Roanoke Valley Astronomical Society

Amateur Astronomy News and Views
In Southwestern Virginia

Volume 42—Number 3 **March 2025**

RVAS February Meeting Notes

What is a Neutron Star?

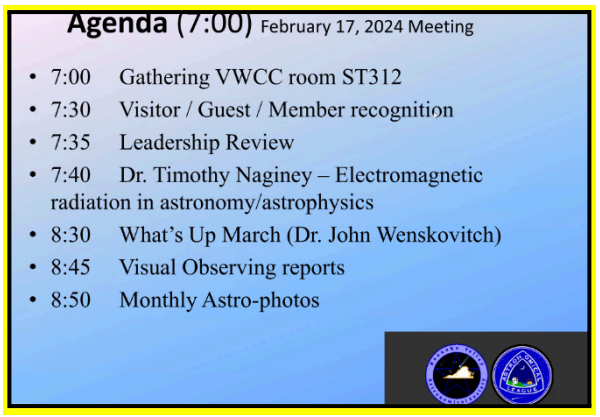
By **Erin Elliott, Secretary**

You can view this month's Zoom recording by clicking this link. The passcode to view the video is: **Uj.N&^Q5**

You can find a timestamp for each segment of the meeting next to the corresponding section header and a full list of timestamps below.

- **Program | 00:05:55**
- **What's Up? | 0:53:05**
- **Visual Observing Reports | 01:09:39**
- **Astrophotography | 01:12:00**

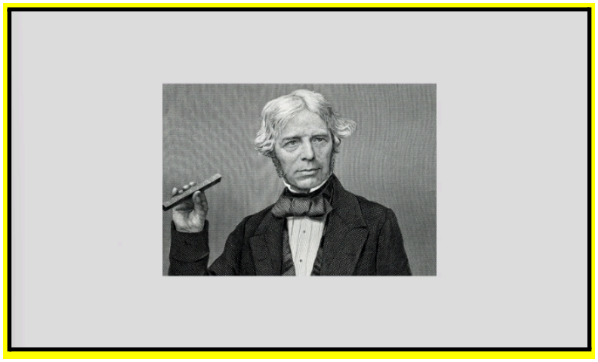
After wrapping up the Celestial Café, the meeting began at 7:30pm with an introduction from RVAS President, **Michael Good**. He welcomed members and guests to the January meeting before going over the agenda.



*February Meeting Agenda – **Michael Good Slide***

Attendance: There were 26 members and 4 guests in attendance. 19 individuals were in person and 11 attended virtually.

Program | 00:05:55: Dr. Timothy Naginey is currently teaching at North Cross. He is an Upper School Physics, Astronomy and Math teacher. He helps run Coding, Robotics and Guitar Clubs. He obtained his PhD from Oxford University. His program this month focuses on electromagnetic radiation and astronomy/astrophysics, in particular the underlying physical nature of light and how it is used by astronomers to study stars and other astronomical bodies.



Michael Faraday – Timothy Naginey Slideshow

Michael Faraday

- Bad at math
- Horrible memory
- Discovered electromagnetic induction
- Visualized electric and magnetic forces with lines

James Clerk Maxwell

- Very good at math
- Befriended Faraday
- Thought Faraday's "lines of force" looked like the flow of an incompressible fluid

Saturn's Rings

- Maxwell published "on the stability of the motion of Saturn's rings" in 1859
- Mathematically proved that Saturn's rings were made of small bits of matter
- This was 120 years before Voyager flybys

Back to Maxwell's Equations

- Maxwell's equations lead mathematically to two very important conclusions
    - Electromagnetic waves exist
    - The speed of these waves is constant

Albert Einstein

- Took the speed of light seriously…
- Based his entire theory of special relativity on Maxwell's equation

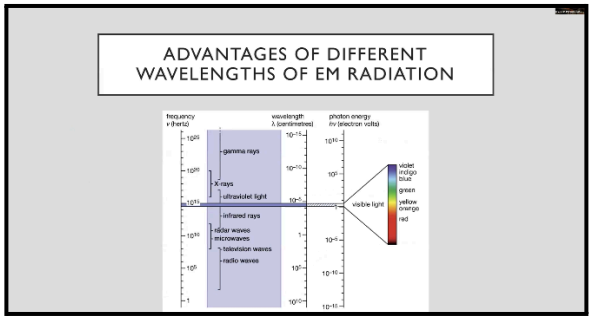
Light as a Particle

- So we can view light as an electromagnetic wave
- But Einstein also introduced the idea of light as a stream of tiny particles (photoelectric effect)
- These photons come in discrete bundles of energy E=hf
- So the higher the frequency, the higher the energy

QED

- Quantum Electrodynamics is the model view of light and electromagnetic radiation
- Extremely accurate

Advantages of Different Wavelengths of EM Radiation



Advantages of Different Wavelengths of EM Radiation – ***Timothy Naginey slide***

Radio Waves

- Wavelength range: 100km to 1m
- Not typically absorbed by the atmosphere (or non-conducting materials)
- Bend around buildings
- Can travel through clouds
- Emitted by pulsars, active galactic nuclei planets with strong magnetic fields and quasars

Microwave

- Wavelength 1m to 1mm
- Used to send cell signals
- Most can pass through clouds and non-conducting surfaces
- CMB: Predicted in late 1940s
- When Universe cooled enough for first atoms to form, transparency
- First light has been stretched due to the expansion of the universe
- Confirmation of Big Bang Theory

Visible Light

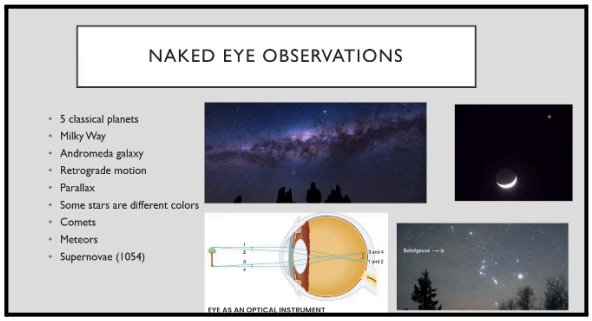
- 400-700 nm
- Can't be detected from ground during bad weather
- Blackbody radiation
- Spectroscopy

Ultraviolet Radiation

- Wavelength 10-320 nm
- A lot gets absorbed by the atmosphere
- Most stars don't emit much
- Spectroscopy

X-rays and Gamma Rays

- X-Rays: 10-0.01 nm
- Gamma Rays: anything smaller
- Most get absorbed by the atmosphere
- Emitted from extremely hot objects
- Galaxies merging
- Accretion disks around AGN, neutron stars, white dwarfs
- Gamma Ray Bursts



Naked Eye Observation – ***Timothy Naginey slide***

The Visible Portion of the EM Spectrum

- Historically, this was the first type of EM radiation for humans to exploit in our studies of the cosmos
- Nake eye observations
- Human eye as an optical instrument

Naked Eye Observations

- 5 classical planets
- Milky Way
- Andromeda galaxy
- Retrograde motion
- Parallax
- Some stars are different colors
- Comets
- Meteors
- Supernovae

The Optical Telescope

- First invented by Lipperhey, 1608
- Used by Galileo to look at celestial objects in 1609
- Magnification was about 20-30
- Moons of Jupiter, rings of Saturn, phases of Venus, rough surface of the moon
- Reflecting telescope

Limitations of Optical Telescopes

- Aberration
- Rayleigh limit
- Theta is the minimum angular separation that can be resolved
- So when it comes to telescopes, go big (diameter) or go home!

Radio Waves

- 1887, Heinrich Hertz creates and detects radio waves

Radio Telescopes

- Tend to be large (why?)

What Can Radio Telescopes "See"?

- Pulsars
- Quasars
- Radio Galaxies
- Cosmic Microwave Background Radiation
- Sagitarius A*
- Sun

X-Ray Telescopes

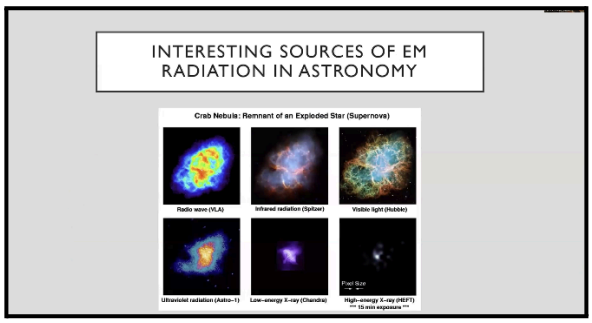
- Challenge
- Must place X-ray telescopes outside atmosphere
- Has made discoveries like:
    - *o* Crab nebula pulsar
    - *o* Neutron stars
    - *o* Black holes
    - *o* M87

Gamma Ray Telescopes

- Cosmic rays hit H gas
- White Dwarf Stars

- Pulsars
- Blazars
- Gamma ray bursts
- Hypernovae

Interesting Sources of EM Radiation in Astronomy (screenshot)



Interesting sources of EM Radiation in Astronomy – ***Timothy Naginey slide***

Rayleigh Scattering

- If we think of light in the classical sense as an electromagnetic wave
- The oscillating electric field of the light wave causes the electrons in an atom to vibrate back and forth with the same frequency as the wave
- We can ignore the magnetic component of the EM wave (it's much weaker than the electronic component)
- Occurs when light is scattered by an atom of molecule much smaller than the wavelength of the light
- Directly proportional to the wavelength to the negative fourth power
- This is why the sky is blue
- Occurs in the atmosphere of exoplanets
- Observed as a larger effective radius in the blue range of the spectrum during transit
- Rayleigh scattering is large for clear, H-rich skies
- Water in atmosphere suppresses Rayleigh scattering
- Clouds also suppress
- Upper limit on wavelength

Thomson Scattering

- Happens when a photon hits a free charged particle
- Occurs for lower energy EM radiation
- Occurs when the photon energy is much smaller than the rest energy of the particle
- Electric field of EM radiation accelerates charged particle, causing it to re-emit
- Independent of wavelength
- SOHO and STEREO missions observe the Thomson Scatter
- Finish

Synchrotron Radiation

- Accelerating charges produce EM radiation
- Acceleration means to change in speed OR in change in direction
- Magnetic fields cause charge particles to travel in a helix
- As a charged particle spirals around the magnetic field lines, it emits EM radiation
- Relativistic effect
- Can tell us about the strength of the magnetic fields
- Detected in the crab nebula 1956
- Synchrotron radiation can come in many different wavelengths

Bremsstrahlung Radiation

- Conservation of energy problem
- Nucleus is so large that its momentum doesn't change
- Change in electron kinetic energy carried away by photon

Conclusion

- The EM spectrum tells us (almost) everything we know about our universe
- Neutrinos and gravitational waves tell us even more
- There is stuff we still do not understand
- QED & general relativity are the two most accurate scientific theories humans have developed
- Faraday spent his last days trying to experimentally demonstrate the relationship between gravity and electromagnetism
- Physicists have been doing the same thing ever since

What's Up? | 0:53:05 John Wenskovitch gave his

"What's Up?" program on what the skies of March have in store for us. John's "What's Up? Highlights" in this issue provide a summary of the program. You can watch a recording of his program by clicking the link at the beginning of the newsletter and following the timestamp listed for this segment.

John gave a shout out to the Astronomical League Program: Messier Observing. You can find more information about this program by following this link.

Member Observation Reports | 01:09:39: February was a cloudy month and there were not many visual reports from our members. **Caleb White** was in Norway and saw the Aurora! He drove a few hours out; they waited about 2 hours and then saw an explosion of the aurora.

Zoom Screenshot – ***Clem Elechi Photo: M37***

Astrophotography | 01:12:00: We thank **Ed Dixon, Clem Elechi, Michael Good, John Goss, Ben Hartman, Dave Thomas**, and **Noah Winslow** for providing their work this month. We had a variety of images focusing on near and deep sky objects.

To provide each image with the focus it deserves, we are sharing the submissions in a separate article in this newsletter. Do not miss checking out the rest of these images.

You can also visit our RVAS Facebook Group to see photos posted throughout the month.

Next month: Kristin Hendershot will be our speaker at the March 17th RVAS meeting. If someone were to ask you to name famous astronomers from history, most could only name men. But many women have made important astronomical discoveries also, yet their work has been mostly invisible. Her program will highlight the women who left the largest impacts on astronomy and the challenges they faced along the way.

The meeting was adjourned at 8:47pm.

What's Up? Highlights

March 1 to 31, 2025

This Month:

Assuming that T CrB doesn't surprise us all and go nova, the top sight to look forward to in March is the total lunar eclipse that will occur in the morning hours of the 14th. Assuming that the clouds aren't occulting the view, Roanoke will see the entire eclipse from start to finish, with the peak occurring at 2:59am. In the evening sky, the fantastic lineup of planets that we had throughout the beginning of the year starts to wrap up. By the 15th, only Mars, Jupiter, and Uranus are above the horizon when astronomical twilight ends. Venus in particular makes a dramatic dip after spending so long hovering in the western sky, starting the month visible for 2.5 hours after sunset and ending the month in the pre-dawn twilight. In between, both Mercury and Venus are bright in the post-sunset western sky. Mars and Jupiter are high overhead as night falls, still giving some great views without much atmosphere to distort their faces. On the 23rd, Earth crosses Saturn's ring plane, but the view is greatly diminished by its proximity to the Sun just before dawn. The winter constellations still dominate the evening sky, but spring officially begins on the 20th at 5:01am. The month ends with a partial lunar eclipse for other parts of the world but no such luck for a super-New Moon event in Roanoke.

Celestial Events:

- March 5: Great views of Jupiter, the Moon, M45, and the Hyades in Taurus
- March 9: Closest approach between Mercury and Venus
- March 14: Total lunar eclipse, peak at 2:59am
- March 20: Vernal equinox at 5:01am
- March 23: Earth crosses Saturn's ring plane
- March 28: Use the Moon in the pre-dawn sky to spot the thin rings of Saturn

Sunset and Twilight:

- Sunset ranges from 5:45pm (1st) to 7:41pm (31st)
- Evening twilight ends from 7:14pm (1st) to 9:10pm (31st)

Lunar Phases and Apsides:

- Perigee: March 1, 4:21pm (224,914 miles)
- First Quarter: March 6, 11:33am
- Full Moon: March 14, 2:55am
- Apogee: March 17, 12:36pm (252,124 miles)
- Last Quarter: March 22, 7:32am
- New Moon: March 29, 7:00am
- Perigee (again): March 30, 1:25am (222,530 miles)

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to the pursuit of observational and photographic astronomical activities. **Meetings are held at 7:30 p.m. on the third Monday of each month. We meet at the VWCC STEM building ST312. Directions are below. Meetings are open to the public.** Observing sessions may be held, weather and sky conditions permitting, at a dark-sky site. For information regarding joining RVAS, including annual dues, click here. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS or its editor.

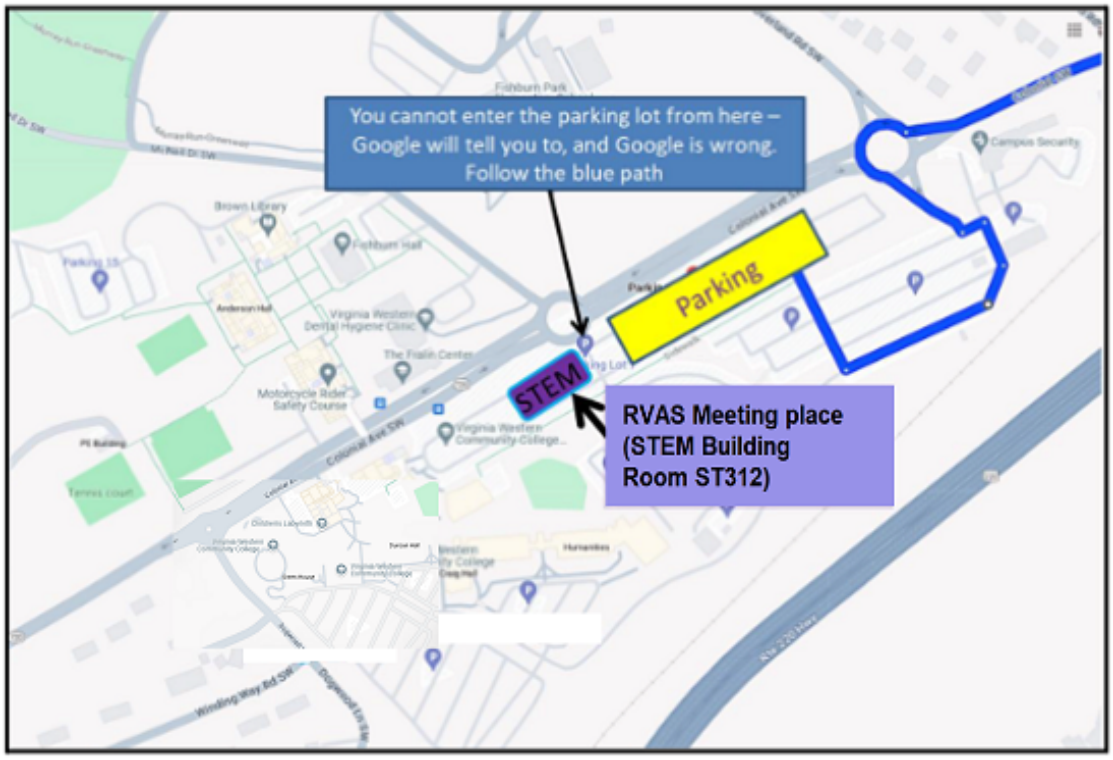
Officers/Executive Committee/Editor/Webmaster

Michael Good, President (president@rvasclub.org)
William Krause, Vice President (vicepresident@rvasclub.org)
Erin Elliott, Secretary (secretary@rvasclub.org)
John Sheffey, Treasurer (treasurer@rvasclub.org)
Nancy Vogelaar, Officer at Large #1 (officeratlarge1@rvasclub.org)
Caleb White, Officer at Large #2 (officeratlarge2@rvasclub.org)
Michael Hutkin, Past President (pastpresident@rvasclub.org)
Ed Dixon, Newsletter Editor (editor@rvasclub.org)
Erin Elliott, Webmaster (webmaster@rvasclub.org)

Directions to RVAS Meeting Location

Virginia Western Community College STEM Building, Room ST312
3094 Colonial Ave SW, Roanoke, VA 24015

VWCC is located in the southwestern area of the City of Roanoke. The STEM Building is accessed via the roundabout at Overland Drive and Colonial Avenue, near Campus Security at the top right of the map. The STEM Building is at the opposite end of the Colonial parking lot from Campus Security. Follow the darker blue path from the roundabout and park anywhere in the lot.



Note: Google provides incorrect guidance to access the parking lot from the roundabout at McNeill Drive. That roundabout **does not** provide an entrance to the parking lot.

Influence the future, Nominate the young!

Horkheimer Youth Service Award: The Smith and D'Auria Awards...

If you know a League member, 18 years or younger, who has brought amateur astronomy to your club or to the public, please consider nominating that person for one of the two Horkheimer Service Awards.
First place winner receives the beautiful Horkheimer/Smith Award plaque, an expense paid trip to ALCon, and a $1750 check!
Second place winner receives the beautiful Horkheimer/D'Auria Award plaque, and a $1000 check!

Horkheimer/Parker Youth Imaging Awards...

Specifically meant for young people who have images that they are particularly proud of.

- Must be 18 years old or younger.
- Must be a member of the Astronomical League.

First place winner receives a beautiful plaque and $1000!
Second place winner receives $500.
Third place winner receives $250.

National Young Astronomer

Sponsored by Explore Scientific

Recognizes outstanding astronomical research achievements of high school age students throughout the United States.

Eligibility Requirements

- Must be 14 - 19 years old (when nominated).
- Must NOT be enrolled in college.
- Project must be applicant's own work.
- Team effort is permitted.

Winning Entries
First place winner recieves a fine telescope from **Explore Scientific** and an expense paid trip to ALCon. Second place winner also receives an expense paid trip to ALCon. Both winners will present their projects at ALCon.

Horkheimer Youth O'Meara Journalism Awards...

Expressing onself effectively is so very important. The O'Meara Journalism Award has been created to spotlight young scientists who submit well composed science essays that demonstrate their writing talent.

- Must be 8 to 14 years old at the time of the piece.
- Must submit a 300 - 500 word essay about a science related topic.

Consider that the purpose of these ten or more avenues of recognition is not simply to encourage students to become professional astronomers.
No, it is much more than that...

It is to open young minds to examine where their futures may lead.

It is to open young hearts to a lifelong love of the night sky.

It is to show that amateurs across the country respect the activities of young observers, letting them know that amateur astronomy is a worthwhile avocation.

Entry Deadline: March 31

More details - https://www.astroleague.org/astronomical-league-awards/

Public service announcement from Bert Herald:

Bert Herald has a friend who purchased a large number of 35mm slides from a science museum, and is offering them to anyone in our club who is interested. Bert writes:

He purchased a large number of 35mm slides and apparently some or all originated from a science museum (unknown what museum). He texted me that he has "over 100 lbs of astronomy photos" boxed in groups of 50. He thinks some may be from Voyager spacecraft. He was offering them to me but I have no use (or time) for them.

The friend lives in Roanoke. I haven't seen the slides but I told him the club might be able to help him properly offload them (either to the club or maybe to the Roanoke science museum or a library or...?). His email is jimmymls7@gmail.com (Jimmy Moore). I believe he's a photography guy himself but mostly does non-astro photos, I think lots of nature photography."

Coming Events of Interest:

Bert Herald writes:

The Natural Bridge State Park is going to be having some astronomy programs starting in March. I met with Aaron Farmer at the park (he oversees volunteers). They would love anyone with astronomy or astrophotography experience and gear to help out or give talks. You need to go through an online background check process first (takes a few weeks). I plan on helping out when I can.

He said for interested parties from RVAS to contact him:

Aaron.Farmer@dcr.virginia.gov

For more interest in the Natural Bridge State Park Dark Sky area, see here:

https://www.dcr.virginia.gov/state-parks/natural-bridge

Blue Ridge Kite Festival: Call for Volunteers!

Saturday, April 19th
10 AM -3:30 PM (volunteer shifts from 8:30 – 12, 12 – 3:30)
Green Hill Park in Salem
FREE!! FAMILY-FRIENDLY
https://www.roanokecountyparks.com/365/Kite-Festival

To volunteer or for more information, contact Nancy Vogelaar:
540-239-5962 n.vogelaar@verizon.net

James Webb telescope solves 20-year-old Hubble conundrum

This could finally explain why the universe's oldest planets exist!

See below for more information about this.

https://www.livescience.com/space/astronomy/james-webb-telescope-solves-20-year-old-hubble-conundrum-and-it-could-finally-explain-why-the-universes-oldest-planets-exist

Opportunities:

The Big Lick Stamp Club is holding their Spring event and invited RVAS participation. They would provide a table for us to distribute club information, to showcase some equipment, and answer questions. They would feature exhibits of "Astronomy on Stamps" for any interested Astronomy Club members and they would advertise RVAS' participation in their advertising. Any volunteers for this?

Date: Saturday, April 12
Hours: 10:00 a.m. until 4:00 p.m.
Location: Thrasher Memorial United Methodist Church, 707 E Washington Ave, Vinton, VA 24179

Contact Mike Hutkin at pastpresident@rvasclub.org for more information

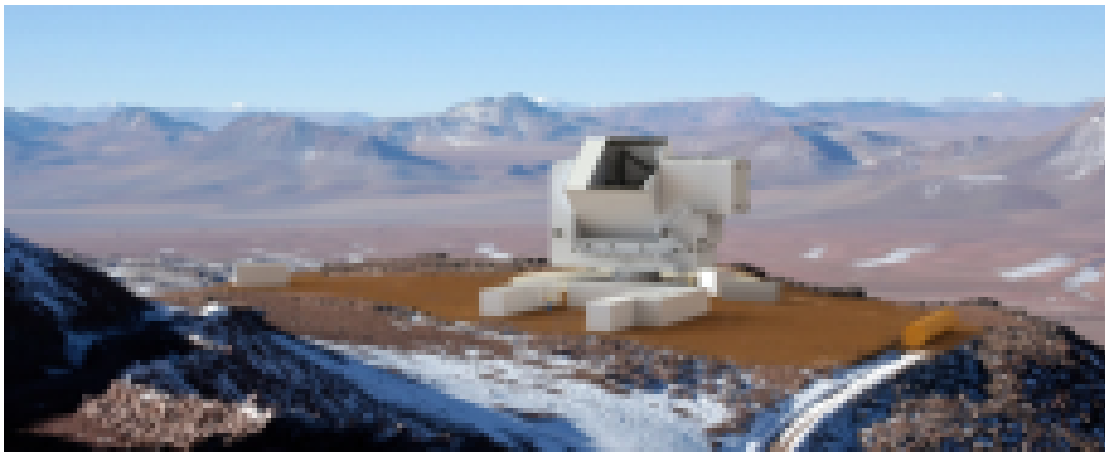
We regret to inform you that RVAS member Tom Cerul, one of our club's accomplished astro-photographers, lost his wife Bettie to Pancreatic Cancer on Feb 6. Tom and Bettie met as Juniors at George Washington University and were together for 61 years. Keep Tom in your prayers as he struggles with this loss.

Relatively new member Sarah Christie suddenly lost a very close member of her family in January, and we need to keep Sarah in our thoughts and prayers as well.

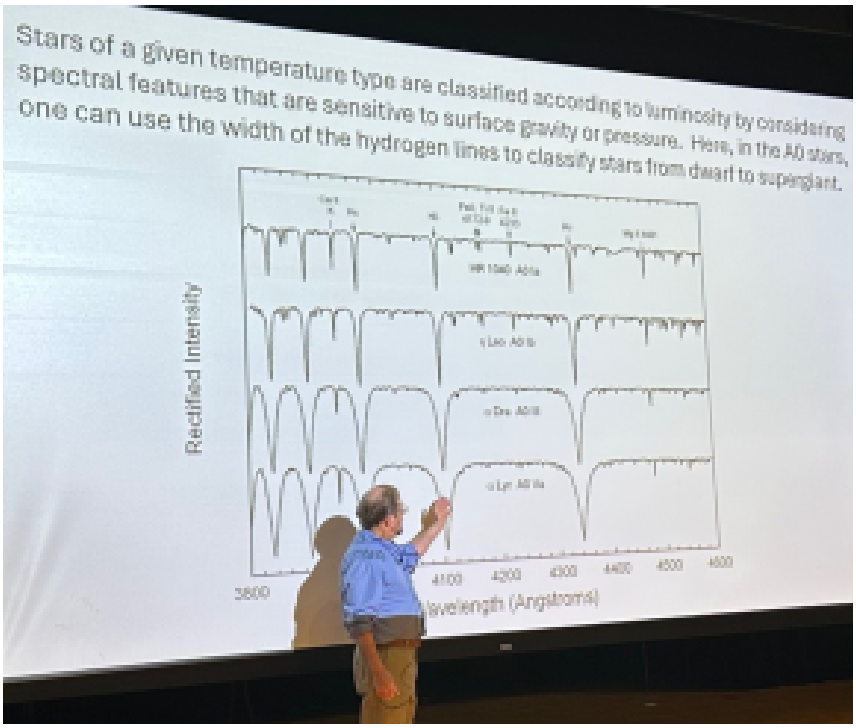
TriStar 2025 recap

Michael Good, and his wife Kathy, drove to the TriStar convention in Jamestown, North Carolina, at the Guilford Technical Community College. We listened to four lectures.

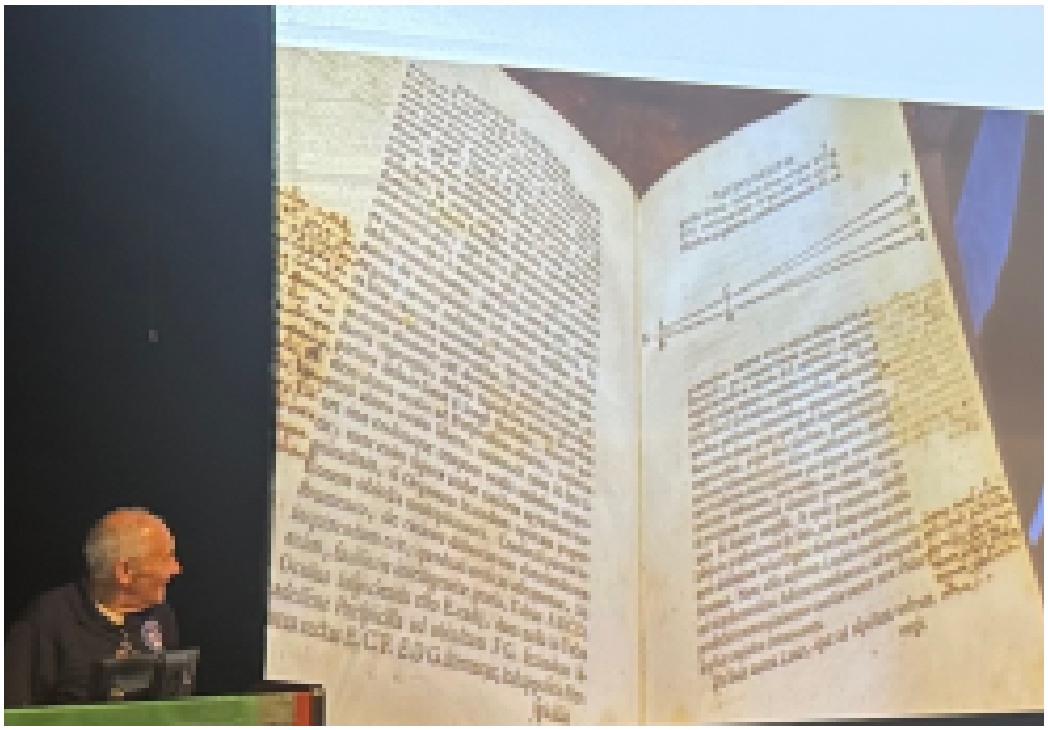
a. Dr. Eve Vavagiakis, from Duke University, gave an engaging lecture on "A New Generation of Millimeter and Submillimeter Observations for Cosmology and Astrophysics". Eve share images of a new collector being installed at 18,000 feet (!) above the Atacama plateau. Designed to improve resolution of CMB data collection, this instrument has the coldest temperature in our universe, literally only a few milli-Kelvin above absolute zero, much colder than deep space (which is bathed in the CMB radiation).



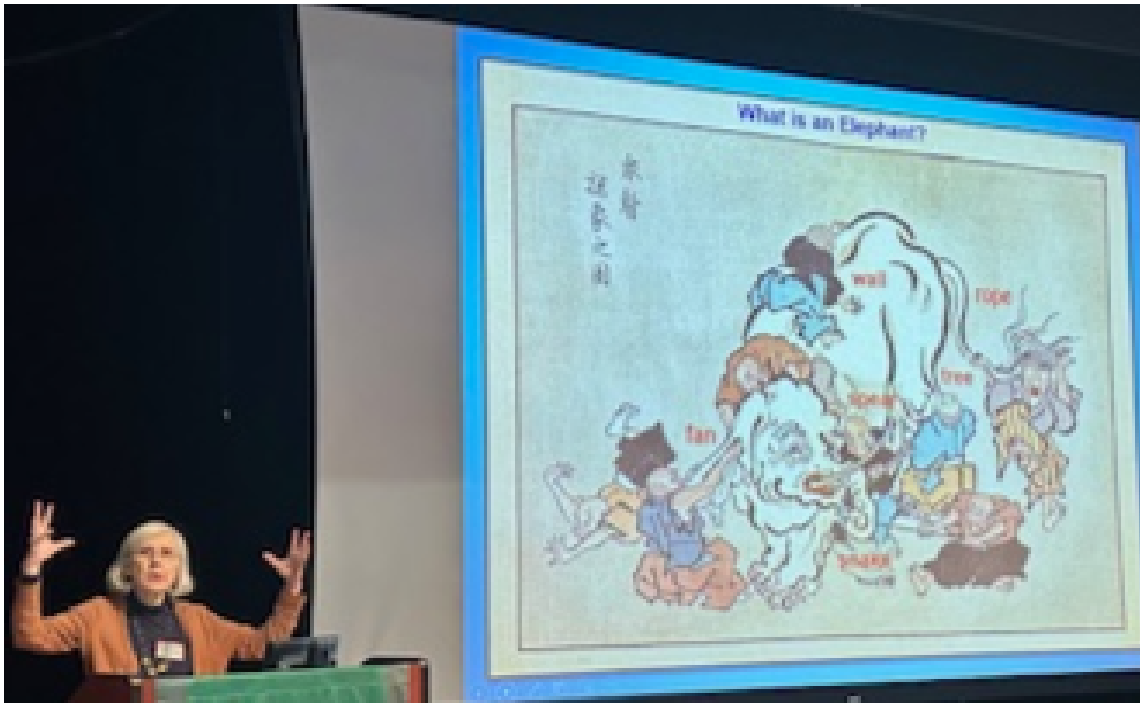
b. Dr. Richard Gray, Professor Emeritus at Appalachian State University, spoke on "Probing the Personalities of Stars through their Spectra". He showed the spectrograph he built as a Fulbright Scholar in South Africa, for a 1.5 meter Cassegrain they have, and went into detail showing the spectral lines visible for each of the OBAFGKM stellar classifications.



c. After lunch, Ken Brandt (Robeson Planetarium & Science Center) spoke on “Up From the Ashes: the Coolest Space Missions that Most People Have Never Heard Of”, reviewing some of the greatest missions that have flown to the Moon & Mars among others. He was recently in Italy and got to see “Starry Messenger”, with comments in the margins (in Italian) like “ridiculous, ridiculous”!



d. Finally, Dr. Barbara Becker (Univ of California – Irvine) spoke on “Horrid Quasar: The Redshift Controversy”. This was an interesting talk on how scientists often disagree on what some new discovery might actually be. She shared Harold Arp’s opinion that Quasars were close objects, and how the astronomical community slowly distanced themselves from Dr. Arp, and no longer awarded him telescope time for further research. Personally, I still like his catalog of Peculiar Galaxies! Here, Dr. Becker describes “What is an Elephant?”



Check out the Astronomical League Live segment “Ten Illusions of the Night Sky” presented by Tom Reinert. This can be found on YouTube at

https://www.youtube.com/watch?v=0Y7cNZXBj3c

The presentation starts at time – 31.49. As a bonus, listen to our own John Goss starting at Time 6.40 address volunteering.

At the awards portion of Tristar, Michael Good won First Place in the astro-imaging contest with an 8x10 print of his Pleiades mosaic, beating out about 30 other entries.

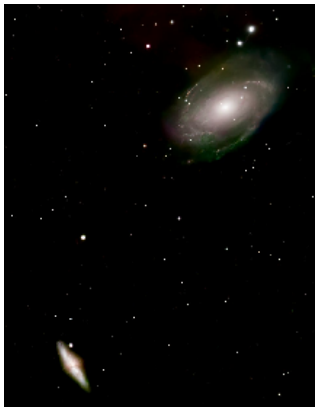
February 2025

Ctrl- Click on the picture see the source file and additional information

Ben Hartman

Noah Winslow

Ed Dixon



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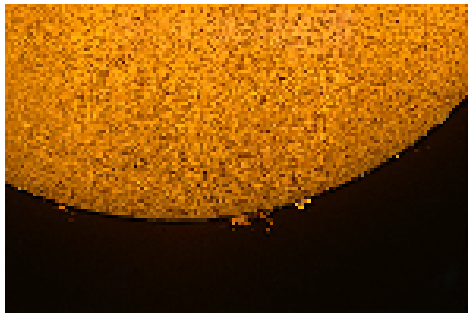

Ed Dixon

Tara Wu

Tara Wu

Tara Wu

Tara Wu

Noah Winslow

Noah Winslow

David Thomas

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Michael Good

Ed Dixon

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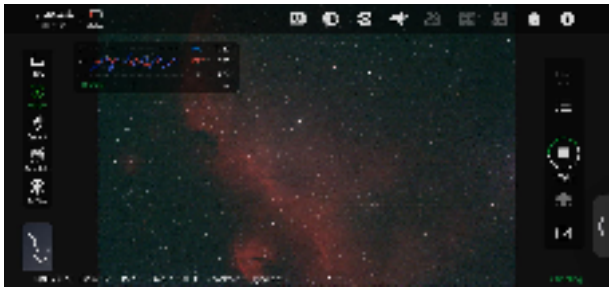
David Thomas

Ben Hartman

Dark Sky Ally

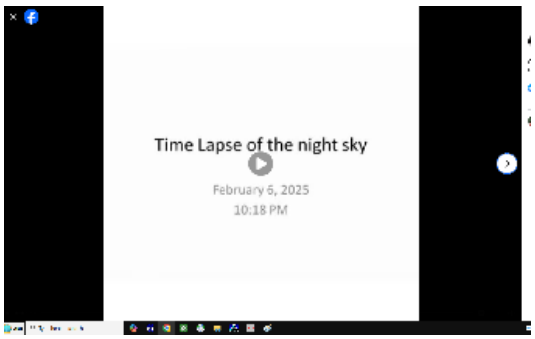
Noah Winslow

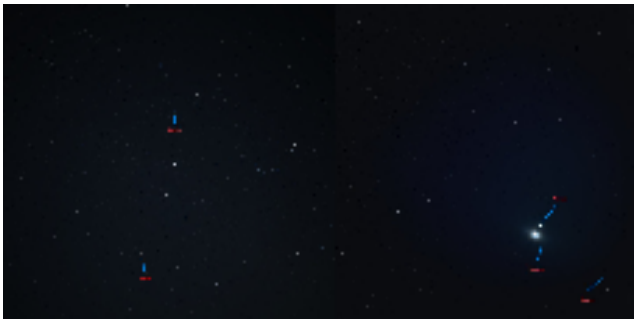
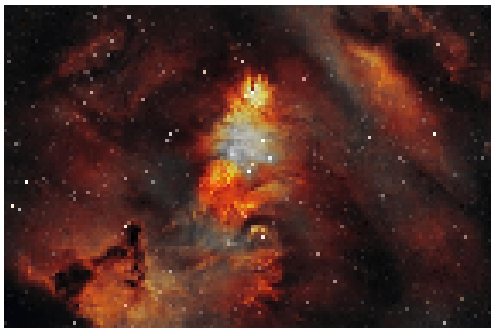
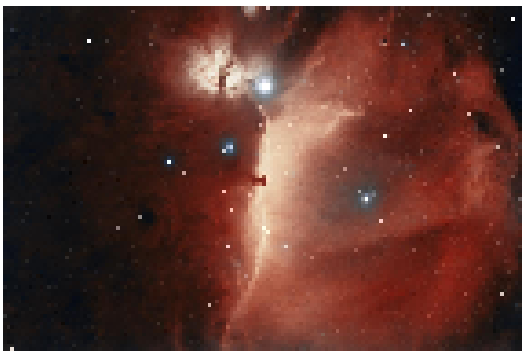
Noah Winslow



Noah Winslow

David Thomas



Noah Winslow 	**Michael Good** 
Ed Dixon 	**David Thomas** 
Noah Winslow 	**Noah Winslow** 
Michael Good 	**Noah Winslow** 

Ed Dixon 	**Ed Dixon** 
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