Annual Report 2023

The Board of Directors and members of the Astronomy Section of the Rochester Academy of Science gratefully acknowledge the continuing support of the Marian and Max Farash Foundation which enables us to achieve our goals,
"the education of members and the general public in the knowledge and enjoyment of the wonders of the universe, and to furthering the understanding of astronomy in the Greater Rochester area".

CONTENTS

2	Who and What We Are	7	Radio Telescope
3	2023 Farash Center Improvement	8	Science
		9	Astrophotography
4-5	Outreach and Education	10	Communications
6	Member Activities	11	Achievements and Plans

Who and what we are

Our Observatory

The Marian and Max Farash Center for Observational Astronomy

Ionia, NY

The Farash Center, comprising 17 groomed acres, 12 observatory, meeting and storage buildings, provides the central meeting place for our members and guests.

Image courtesy of ASRAS member Nick Lamendola

Our Membership

Our membership has grown by 10% since our last report. Ranging from professional astronomers and researchers to beginning stargazers, our 248 individual and family memberships represent about 300 individuals who span all ages and have a wide array of interests and abilities.

Farash Center Improvements

2023 included many repairs and renovations at the Farash Center. The most significant of these projects was the Louis Wolk Education Center basement restroom restoration and rebuild, after it suffered water damage. To ensure this was done right and in a timely manner before the winter, after getting several quotes, it was contracted out to a company called A Cleaner Image. Having it functional for the winter is critical for ASRAS operations, as members and guests observing need access to a restroom.

To save on energy costs, the basement restroom is the one area of the site that is kept heated throughout the winter. The upstairs restroom and kitchen are winterized each year, and heaters in the 'Education room' and 'Warm room' are only used when the site is occupied.

Speaking of the 'Warm room', also completed in 2023 was a major repair to the Farash Observatory 'warm room' metal roof that included removal and installation of Polar White Imperial Rib roofing material on new underlayment, deck replacement (where necessary), and a full check and reseal of the dome.

In another improvement project during the year, in April, we ordered 20 tons of crusher run (gravel) delivered by slinger truck. This was a larger size stone than ever used before, to resist washing out. A work party was held to rake the gravel and move it where it was needed.

In late 2023, Bob McGovern and Roger McDonough replaced the worst boards on the rear deck of the Wolk Education Center. More may need to be replaced in 2024.

Finally, the BrewHouse had its roof rail repaired in 2023, and some regrowth was removed from around it.

Shown above are images of the Wolk Education Center basement restroom, part-way through the rebuild. At left is the restroom after completion. Images by Ryan Ricketts.

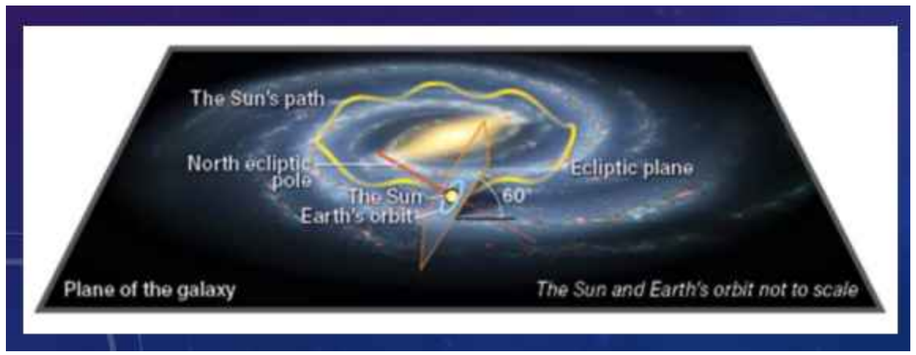
This rail on the Brew House was repaired in 2023

Outreach and Education

Scouts

We held 12 scout events at the observatory this year with boys and girls as young as 8 to as old as 18. All of them got tours of our observatories, and weather permitting, got to see the stars and planets. Several camped out at our observatory, some coming into our main building as storms threatened their tents. We had one troop that encountered their very first hail storm at our site this spring. Our talks are tailored to the age of the scouts, a "solar safari" for the younger ones, and talks about events in astronomy and space for the older ones. Older scouts did some maintenance on the site for us by painting and maintaining our trails.

Solar observing opportunities offered the scouts another perspective in astronomical viewing, expanding knowledge and understanding of our home star and providing extremely important safety information on how to protect your eyes while viewing the Sun. Scout groups continue to come back season after season to continue their scouting badge work including community service, survival skills, astronomy related activities, and leadership roles.



The Astronomy Forum

The ASRAS Forum, or “Astronomy 101”, is a monthly educational opportunity for any members and especially those newer to astronomy. We explored a broad range of topics in 2023. These evening sessions are held by zoom for ease of attendance regardless of weather or early nightfall. Attendance ranged from 9 to 18 members per session.

January – ASRAS member Don Chamberlin led the session “Navigating the sky for observation, including using Sky maps, phone apps, FOV applications, Star Hopping, scope finders and red lights

February – ASRAS member Carol Latta presented “How It Moves…about the rotation, orbital and proper motion of heavenly bodies (Sun, Moon, planets, asteroids, comets, stars, galaxies), including differential rotation and resonance orbits.

March – Members Dave Bishop and Nick Lamendola presented “types of telescopes; optics, including focal ratios and eyepiece choices; and a review of the Farash Center telescopes and what each is best used for, as well as theimportance of f/ratios in camera lens for meteor photography”

April – Carol Latta presented “Star Magnitudes” and members discussed “what kind of astronomer are you?”

May – President Tony Golumbeck presented “Some packaged options intended for newer astronomers, a brief primer on Stars and how they are classified, and connecting some JWST images to all of the above!"

September – Prof. Kelly Douglass presented “The Cosmic Distance Ladder” about how astronomers measure the distances to astronomical objects at various distances.

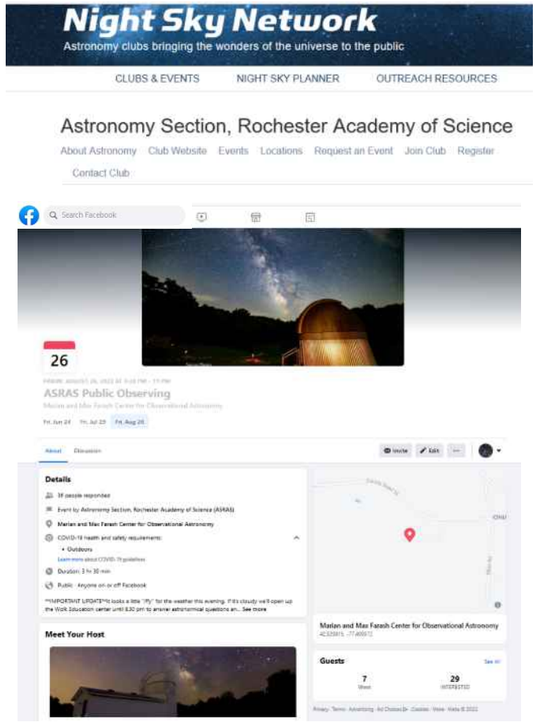
October –Don Chamberlin presented “Lewis Swift, Rochester Astronomer”

(above) ASRAS members attend Dr. Kelly Douglass talk on “The Cosmic Distance Ladder” on Zoom in September
(left) A highlight of Past President Carol Latta’s Forum talk from February showing the plane of the solar system relative to the plane of the galaxy

Outreach and Education

Public Star Parties

ASRAS was able to open up our observing site to the public offering six months of Dark Sky viewing from the Marian & Max Farash Center for Observational Astronomy.
From May through October 2023 on the Friday evening closest to a New Moon, the Astronomy Section advertised on Facebook, our own Website, the Night Sky Network, and the AstroSpheric Weather App that our site was open to the public for observing popular, and even some rare, celestial objects. Over 180 people attended these six events to find many celestial beauties each of these nights through our club telescopes and members' telescopes.



Partial eclipse viewing planned for October 14 2023 was clouded out.
Screenshot of Astrospheric website forecast for Oct. 14 2023

(left) ASRAS at an RMSC event in Rochester.
(above) VP David Bishop leads an observing session in Ionia.
(right) Past President Mark Minarich continues to schedule and lead Outreach for ASRAS in 2023. He also took over as Mees Summer Tour Director.

Image credits: Quinn Freidenburg, documentarian, RIT Photojournalism student in 2023

Outreach: Mees Observatory Tours

ASRAS Past President Mark Minarich assumed the Mees Summer tours Director role this year after many years as a member of the Tour Guide team and backup to the prior director.

Our outreach efforts in Mees Observatory Summer on – site tours were quite successful in 2023, with twelve ASRAS members and four students joining the combined ASRAS/UR team. In that format, 18 tours were supported, and 67% of those included telescope observing, thanks to many nights with clear skies.

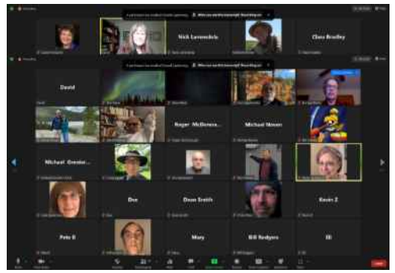
All tours were fully reserved, and long waitlists built up, as witness to the high degree of interest in the tour offering. In all, 314 guests visited this summer and were delighted with their time at the observatory.

Member Activities

ASRAS Monthly Meetings & Lectures In-Person & Virtually

ASRAS continued to host monthly membership meetings throughout 2023 conducted in a bybrid manner: In-person and virtually. Some members attend virtually only (because of health complications or because they live overseas), so we continue to offer virtual as an option in addition to in-person. This is also helpful when the weather is poor for travel. After each meeting we send out the meeting slides to the members, and we post a video of most Presenters' talks online at YouTube:
https://www.youtube.com/playlist?list=PLUKWxnvjYq6ir1s1dpz86HiwAfx0yp2MX

At September's meeting in the Louis Wolk Education building of the Farash Center, RIT Visiting Lecturer Jennifer Indovina presented to a full room of ASRAS members.

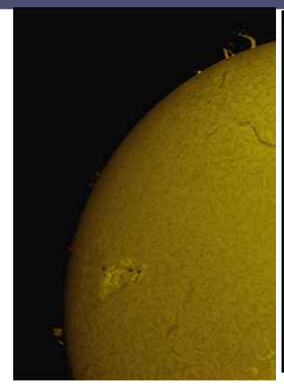


30 members attend virtually for the March meeting the night of a snow storm

2023's RocheStarFest was a major highlight of the year in July

Open Houses

Members observe through the Solar telescope at a clear April 8 2023 Open House



Sun in H-alpha (left) using Ionia solar telescope, and white light (right) by Douglas Kostyk, special Open House April 8 2023

In 2023 we held 13 open houses, including two in April (one exactly 1-year out from Totality on Saturday April 8 2023), hosting hundreds of people total. Open houses are typically held on Sundays from noon until 3p.m. or later if the skies are clear.

Observing Nights at Farash Center

Picking the optimal Moon phase for deep sky observing and imaging, we schedule a series of observing nights at the Farash Center for members. On these evenings, all of the many observatories are in use, as well as equipment members bring for the evening. Besides these scheduled events, on numerous other occasions, members came to observe under the Farash Center's clear, dark skies. While some celestial events (Oct 14 Partial Solar Eclipse) were clouded out this year, others were fantastic (Geminid Meteor Shower).

Nick Lamendola captured this Geminid Meteor streaking through Orion from the Farash Center Dec. 14

Science: Radio Telescope

The Farash Foundation's educational outreach grant has enabled RIT engineering students to research, design and build a Solar Radio Telescope that will study the Radio Frequency signature of solar disturbances (right).

Most people think that Solar activity merely creates the pretty auroral display of the Northern Lights. What they don't realize is Sunspots, Prominences and Coronal Mass Ejections (CMEs) present a significant danger to Earth's increasingly electronic world, especially as they interact with Earth's magnetic field. The most recent disturbance (*right – December 2023*) demonstrates that. It was a X class Solar Flare that is one of the strongest classes of emissions from our nearest star.

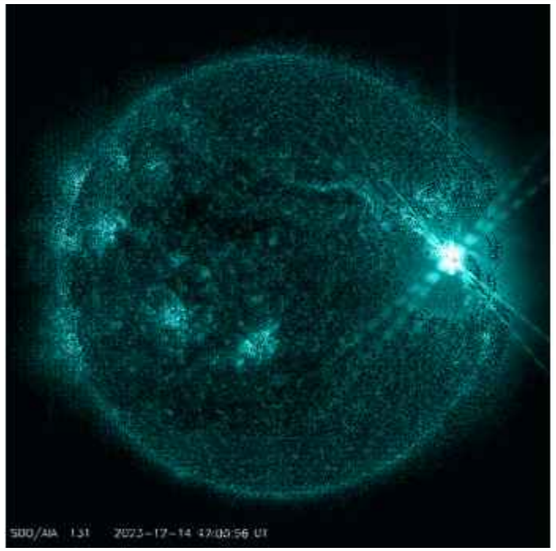
The scale of even sunspot emissions *(far right)* is hard to appreciate, they're so strong & huge, that it interferes with aircraft navigation and communications. Scientist know that this can wreak havoc on the electric grid, internet, and blind or disable orbiting satellites. Additionally, it can create problems with railroad signaling and safety systems, a potential for serious crashes. History has shown that some of these events can be much more devastating if they are a direct hit *(image c)*. Picture the rotating Sun like a rotary lawn sprinkler, as it rotates the material is ejected, and spews in a 3D ball. We need a better early warning indicator, as the satellites that study the Sun operate in various optical bands, but NONE are in the RF spectrum.

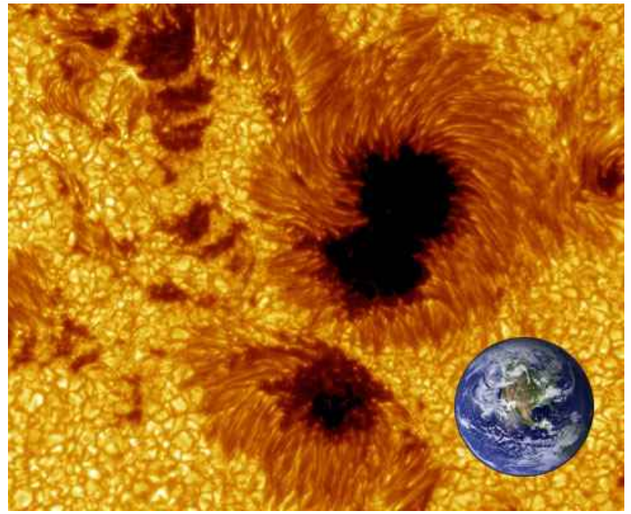
An Autonomous Radio Telescope (ART) has been in development at RIT for the Farash Center site in Ionia, NY. Its mission is to detect and relay coronal mass ejection data from the Sun to the solar helio-scientists of the e-Callisto Project in Zurich, SZ.

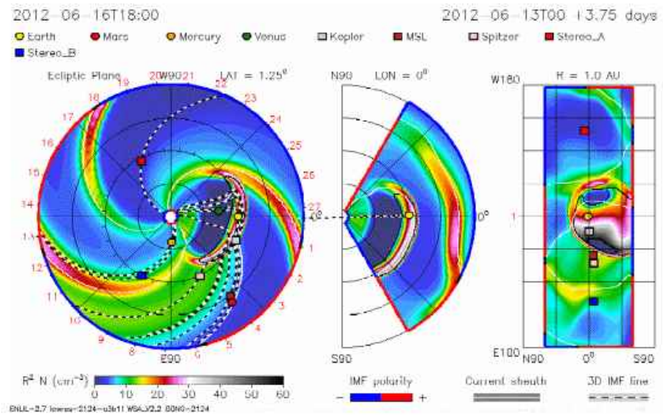
This will enhance our understanding of Solar Physics dynamics. Additionally, it will put the ASRAS organization on the global astronomy stage. An example of its output 'image' is shown at far right *(d)*, the red is the most intense, notice the horizontal lines, this is noise from local interfering radio & TV stations. A problem for Solar Radio Astronomy worldwide, even in places like Africa.

We've been making constant improvements, we're adding some unique active noise removal technologies which were demonstrated with a 'proof of concept' field experiment two summers ago, in Ionia *(image below, left)* and, we just doubled the resolution of system FFTs.

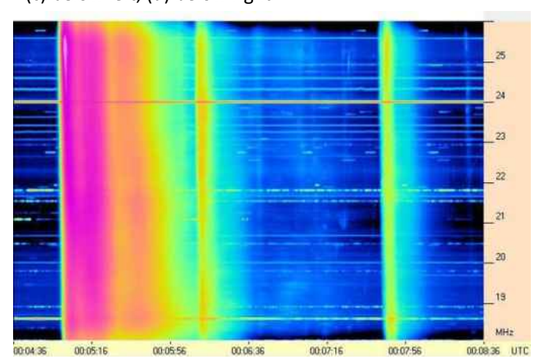
The hardware is being expanded to include dual receivers, one to collect the Sun signal *(Red & Green Traces, below)*, the other to simultaneously collect the local interference. The 'local' dipole *(Blue Trace below)* is mounted right on back of the telescope, so it tracks with the dish and thus, has its 'null' axis always pointed directly at the Sun, this minimizes the Sun's signal on the 'noise' channel. Not being content, we are involved with developing even newer noise strategies for dealing with the new cell phone and wi-fi frequencies. We're looking at concepts to perform noise removal in real time, and even looking at expanding into nighttime operation for the top 40 or 50 brightest objects in the RF night sky, but we have put these on hold to get ready for the upcoming eclipse *(below, right)*.

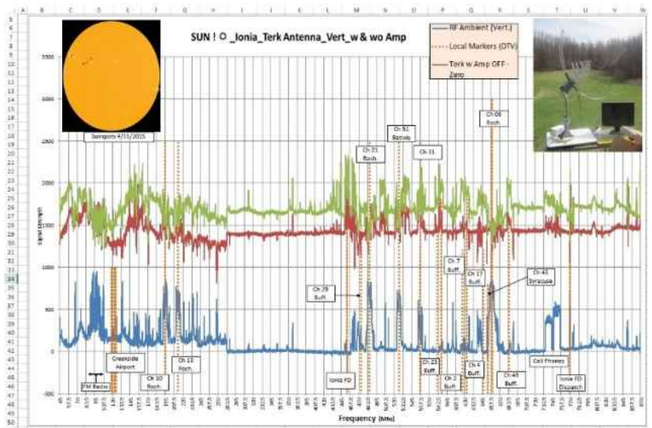






(c) below left, (d) below right





Total Solar Eclipse of 2017

Our Callisto station in Ionia, NY, is called 'KROC-USA'. Hope is that we will be 'on the air' with some actual Sun data to Zurich, for the WNY total eclipse in 2024 *(right)*. We look forward to having tracking fully automated (autonomous), that of waking the system up in the morning, pointing it to the east and acquiring the Sun then tracking during the entire day, until sunset, without needing any human operator intervention.

Recognition and credit(s) must be given to those supporting this continuing effort. Funding was provided under an 'Educational outreach grant' by the Farash Foundation thru ASRAS. Site selection and characterization that was performed by students from the University of Rochester (U of R). Development and Lab facilities provided by RIT Kate Gleason College of Engineering & the entire ASRAS community. The Farash foundation's foresight has given young engineering students the chance to 'get their hands dirty' and apply their 'book' knowledge into actual hardware & software delivery, to the benefit of everyone involved. Besides the direct involvement of the mainline student teams, additional thanks, recognition must be given to the many students, professors and support personnel who have given us their continued efforts over the (many) years of incubation and development.

Sincerely,
Martin Pepe

Do you know what your Sun is doing today?
ART does!

Science

Supernova Webpage

Our organization is one that is interested in science. The supernova web page, which is hosted by us has been cited in several astronomical papers. Most of the supernova reported these days are in very distant galaxies, and only of interest to professional astronomers. Most years the brightest supernova we get is just bright enough to be seen by a larger amateur telescope. **The year 2023 was an exception.**

In the constellation of Ursa Major (the big dipper) just above the inner part of the handle is a galaxy known as M101 (the 101st object described by 17th century astronomer Messier). This year in May an amateur astronomer in Japan observed a supernova in this galaxy. It got **bright enough to be seen by binoculars**. This was the 5th supernova found in M101. David posted more than 250 observations of this supernova, its progress carefully tracked as it turned from blue to red and then began to fade away. For about one week this object was almost as bright as it's parent galaxy.

This year we also added a cell phone version of the supernova page: https://www.RochesterAstronomy.org/snimages/sn.html

And we did extensive work in the archives (where older objects are referenced). This database is used by astronomers to research past events, some of which are only archived on the ASRAS supernova web page.

Finally, we created an extra mirror (backup) of the supernova page at the RAS website in 2023 at http://supernova.rasny.org/

Image Credit: Tom Powers

Ours is the only web page that keeps track of and can keep up with the pace of discovery.

Check it out: www.rochesterastronomy.org/supernova.html

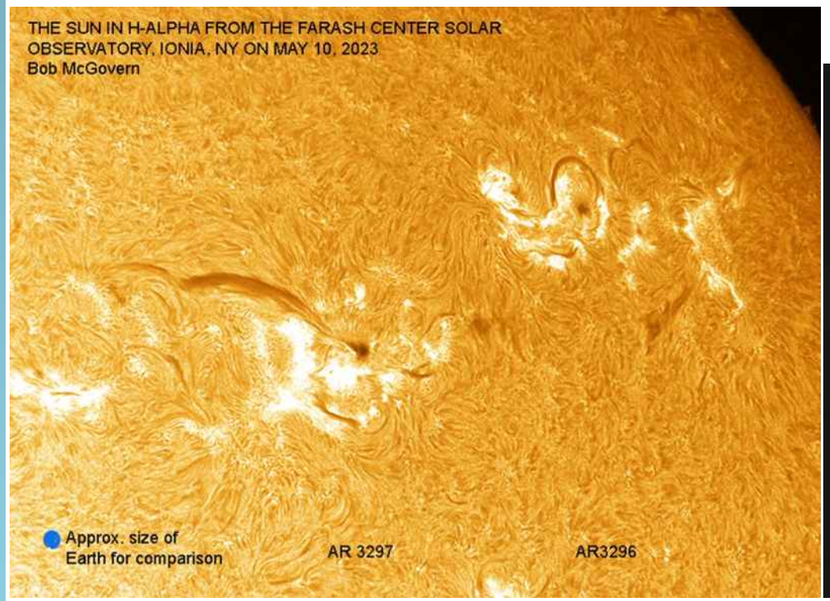
ASRAS member David Bishop has made the cataloging of supernova a study of his. A quarter of a century ago Dave made a list of the currently observable supernovae (plural of supernova). The list was designed so that people could easily see what objects were visible. His webpage is the only source of supernova reference images on the web (http://www.RochesterAstronomy.org/snimages). It has been cited in many technical papers

Astrophotography

Member Astrophotography

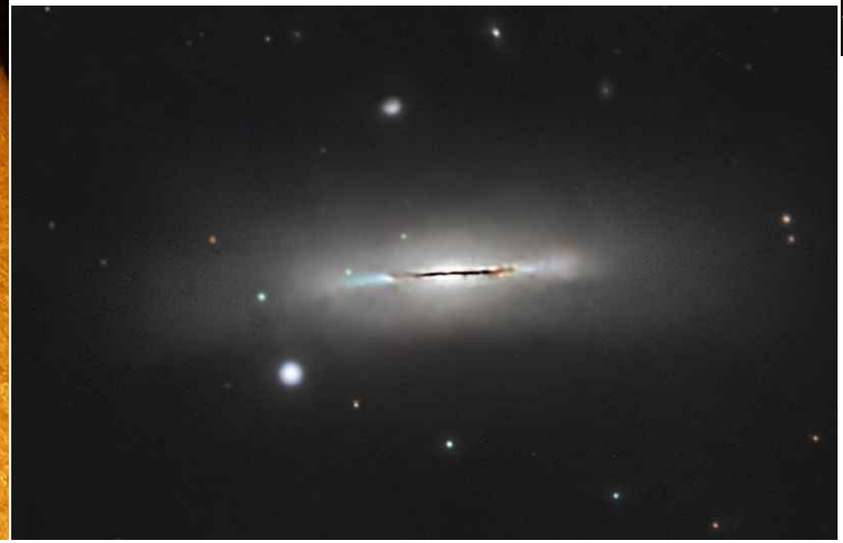
ASRAS members continue to refine and improve their astrophotography skills using their own equipment or equipment available to them at the Farash Center. Techniques learned from experience and fellow members who enthusiastically share their knowledge help create images such as these, which are included on our website and newsletter, shared online with members, and routinely posted to online sharing sites.

NGC 6820, Gary Opitz, September 2023



Sun in H-alpha, Bob McGovern, May 2023

Thor's Helmet NGC 2359, Seth Zebrak, March 2023



M102 Spindle Galaxy, Patrick Cosgrove, July 2023

Lunar Surface,
Kevin Lyons,
April 2023

NGC 7331 with deer lick group, Rick Albrecht, November 2023

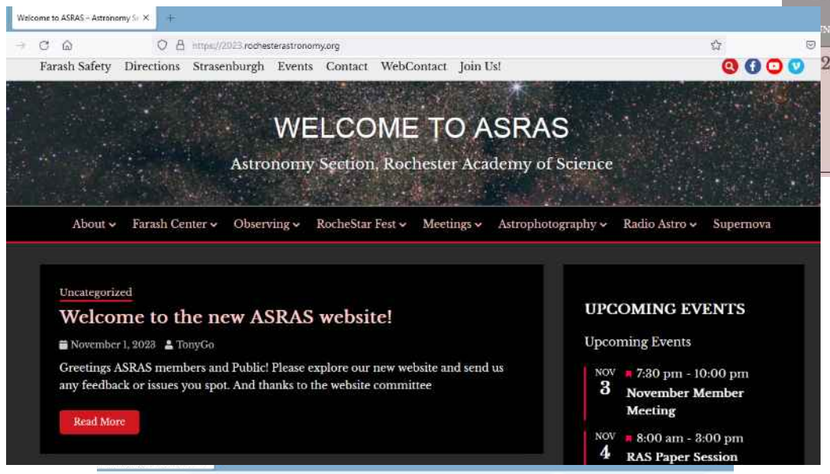
M27 Dumbbell Nebula, Mark Hehir, October 2023

Communications

New ASRAS Website!

www.rochesterastronomy.org

After many months of work, with major contributions from ASRAS member Damian Allis, Ph. D. and our website committee, ASRAS launched a brand new website, including a new Events Calendar and Astrophotography pages. We continue to provide information about astronomy-related events and happenings in the Rochester area. Including the supernova page, this year there were over 110,000 unique visitors.

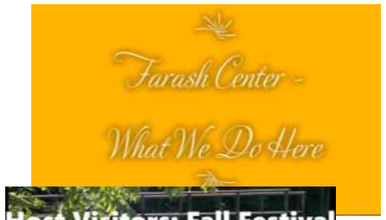


ASRAS Historical Information Project (AHIP)

With the creation of the history project in 2020, there is now a base of historical files, stored on OneDrive and backed up on a hard drive. The Digital Age has made it easier to collect and store files as we add the most current versions of newsletters, Board minutes, meeting presentations, Outstanding Astronomer citations, etc. For the earlier years, scanned documents and also hard copies are part of the collection.
Key 2023 documents have been added, and additional categories of documents (e.g., images) will be added over the next several years.

ASRAS internet provided by:

frontier Communications

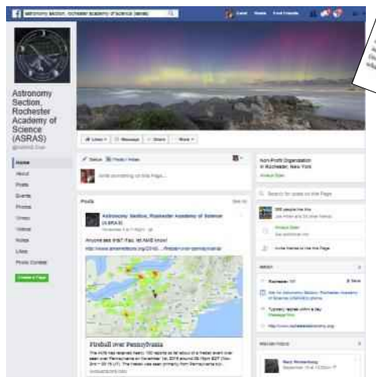


Monthly Newsletter

The Rochester Astronomer is our monthly newsletter with reminders of ASRAS upcoming events, recaps of activities, interesting Astronomy articles, and critical member information. It's a handy monthly connection to what's happening at ASRAS. The newsletter continues to be distributed in an all-digital format, both to be more "green" and also because members preferred it. We've had a 52% open rate of this format among 272 subscribers.

Facebook

The ASRAS Facebook page continues to function as a public outreach and serves as an avenue to draw local interest to our public star parties, Farash Center open houses, monthly lectures, and more. Many of those who attend our public events become members! Currently, our page has 1400 Likes and 1678 followers, up 31% from 2022.



Achievements and Plans

2023 Achievements

Member Events
- 18 member events with talks
- 12 member observing events
- 12 member social events and open houses
- 7 work parties
- 12 board meetings

Outreach Events
- 6 Public star parties
- 12 Scouting events
- 5 School and community events
- 2 Community festivals

Thousands of individuals were touched by astronomy-related experiences provided by ASRAS

Scientific Achievement Areas
- Supernova website
- Radio Project
- Helped train RMSC Eclipse Ambassador Program

Farash Center Improvements
- Upgraded website to be more user friendly, including a robust Calendar of events and current activities
- Major restoration of Wolk Education basement restroom
- repaired Farash Observatory metal roof and resealed dome
- Ordered and placed 20 tons of crushed stone gravel on the driveway, using a larger size stone than ever before, to resist washing out
- Repaired roll off track of the Brewhouse observatory building
- Replaced boards in the deck of the Louis Wolk Education Building

ASRAS Financial Position

In 2023 ASRAS continued to be financially sound, thanks in part to generous donations from sponsors such as the Wolk Foundation. ASRAS continued its growth in 2023 and at year's end the total of our funds reached $107,000. Site maintenance was a major expenditure for us in 2023 with roof repairs and other building and infrastructure maintenance. ASRAS continues to provide a wonderful astronomical resource to the community while keeping dues affordable and without increase from 2022 levels. It is through financial contributions that we are able to provide this valuable service to the community.

2024 Plans

- **Continue preparations and outreach for April 8, 2024 Eclipse**
- **Expand our electronic resource offerings on our new website**
- **Expand our partnership with RCSD to provide more classroom and hands-on experiences for students**
- **Continue to address new member & public telescope inquiries**
- **Upgrade the computers at the Farash Center and formulate a replacement plan**
- **Add solar powered ventilation fans to select observatories to aid in more rapid equipment cool-down**
- **Continue implementation of radio telescope projects**
- **Continue to support our full spectrum of educational & outreach programs**
- **Support L3Harris' satellite tracking refinement project at the Farash Center, should it resume**