Astronomy Section
of the Rochester Academy of Science

# ASRAS

# Annual Report 2019

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, 11 observatory, meeting and storage buildings, provides the central meeting place for our members and guests.**

## Our Membership

**Ranging from professional astronomers to amateurs to star-gazers, our 210 memberships represent about 330 individuals who span all ages and a wide array of interests and abilities.**

*Image courtesy of ASRAS member Nick Lamendola*

# Farash Center Investments

Two local Boy Scouts were mentored for their Eagle Scout programs by doing their Community Project portion of the program at the Farash Center.

- Nathan Bradley of Ionia led the project which built and installed benches for casual observing on the top of the north ridge.

- Connor Maksymciw of Chili led the project where the Education Center deck and both ramps were power washed and stained.


Ridge-top Viewing Benches - Eagle Scout Nathan Bradley's Project. Summer 2019


Deck & West Ramp power washed and painted - Eagle Scout Connor - 2019

New evergreen trees were planted to replace ones that did not survive last winter. Ultimately, they will provide a light barrier shielding the observing areas from automobile headlights in the lower parking area.

Erosion of the bank near the top ridge was addressed by planting grass and wildflowers.

In order to reduce exposure times with the Farash Observatory's 14-inch Celestron Edge telescope and allow an easier entryway into astrophotography, a Hyperstar optical attachment was purchased and installed; therefore, converting it into a very fast photographic system of f/1.9. It is usable with any DSLR camera, making it a practical tool for experienced and beginner astrophotographers.

An attachment for easier collimation of the Farash Observatory telescope was purchased from Hotech.




# Farash Center Investments

## Telescope Loaner Program

The ASRAS new and improved Telescope Loaner program is now one year old, making the resources of ASRAS more available to our members. All of this equipment is in our Loaner Scope space in the Farash Center basement. Now 12 telescopes of various designs and sizes can be signed out by members for up to eight weeks at a time. This year we've added a Go-To telescope and a 10" Dobsonian reflector as well as four eyepiece kits with Low and Med-high power eyepieces. Members can try out different kinds of scopes and eyepieces before they buy their own. By having equipment out in the community, instead of just at our site, we help to expand neighborhood opportunities for astronomical observing.


Included in this program is a pair of 11x80 binoculars with a parallelogram mount and an iOptron Sky Guider camera mount and tripod for one week loan. Borrowers will sign an agreement making them financially responsible for adequately protecting the equipment from theft or damage.


California Nebula by Nick Lamendola using iOptron Sky Guider

## Outreach to Rochester City School District

ASRAS has again this year performed outreach to some that truly NEED the interaction within the Rochester City School District (RCSD), cooperatively bringing Astronomy to urban school kids who are underserved in Science, Technology, Engineering, and Mathematics (STEM) outreach. In 2019, we worked in three separate areas where we could help to strengthen science education with these children.

First, working with Kelvin Knight, a STEM coach who tutors two RCSD high school and middle school STEM teams, ASRAS coordinated another field trip to visit the Farash Center for a live presentation of basic astronomy and a tour of our facilities and telescopes in September. This included a nighttime visual tour of the heavens through one of the large telescopes at the Max and Marian Farash Center for Observational Astronomy in Ionia, NY. The talk and tour were again well received, and we have commitments for new members to ASRAS as well as an annual ongoing visit from this coach and his teams.

Second, working with Dr. Mittal, an Astrophysics professor from RIT and the RIT K-12 Outreach Director, ASRAS is working with the Children's School of Rochester to generate scientific interest among the primary school students. By using their weekly Teaching & Learning briefing period during school hours, ASRAS members and Dr. Mittal delivered short talks with hands on demonstrations on Astronomy to over 350 diverse and disadvantaged children. This year's talks covered the Solar System and later, Asteroids & Comets. We made a "comet" in the assembly! In November, we demonstrated telescopes and how they work.


Mark Minarich, Rupal Mittal at CSR School #15 Briefing February 2019

Third, ASRAS is working directly with RCSD Science teachers in hosting the group at the Farash Center to demonstrate the capabilities we have and to offer our site as a resource to their education.

Kelvin Knight & the Urban Suburban Science Team

Frosty "Comet" created at CSR School #15 in February 2019



Outreach and Education

## Summer Science Club 2019

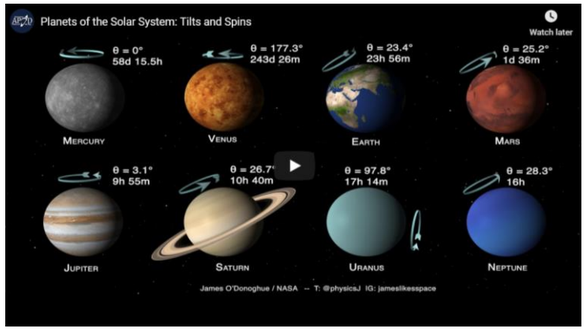
After six years of holding Science Summer Camp at Farash Center, in 2019 we tried a new format for summer outreach: six evenings of Science Club. Each evening included a different topic related to astronomy, followed by telescope observing after dark on clear nights.

Eight ASRAS members led or assisted with these programs, and 78 children and adults attended. We've concluded that those who attend are strong people – and especially kids – with keen interests in science, making this program highly successful and inspirational.

## Young Astronomers Program

This year we re-allocated the resources previously dedicated to our Young Astronomers, due to declining participation, and focused instead on Scouts, RCSD and other outreach efforts.

## Science Exploration Days




Science Exploration Days at St. John Fisher College were held on May 17 for the public and May 18 for students in grades seven through twelve. Over 700 students, teachers and parents attended the event. ASRAS members operated a table of exhibits and information, talking to the students and distributing educational handouts. Attendees were able to use and compare telescopes.

## School and Special Programs

We fulfill special requests for astronomy programs. This year, ASRAS participated in the following functions:

- Adirondack Mountain Club (ADK) spring festival
- Local library programs, including “A Universe of Stories over the Summer”
- Local charter school science fair



Outreach and Education

## Star Parties

We successfully held two star parties this year in Mendon Ponds and Northampton Parks – several others were planned, but Mother Nature did not cooperate. At these events, members set up their own telescopes and binoculars, then invite all who come to take a look while we describe what they are seeing. These events are wonderful opportunities to engage individuals who otherwise would not share our privileged view, and to discuss events and news in astronomy. Star parties have also been a great means of attracting new members to ASRAS. Average attendance this year was 25 individuals. In addition, returning to an old tradition, there were four impromptu "sidewalk" events at the Charlotte pier with a total of over 1000 people viewing.

## Strasenburgh Planetarium Observing

Our 50+ year commitment to RMSC and the Rochester community continues, as we operate two roof-top telescopes every clear Saturday night. An average night typically brings 50 – 100 guests up the stairs to view the Moon, planets, and the brighter deep sky objects. A vital part of this experience is for our visitors to find a friendly, well-informed amateur astronomer, who loves to talk about the heavens and answer questions, operating the telescope. This year was a particularly cloudy one, limiting the number of successful observing nights. We were able to operate the telescopes on 32 nights, and host approximately 2300 visitors at those events.

## Scouts

As in past years, our scout groups were fantastic. Our program continues to grow due to positive feedback from Scout Leaders and parents. The groups ranged from 10 guests up to 50. Events covered Astronomy badge requirements through presentations, small projects, scale demonstrations of the solar system, earth-moon dynamics, telescope workshops, and, of course, telescope observing. The Scout groups regard the Farash Center as one of their primary venues for activities. They enjoy the open field to learn about and carry out lifesaving skills when out in the wilderness

ASRAS has built a great relationship with out local troops by becoming an outlet for Eagle Scouts to plan and implement their projects at the Farash Center for the enjoyment of visiting scout groups, ASRAS members, and the community at large. Overall, the relationship has provided a wonderful opportunity for both parties to fulfill their goals.


## Mees Observatory Tours

Continuing decades of ASRAS support of University of Rochester's Mees Observatory Tours, this summer saw 11 ASRAS members participating as tour guides and as tours director. In partnership with UR students, we conducted 25 tours, hosting over 500 guests. Given excellent sky conditions this summer, we were able to provide guests with telescope observing 75% of the time. We are proud to include this collaborative outreach opportunity to the broad Rochester area community.

The UR Department of Physics and Astronomy recognizes ASRAS as a key enabler for what has become a highly-sought experience for members of the Greater Rochester community.




Outreach and Education

## Telescope Tune-up Day

In April, we held our annual telescope tune-up event at the Strasenburgh Planetarium to provide guidance to members of the public needing assistance with setting up and using their telescopes. Individuals and families were helped with small repairs and advice on how to set up and enjoy their telescopes.

## Ionia Fall Festival

In support of the local Ionia community, we welcomed Fall Festival guests up our hill (as we do every year) to check out our observatory. Several of us also greeted visitors at our booth on the fire house grounds, sharing our enthusiasm about astronomy and all ASRAS has to offer. This year both the sun and moon cooperated. At the Farash Center, guests were treated to views of our nearest star, and at the festival grounds, festival goers were treated to views of the Moon (yes, it is visible in the daytime). Sharing our resources with our neighbors serves the dual purposes of outreach and inspiring them to watch over our home.


## Mendon Ponds Park WinterFest

ASRAS, once again, utilized this event to provide scientific information and membership opportunities to the public. This event is always fun as we connect with a large group of outdoor enthusiasts from all different backgrounds and members of other volunteer organizations.

## Monthly Meetings

Our monthly member meetings (always open to non-members as guests) are attended by 60 – 80 individuals and include long and short talks on many topics. Attendees also share observing and event reports and enjoy connecting with fellow astronomers. During summer months when meetings are held at the Farash Center, we conclude with nighttime observing. 2019 main talks covered topics ranging from "Gravity Waves" to "When Star Trek Meets Physics / Astronomy" to "A Trip to Kitt Peak", among others.

In winter when observing conditions are less favorable, we schedule a series of additional talks and lessons. This year, two of these talks were held. In addition, ASRAS members were treated to a presentation and tour of the University of Rochester Laboratory for Laser Energetics.

## Roche*Star* Fest – July 26-28, 2019



RocheStar Fest 2019 was, as always, a major event for ASRAS. Friday night featured a riveting round of astro-music trivia, followed by astronomy themed Jeopardy. Saturday was a full day filled with gatherings, lessons, fun and opportunities to share ideas, equipment and experiences with like-minded amateur astronomers and guests. The day also included door prizes, our usual outstanding and self-catered barbecue dinner, a silent auction, and a fascinating talk by our Featured Speaker, David Kendrick of Hobart & William Smith Colleges on "Habitability and the Search for Life in Our Solar System and Beyond."





## Open Houses

Twelve monthly open houses were held hosting a total of about 125 people. Open houses are typically held on Sundays from noon until 4 p.m. or later if the skies are clear.

## December Celebration Meeting at Strasenburgh Planetarium

Our annual holiday season celebration event at the Strasenburgh Planetarium is a highlight of our year, and a perfect chance to showcase our organization to friends, family members, and guests. Members bring food to share in the lobby, followed by a demonstration of the new Digistar system's capabilities. We use this event as the opportunity to recognize members who have made unique and significant contributions, such as the annual Outstanding Astronomer. Then, all attendees experience a star show, like those presented to the public. The event culminates in our member images show, featuring the remarkable and ever-improving astrophotography skills of our members.

ASRAS President Mark Minarich presenting award to Don Chamberlin (right) as Outstanding Astronomer of the Year 2019

## 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. Special events in 2019 included the January Lunar Eclipse and Messier Marathon.

# Project ART: Autonomous Radio Telescope

The Farash Foundation, through its generous educational outreach funding through ASRAS, enabled 34 students of RIT to research, design and build a Solar Radio Telescope that will autonomously operate and relay real-time coronal mass ejection warning data from the Farash Center for Observational Astronomy Ionia site to the solar scientists of the e-Callisto Project in Zurich, Switzerland.

The first few years were spent in developing 'proof of concept' ideas for basic functions. For example, we decided to develop a modified feed 7' (2M) dish for its superior front to back ratio rather than a standard Log Periodic 'Yagi' like design. We partitioned the overall system design into basic functional subsystems to be implemented by individual groups as Senior Projects at the Rochester Institute of Technology (RIT). Our priority was the design of the mission-critical solar autonomous tracking feature. This system automatically acquires and continuously tracks the position of the Sun.

A Right Ascension/ Declination mount was designed, built and then installed at the Farash Center for Observational Astronomy in Ionia to enable basic manual operation, to enable taking local data during the summer to both further our understanding of local ambient noise, as well as take basic Solar data. This effort, along with a totally manual 'proof of concept' portable bench set-up, is shown in the picture below:

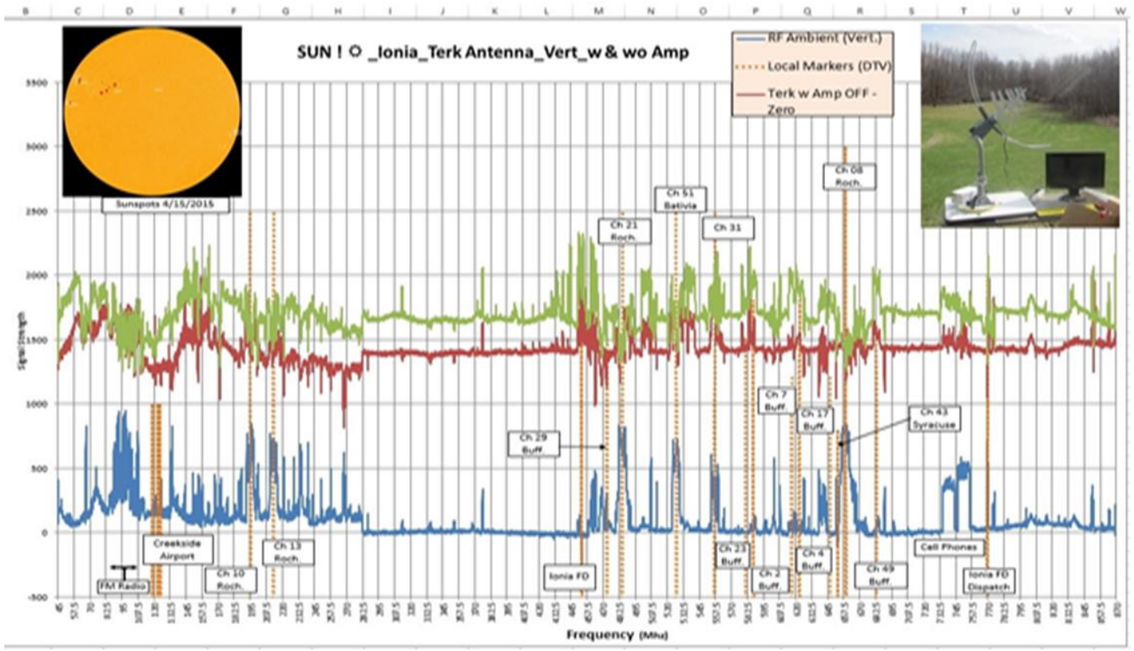



*Figure above: the **blue trace** shows local radio, TV, and cell tower interference taken with the interference measurement dipole antenna. The green trace shows the actual Sun signal with interference cancellation included – i.e. the blue interference trace mathematically removed from* the raw Sun signal taken by the main solar antenna. *Note that the very large 658 MHz TV interference signal was successfully removed from the processed Sun signal. (The red trace is the same as the green trace, but without an additional amplifier used for nighttime radio astronomy). Upper left: A visual SOHO image of the Sun at the time with active sunspots. Upper Right: portable test setup operating at the Ionia Farash Center for Observational Astronomy..*



Science and Astrophotography

# Project ART - continued

Next, the design team concentrated on controls and software development, incorporating the use of "Radio Eyes" software, a planetarium-like software package for the RF radio sky, to add some systems intelligence to our project.

Next, we added an uninterruptable power supply (UPS) to minimize system crashes and data corruption, improved software operability, and looked into the possibility of nighttime operation by adding low noise amplifiers (LNAs). The LNAs are meant to try to acquire the top 40 brightest RF objects in the northern night sky, limited by the meager dish size of only 2 meters. This was our lowest priority task.

The next design team concentrated on designing a LabView-like graphical user interface to look like a piece of test equipment for student operator input and controls. A concept was devised for self-calibration, consisting of a 'zero' signal (75Ω load) and a 100% (RF noise source) implemented with RF switches under processor control. This enables occasional self-checks whenever data quality/integrity is questioned. At this point, the system was operational enough to make preliminary data runs and to try sending preliminary data to Zurich.

The current team (Fall, 2019) is concentrating on systems level integration, software development, and adding functionality, including a web-based interface 'portal' for remote operations as well as LED system status and operability indicators. The hardware is being expanded to include dual receivers, one on the main solar dish antenna, and the second, a dipole antenna, to collect local radio interferers.

The second interference dipole is attached directly onto the solar dish antenna mount, so it tracks with the dish and thus has its 'null' axis always pointed directly at the Sun. This has the benefits of minimizing the Sun signal, maximizing the related 'local' RFI signal, and increasing the system's signal to noise ratio.

Many thanks to the Farash Foundation for funding provided under an educational outreach grant through ASRAS. This funding allowed 34 students across five teams to learn not only about Radio Astronomy but also engage in a hands-on team approach to real-world project development.

Martin Pepe

The e-Callisto station **USA-KROC** located at the Farash Center for Observational Astronomy, summer 2019. We should be on-line to Zurich with actual Solar data by May 2020.

# Science and Astrophotography

## Member Astrophotography

ASRAS members continue to refine and improve their astrophotography skills using 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 Facebook.

Saturn, Kevin Lyons, Sept 2019

Flaming Star Nebula
Dan Kuchta, October 2019

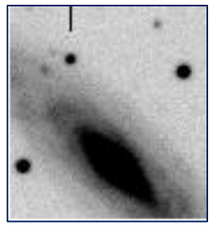
NGC 6820, Eric Day, October 2019

## Supernova Webpage

2019 was a very slow year for bright supernovae. Although we had a record number of discoveries (more than double last year's total), most have proven to be very dim objects. With both satellites and observatories looking for these objects, the amount of data is overwhelming. One phenomenon that did show up regularly was luminous blue variables (LBV). These supernova imposters get much brighter than nova, but not as bright as a supernova, and can reoccur. Two of these objects were spotted in nearby M74 and M51.

Supernova 2019np in NGC 3254

- Type IA supernova in the Sbc spiral galaxy in Leo Minor



**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**



# Communications

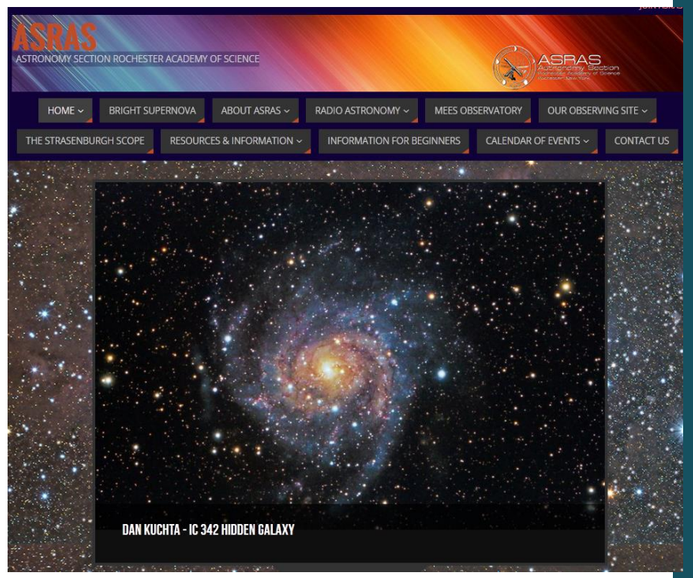
## ASRAS Website

**www.rochesterastronomy.org**

Our website continued to provide information about astronomy-related events and happenings in the Rochester area. This year, it had over 10,000 visitors from the public and ASRAS members.

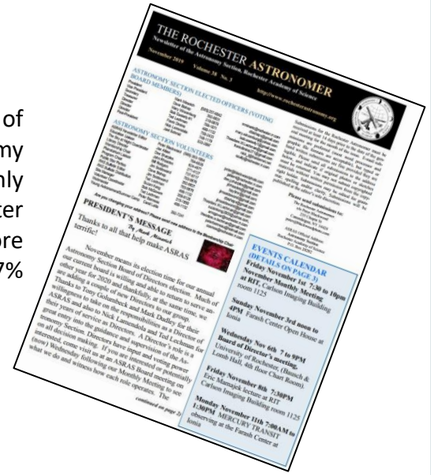
ASRAS internet provided by:

frontier Communications

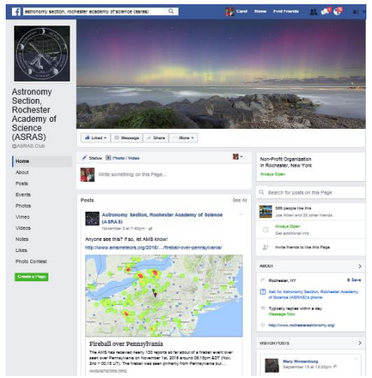



## Monthly Newsletter

*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 57% open rate of our new format among our 211 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 884 Likes and 905 Followers.

# 2019 Achievements

### Member Events

- 14 member events with talks
- 7 member observing events
- 13 member social events and open houses
- 12 work parties
- 12 board meetings

### Outreach Events

- 6 star parties
- 26 scouts events
- 32 Planetarium telescope nights
- 25 Mees observing tours
- 6 Summer Science Club events
- 5 school and community events
- 3 community festivals
- 6 daytime Planetarium events

**More than four thousand individuals touched by astronomy-related experiences provided by ASRAS**

### Scientific Achievement Areas

- Radio astronomy
- Supernova website

### Farash Center Improvements

- Replacement evergreen trees were planted as a light barrier.
- Erosion was addressed by planting grass and wildflowers.
- A “Hyperstar” optical attachment was installed on the 14-inch telescope which allows shorter photography exposure times.
- An attachment for easier collimation (maintenance) of the 14-inch telescope was purchased.
- Two local Boy Scouts completed their Eagle Scout Community Projects at the Farash Center, installing benches and power washing and staining the deck and ramps.



Plans and Achievements

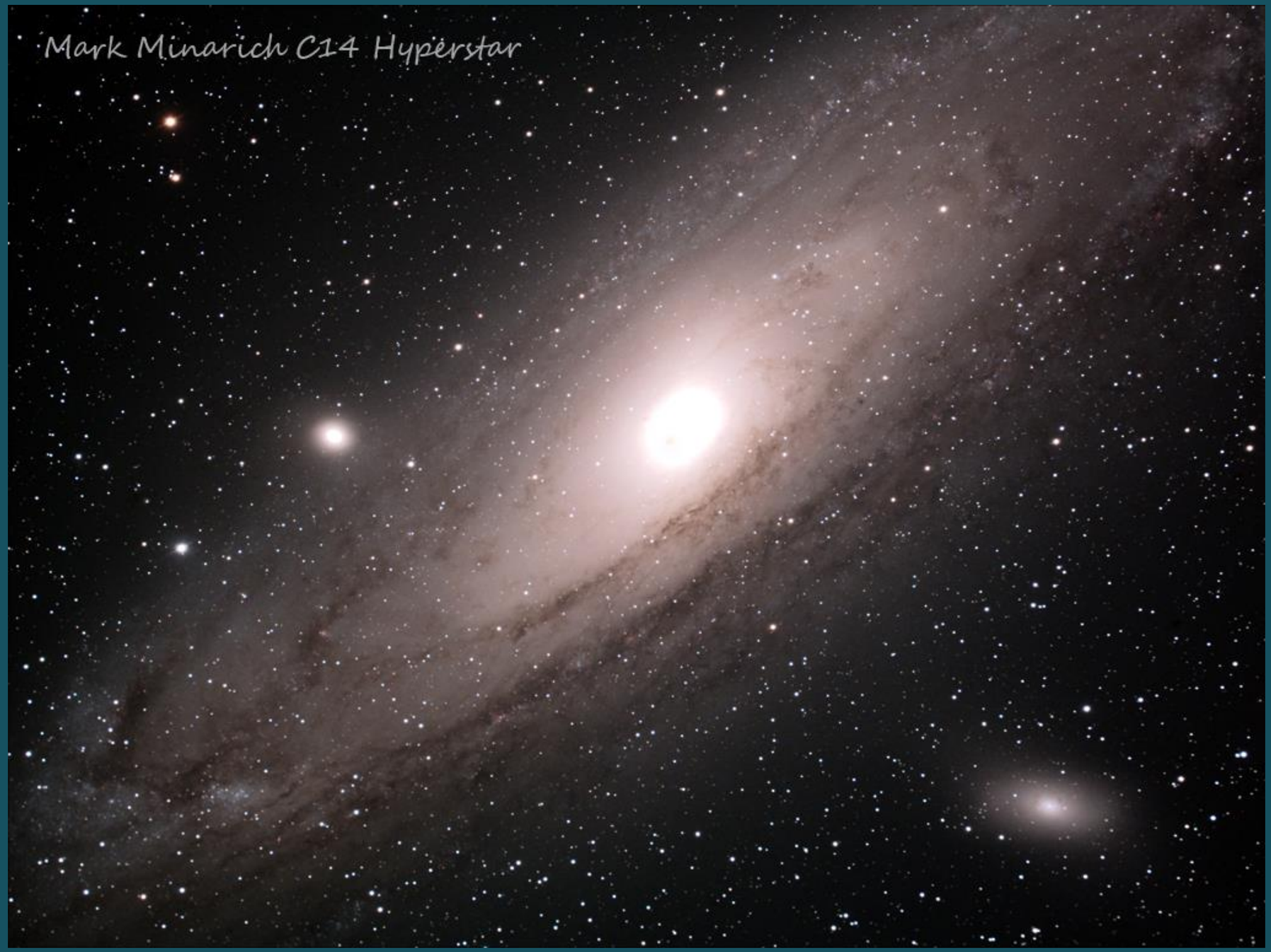
# ASRAS Financial Position

Receiving funds from the Farash Foundation has been fundamental to our growth. Our financial position has been strengthened incrementally by the Legacy Fund, so that ASRAS has been able to pay for needed site repairs/improvements and keep dues at a level that is affordable to the individuals and families in the Rochester community. At year end, the value of our total funds is $85,000. We critically need the increase in our accounts to provide an adequate cushion to support the large site expenses, insurance, etc. in case of economic downturn or large unplanned repairs, as well as, to continue to support our many community programs.

# 2020 Plans

- **Expand our partnership with RCSD to provide classroom and hands-on experiences for students**
- **Equip the 14-inch telescope For Astrophotography at a very fast focal ratio of f/1.9**
- **Add crushed stone to the Farash Center entry roadway**
- **Add solar powered ventilation fans to select observatories to aid in more rapid equipment cool-down**
- **Upgrade security at the Farash Center through the purchase of a private server to control the site security cameras**
- **Obtain additional chairs for Classroom**
- **Conduct scientific work through spectroscopy observations and study as well as photometry**
- **Continue implementation of radio telescope projects**
- **Continue to support our full spectrum of educational & outreach programs**

# Astronomy Section of the Rochester Academy of Science




Andromeda Galaxy
from C14 Hyperstar
Telescope
10/29/2019,
taken at the Farash
Center in Ionia, NY.

**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.**