50
M83, 1.9 hours, S50
 ρ Ophiuchi Nebula, 3.1 hours, S30 Pro
M16 and M17, 2.87 hours, S30 Pro
Omega Centauri, 2 hours, S50
M20 and M8, 2.5 hours, S30 Pro*



Finding Our Place in the Galaxy Using Amateur Radio Astronomy

By Bob Hamers

Ever wonder how we know that we live in a spiral galaxy? Stuck inside, we can't simply look and see spiral arms, so we have to resort to other approaches. Recently I've been doing some radio astronomy measurements to understand what is known (and not known) about the structure of our home galaxy, using my home-built radio horn and radio electronics to capture the radio emission from neutral hydrogen atoms, which occurs at 1.42 GHz, or ~ 21 cm wavelength. I began by pointing my radio telescope at different elevations along the North-South meridian and recording spectra every 4 minutes for 24 hours continually. Each 24-hour "drift scan" captures the H radio emission from a ~ 10 -degree width swath of the sky. Doing this at 10 different elevations between +30 degrees South (about as close to the horizon as I can get) and 60 degrees North over a period of 2 weeks gave about 4,000 spectra, with enough coverage to make a "sky map". I coded my own analysis programs using Python together with other open-source software packages. To make a map, I integrated the area under each

H emission spectrum to get the total emission intensity. From the altitude, azimuth, and observation time, python calculates the right ascension (RA) and declination (dec) for the common earth-centered coordinate system. Plotting the total H emission intensity vs. RA and dec gives a map like that in Fig.1. For any given declination, the plane of the Milky Way drifts through twice per day, giving rise to the two strips of high emission intensity (red=high intensity, blue=low).

To understand how radio astronomy data reveals the structure of our galaxy, it's useful to adopt a different coordinate system – the galactic coordinate system. Galactic coordinates are centered at the Sun, with the center of the Milky Way at 0° longitude. The plane of the galaxy corresponds to a galactic latitude of zero. From our position on earth, looking

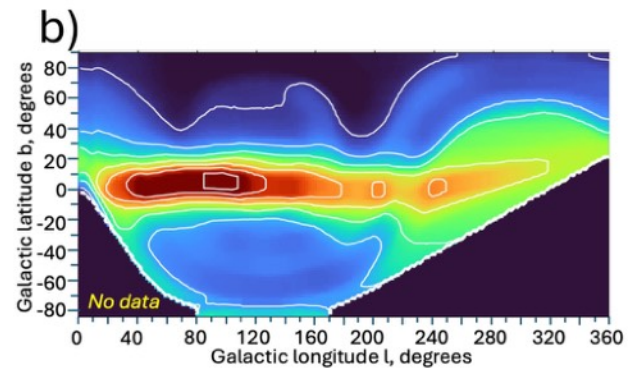
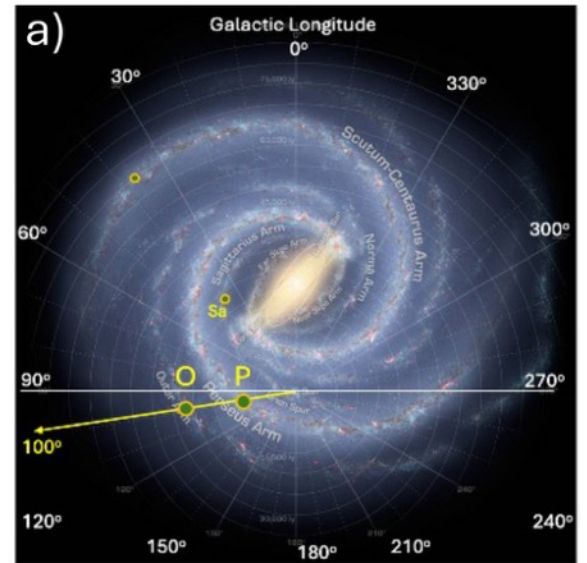


Fig.2: The galactic coordinate system. The top graph shows an artist's depiction of the milky way in the galactic coordinate system, with some of its arms labeled. Fig. 2b shows my radio data plot in the galactic coordinate system, showing high emission along the galactic plane (latitude = 0).

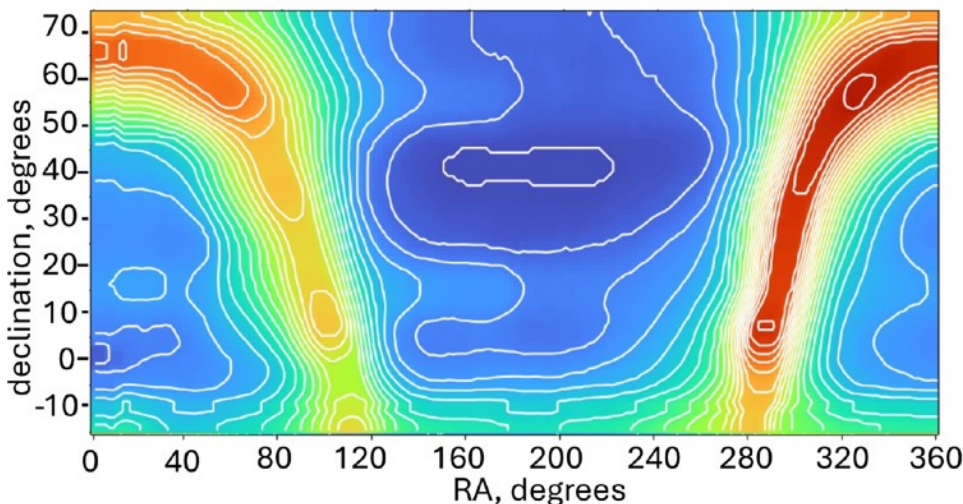


Fig. 1: A 2D map of Hydrogen emission. Red=high intensity, blue=low.

latitude means looking toward the center of the galaxy. Figure 2a shows an artist's rendition (not accurate in detail) of the Milky Way labeled using the galactic coordinate system, while Fig. 2b shows my H radio emission (the same data as in Fig.1) in this new coordinate system. From Madison there are parts of the sky we just don't see, and so there are some areas where there's simply not data. In this galactic representation it's clear that the radio emission at different RA and dec values in Fig. 1 is actually confined

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to a narrow, flat region at 0° latitude – the galactic plane.

To learn about the shape of the Milky way, we need to look in detail at the radio spectra, showing the H emission at different frequencies near 1.42 GHz. Fortunately we don't have to go through all 4,000 spectra, but we can pick out some representative spectra measured along the galactic plane, at different longitudes. These are shown in Fig. 3, one spectrum every ~ 10 degrees in galactic longitude. There are two horizontal axes, corresponding to the observed frequency and, using the Doppler equation, the line-of-sight velocity toward or away from us, based on the shift in frequency away from that of stationary hydrogen (1.420406 GHz). Each peak in these spectra corresponds to some distribution of H atoms moving with a particular speed along the line-of-sight from us to them, due to the rotation of the galaxy. All the spectra show a peak near 0 velocity, due to local ("L") hydrogen atoms that are near us and moving at approximately our own velocity. At 180° the spectra all collapse into a single peak near 0 velocity because looking at 180° longitude (see Fig. 2a) the motion due to circular rotation of the galaxy is *perpendicular* to our line-of-sight, so the Doppler shifts vanish. At other longitudes, the data show peaks that shift in frequency (and Doppler shift) as the longitude changes. By piecing together peaks and how they shift with longitude in a more detailed analysis, one can piece together a picture of the Milky way. But there's a few tricky parts: The Milky Way is rotating (clockwise as depicted in Fig. 2), and we are moving along with it. The Doppler shift arises from the differences in *speed* along the line of sight between us and the object we're observing, and so the Doppler shift we measure depends both on how fast the H atoms are moving and in what direction within

the galactic plane relative to our line of sight (think trigonometry). As one example: the spectrum at 100 longitude degrees in Fig. 3 shows a peak near 0 Doppler shift (H atoms

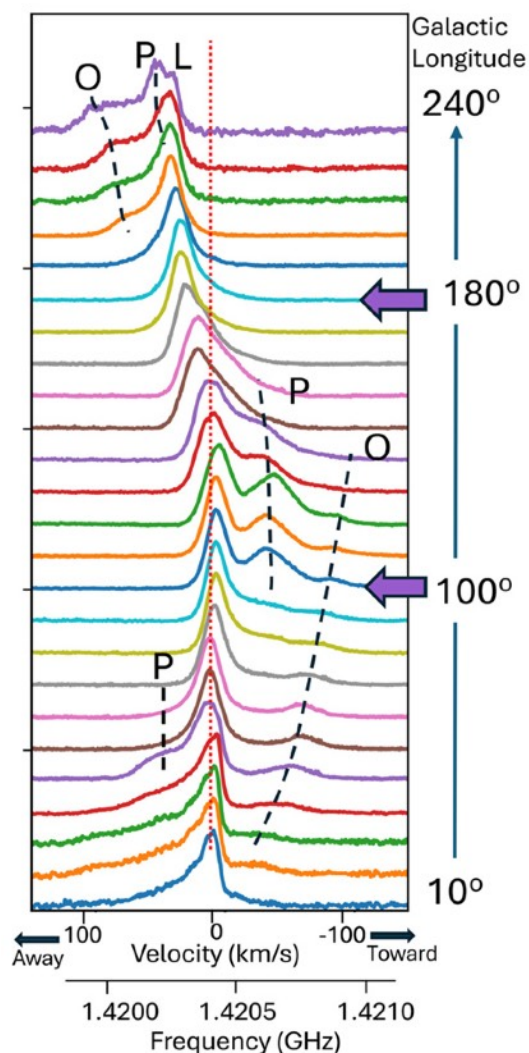


Fig 3. Radio emission spectra measured in the galactic plane (latitude=0) at different galactic longitudes. P=Perseus, O=Outer, and L = Local.

moving at the same speed as us), another peak near -50 km/sec (moving toward us) and another peak at -90 km/sec (also moving toward us). Comparing graphs at different longitudes shows that these peaks shift in frequency. We are probing different parts of an arm and how the speed of the H atoms varies along it! Looking back at the galactic map in Fig. 2a and the yellow line I drew, you can see how at 100° galactic longitude our line-of-sight cuts through two major

arms of the Milky Way: the Perseus Arm ("P") and the Outer Arm ("O"). But which one is which? The Perseus Arm has a galactic radius (distance from the galaxy's center) closer to our own, and so its velocity is more similar to our own, leading to a smaller Doppler shift. Using similar arguments and some help from a recent publication, I've labeled some of the peaks and their likely origins to the specific arms shown in Fig. 3.

The backward-mapping from the observed radio intensities and frequencies to a physical map is complex and is still evolving: the spiral arms are lumpy with matter distributed unevenly along the arms, the galaxy isn't perfectly circular, and the galaxy's rotational rate varies with distance from the center. Despite these challenges, radio measurements have been crucial in revealing the overall structure of our home galaxy. More recently, measurements of the rotational speed of the Milky Way and other galaxies by Vera Rubin and others have provided crucial evidence for the existence of "dark matter."

While detailed mapping the galaxy is complicated and requires professional equipment, amateur astronomers using inexpensive back-yard measurements can directly observe the "arms" and approximate structure of our home galaxy.

To assist in interpreting my own data, I found this reference very helpful. Reid, M.J. et al, The Astrophysical Journal, vol. 885, p.131. (Nov. 10, 2019). The paper is open-source at <https://iopscience.iop.org/article/10.3847/1538-4357/ab4a11>. The Milky Way map in Fig. 2 is modified from a Wikipedia article on Galactic Coordinates.

[https://en.wikipedia.org/wiki/Galactic_coordinate_system#/media/File:Artist's_impression_of_the_Milky_Way_\(updated_-_annotated\).jpg](https://en.wikipedia.org/wiki/Galactic_coordinate_system#/media/File:Artist's_impression_of_the_Milky_Way_(updated_-_annotated).jpg)

My Astronomical League Observing Program Journey

By Danny Glover



My foray into Astronomical League observing programs was a happy accident. After spending a year hunting down all 110 Messier objects with my binoculars and the club's 8" Dob, I met fellow MAS member Jack Fitzmier, who pointed out that the AL had a Binocular Messier program, and that I'd essentially already completed it!

I initially hesitated, as I didn't see how logging observations would benefit me and did not expect that aspect to be enjoyable. After all, I took up this hobby as a casual observer looking to enjoy the beauty of the night sky and the wonder of space. But when I looked at the requirements, it turned out I just needed to transfer my own notes into an official log format with object name, observing date and location, sky conditions (my own subjective account of seeing and transparency), what equipment I used, and a brief description of what I saw. That first submission was surprisingly painless, and within a few days the coordinator

had reviewed my logs and confirmed my first award. The logging and coordinator review added to the sense of accomplishment that I already felt for locating all of the objects on my own.

Since completing my first program about 6 months ago, I've completed the Binocular Double Star program, Advanced Binocular Double Star program, Asterism naked eye and binocular certificates, and Lunar naked eye and binocular certificates. I'm actively working on the Deep Sky Binocular program and the Solar

Neighborhood program, and I'm well on my way to earning the Binocular Master Observer Award! I have developed my own custom log format that I built to suit my style, with black background, red text, my preferred seeing and transparency scales pre-printed so I just circle values in the field. I'm happy to share my log templates, experiences with observing programs, or help you get started with your first observing program! If the skies are clear, you'll likely find me out at Yanna Research Station.

I have found that AL observing programs have allowed me to better appreciate what I am looking at in the sky. For example, the Lunar observing program introduces you to using the terminator as an observation tool, as it highlights specific craters throughout the month, some of which cannot otherwise be seen. That program has even allowed me to forgive the Moon for its monthly interruption of our dark skies... ok, maybe not entirely.



Want MAS branded merch? Visit our store at Madison Top Company. Men's and women's apparel, a mug and a ball cap currently available. Each purchase puts a tiny donation back in MAS's general fund to help us in our nonprofit mission to educate the public about astronomy.

<https://madison-top-company.printavo.com/merch/madison-astronomical-society/> or just click [here](#).

MAS Merch!





Astronomy Club Milestones Need to be Celebrated

By Craig Jewell

On a recent episode of the Planetary Society's Planetary Radio podcast, I heard the story of Jeff Schroeder who, at 19, built the world's largest portable refractor telescope from scratch, along with all the optics and custom mount. Grinding an eleven inch lens is impressive enough, but what really caught my attention is how he managed to make this immense scope portable. He built a rooftop mount and the scope currently is attached to his Volvo, giving him the freedom of the road to take his scope anywhere and set up in minutes. This unique scope has to be seen to be believed. Stop reading and click this link: <https://www.planetary.org/space-images/jeff-schroeder-and-his-telescope>.

Just as fascinating is the story of how the scope led him to a career at JPL and eventually the Griffith Observatory. His story, and many others are covered in the episode celebrating the Los Angeles Astronomical Society's 100th anniversary. For clubs started in the early part of the 20th century to

continue all these years is quite a feat, and one that we at MAS know well, having celebrated our 90th anniversary last year.

Although the podcast focused on the LAAS, it highlighted many of the amazing reasons for finding a local astronomical society. Its story is both unique and familiar, reminding me of how valuable and special the history of amateur astronomy is. From an era where club members often built some or all of their gear themselves, to smart scopes and computer aided target searching, astronomy keeps changing and clubs continue to incorporate these changes. The kind of people attracted to amateur astronomy are as varied as their interests, but they all share a passion and curiosity that helps the hobby grow and evolve. That, along with a desire to share knowledge and a commitment to mentoring help attract new club members.

The Planetary Society covers many topics on Planetary Radio, and they have a special interest in NASA and our own solar system. But they have not lost their focus on local

astronomical societies, and they promote the value of taking advantage of what local clubs have to offer.

The last guest on the podcast offered good reasons for attending meetings and star parties before buying your gear. Talk to people about what they like and don't like about their setups and how much they cost before spending the first dollar. He also recommended beginning with an inexpensive pair of binoculars to explore the sky. This is a mantra near to my heart, as I've given that advice to countless people at MAS outreach. The LASS president, Keith Armstrong, also made a point to discuss the social value of such organizations and how many people he's come to know over the years. He summed it up well with this quote, "At its core, LAAS is a social group with a penchant for the extraterrestrial." So is MAS!

Listen to the podcast here, including Jeff's story, which starts around the 39 minute mark: <https://www.planetary.org/planetary-radio/2026-laas-centennial>.

MAS Membership Stats

By Jurgen Patau, treasurer

At the end of May, we had 153 family memberships. That's 150 General, 2 Life, one Patron and no Student memberships. Last year we ended up 155 (a record), so with 3 months left in the 2025/26 membership year, we will likely continue our slow growth.

Astronomical League memberships are growing slowly. Currently we have 78 AL members (51% of MAS memberships). Since we rejoined the AL, we've had roughly half of MAS memberships also join the AL – which also is a **family** membership.

A word about terminology: We do not track how many people are in a family, so the number of General MEMBERS is always LARGER than the number of General memberSHIPS. To keep from getting bogged down in this fine distinction, in conversation, we usually use the word "member" as a synonym for "membership."

ITS ALMOST TIME FOR

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AUGUST 12-15th* 2026

*afterparty is August 16th

EXTENDED REGISTRATION DEADLINES:

July 14th: Marriott reduced rate rooms

July 24th - 31st: Various event registration deadlines

See ticketing site for details

July 31st: ALCON General Registration



KEYNOTE BANQUET SPEAKER

Dr Rebecca Williams

Planetary Geologist /
Deputy Principal Investigator
Mars Curiosity Mastcam and
MARDI cameras / Senior scientist -
Planetary Science Institute



FEATURED SPEAKERS

Pranvera Hyseni
PhD candidate UC - Santa Cruz
Founder Astronomy Outreach
Kosovo



Dr Shane Larson
Research professor of physics
at Clarkson University

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- The Annual StarBQ at The Cincinnati Museum Center
- The Sunday Afterparty at The Moeller Observatory

Learn More and Register at
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See the schedule [here](#).