Richland Astronomical Society
The Warren Rupp Observatory

M111

April 2025

The newsletter of the Richland Astronomical Society and Warren Rupp Observatory

Member News: Celebrating Our Rising Stars

The Richland Astronomical Society is proud to highlight the achievements of two of our outstanding young members, both of whom will graduate from high school this spring.

Will Marshall will be attending **The Ohio State University** this fall to pursue a degree in **Astrophysics**! OSU is home to one of the nation's most comprehensive Astronomy and Astrophysics departments. Will's interests don't stop there, he also plans to study **Art** and **Philosophy**, embodying the spirit of a true Renaissance thinker. We've greatly enjoyed his engaging talks at the observatory and look forward to seeing (and hearing) more from him in the future!

Katherine Thesling has distinguished herself as a competitor in **Science Olympiad**, with a special focus on Astronomy. This February, she and her partner earned **6th place** in the Astronomy category at the highly competitive **2025 Carnegie Mellon University Invitational**. Her final Science Olympiad contest will take place this April, after which she will head to university to study **Computer Science**.

Reflecting on her journey, Katherine shared a special memory:

“At a WRO public night, one of the objects we were viewing happened to be one that I had studied in Science Olympiad, the Helix Nebula. It was very cool to be able to actually see the same planetary nebula that I had been researching in real life!”

We congratulate both Will and Katherine and will be rooting them on in their future endeavors. The sky is truly the limit! (Submitted by Mark Vanderaar)

Changes to the Asterism Observing Program

Lots of changes. If you recently worked on this Program, are working on it now, or are thinking about working on it, this is for you.

- Modifications to make the awards available to southern observers.
- Addition of Eyes-Only certificate (13 objects).
- Addition of Binocular certificate (15 objects).
- A reduction in required number of objects for full certification (and pin) (91 objects).

May 3, 2025 Meeting Presentation - "The 1919 Eclipse that made Einstein Famous" by Dr. Stephan Frank, OSU

In 1919, two expeditions sent by the British Royal Astronomical Society to observe a total Solar Eclipse (in Brazil and off the coast of West-Africa) spectacularly confirmed theoretical predictions of the deflection of starlight when passing near massive objects. Albert Einstein, by then moderately popular within the world of Physics, as the author of those predictions within the framework of his Theory of General Relativity, almost immediately rose to the status of "international science super-star", due to the widespread enthusiastic media coverage. Apart from a (very) brief introduction to the two Theories of Relativity, we will also examine how several earlier expeditions to observe that phenomenon had failed (sometimes under dramatic circumstances) - which ultimately can be almost seen as a stroke of luck, ironically. We will in addition explore how the same principle of light-bending due to the presence of mass is still used today, and in fact pioneered by OSU researchers in the search for extrasolar planets.

MODIFICATION OF A BACKYARD OBSERVATORY FOR MOBILITY CHALLENGES

Francis Graham - Christina Alley Observatory

In 1986 I acquired a beautiful long focus refractor of the type used in small colleges, that required permanent mounting, a 15.5 cm f/15. In March, 1991, I mounted this in a 10 x 10 x10 foot cube with a roll-off roof, built by James Paradise and company from my blueprints. The roll-off roof design was chosen instead of a dome because I did not want it to stand out in the neighborhood. I wanted it looking instead like any other ordinary yard building.

The roof was slid off with casters on runners, at the same level, by me or any other observer climbing a ladder, grabbing handles attached to the inside roof, and sliding it. It was a lightweight roof.

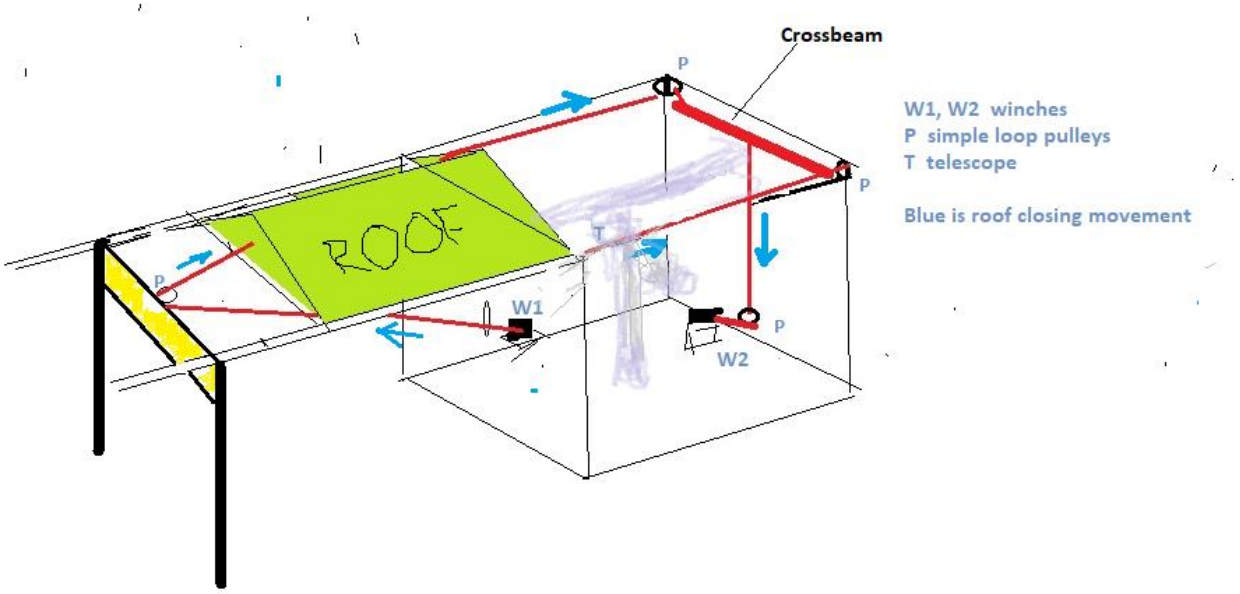
This little backyard observatory, Christina Alley Observatory, now is a source of viewing pleasure for me. Nebulae and comets are excluded from view except on exceptional nights, because of nearby streetlights and urban sky illumination. I strained to see all the Messier objects, utilizing only the best nights. The telescope, though, is very good for double stars, the Moon, and planets. I have many times taken my Kent State students here over the years, but now it is just for me.

The German-type equatorial mounting has an old-fashioned clock drive I have re-installed, and there is no computer control. I find things in the sky the old nineteenth century way, by following star fields, or by setting circles.

People contemporary with me will recognize the telescope mount as a very heavy steel mount for an Edmund 8-inch Newtonian, that was certainly overdesigned for the fiberboard tube of the Newtonian that was originally put on it. It's perfect for this refractor. In 1991 I sank the supporting pipe deep into the bedrock. Over the years, it has not deviated from the vertical.

Various repairs and re-roofing occurred over the years, and I am grateful to August Pirkheim, Leif Hammer, and others for help. The roof was entirely destroyed in a windstorm on April 13, 2010. Its last roof incarnation lasted from then. But the main difficulty was that I had to climb a ladder, very risky and painful after my pedestrian accident in March, 2016. Finally --No ladders: doctor's orders.

So, the design for opening and closing the roof from the ground level jelled. Robert Dinkel had donated one winch, and I acquired the other from Harbor Freight. Manual cranks were chosen, although the Harbor Freight model can be operated electrically. Piece by piece the thing was put together, and the roof replaced one final (!?) time, after the old roof ran off track easily. Theresa Graham and Gloria Halliday were help in this transformation, as were Dan Cordera and his crew. I also had some wind damage to the edge of my back porch roof, but the Observatory came first.



Opening the roof was simple enough: a steel cable looped and fed back into the winch in the Observatory. The closure was more complicated. To allow the telescope free rotation to all parts of the sky when the roof was open, the closure cables ran on either side of the roof. They were connected at the ends of a 9 ft. crossbeam which was at the top when the roof was fully opened. A cable connected the center of the crossbeam down the wall to a pulley, and then only 18 inches up to a second winch. This would not interfere with telescope rotation.

As one cranked the second winch, the crossbeam descended to the floor, pulling on the roof from both sides. When the crossbeam reached the floor, the roof was closed.

Illustrations

Constructing Christina Alley Observatory, March 14, 1991.

Completed Observatory, March 22, 1991.

Another view of scope and roof opened, March 22, 1991.

New Bracing and runners installation, April 3, 2023

Roof Rebuild April 5-7, 2023

Roof Completed April 11, 2023

Painting of exposed bare surfaces completed June 18, 2023

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The author and Sterling Tomczak.

Telescope aimed at Venus, May 10, 2023

Our old planetarium finds its forever home.

Here's some pictures from the Lorain County Metro Park's Universe of Wonder showing the Starlab inflatable planetarium we donated to the Parks. The event took place over three weekends in March. (Submitted by Mitch Luman)

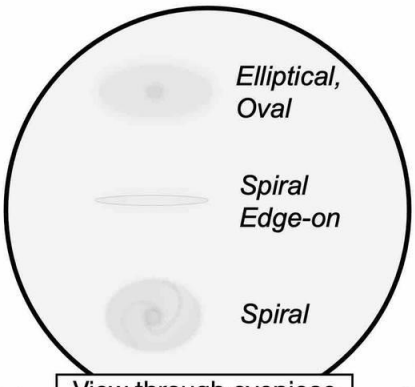
Observing Galaxies

Because galaxies are so very far away, they are typically faint. Therefore, your goals are to increase light collection and to maximize visual contrast whenever possible.

• Clear, dark skies are best.
• The larger the aperture of the telescope, the better. A four inch telescope barely reveals less than a dozen dim, indistinct glows, while an 8 inch scope picks out several dozen under the best conditions. Larger scopes begin to show internal structures such as dark dust lanes and spiral arms.

Consider these factors when observing:

• Note the general shape and apparent size of the galaxy. Is it more round than oval? Is it thin?
• If it is oval, in what direction does its major (long) axis point?
• What does the core look like? Is it star-like, or a round glow? Is it indistinct?
• Are spiral arms visible?
• For edge-on galaxies, are dust lanes visible?
• How quickly do the boundaries fade into blackness?
• Are smaller and dimmer galaxies also visible in the field?



View through eyepiece

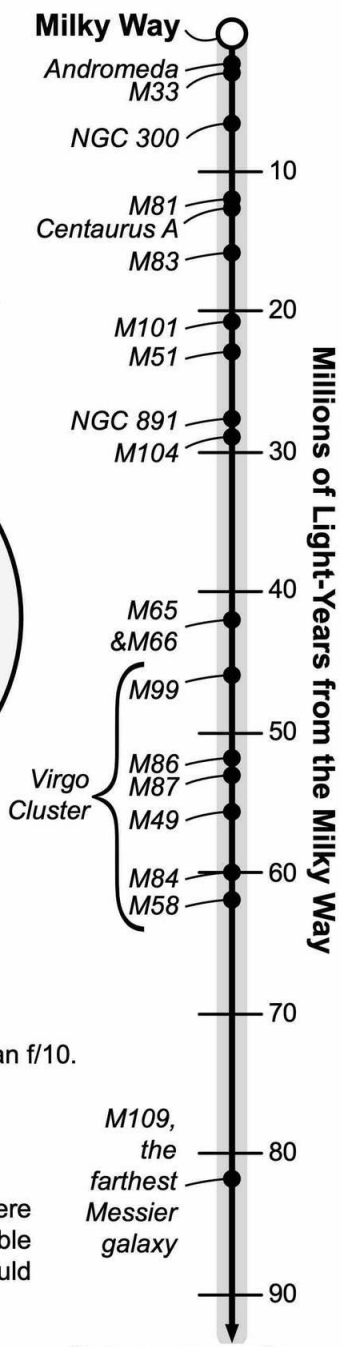
Enhance your view:

• Use averted vision.
• For better perception of small details, increase the magnification.
• To increase contrast, use a smaller focal ratio scope–f/5 is better than f/10.
• Tap the telescope tube to help bring out detail.
• Increase apparent field contrast by covering your head with a hood.

The importance of surface brightness:

The published magnitude of a galaxy refers to its brightness as if it were a point source. A galaxy, however, spreads its light over an appreciable area, making it appear dimmer than its published magnitude would suggest. As a result, it may be surprisingly difficult to discern.

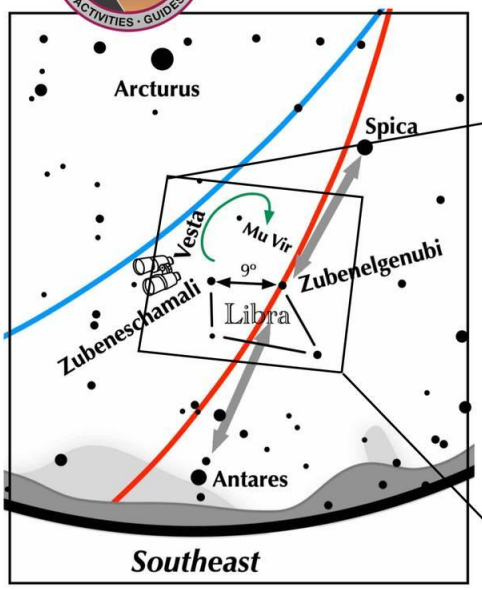
Record your observations! Use a logbook, tablet, laptop, or voice recorder. Your notes are too precious to lose! You will refer to them years later.

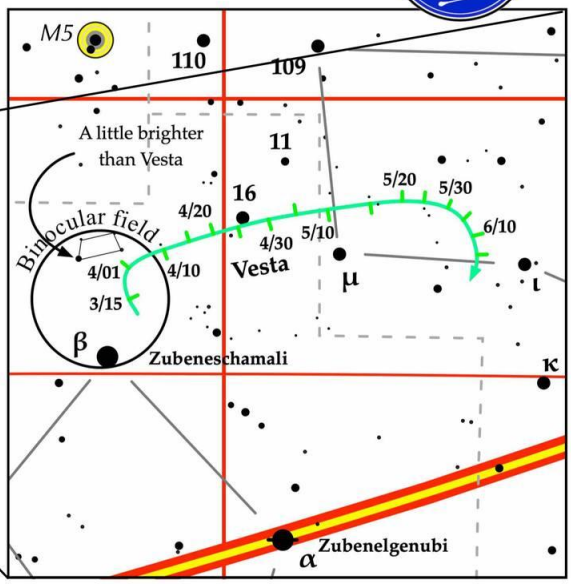


Deepen your experience: Appreciate the distance of your target galaxy, and how long its light took to reach your eyes!

Have you ever spotted the asteroid Vesta?

March through June presents your chance!

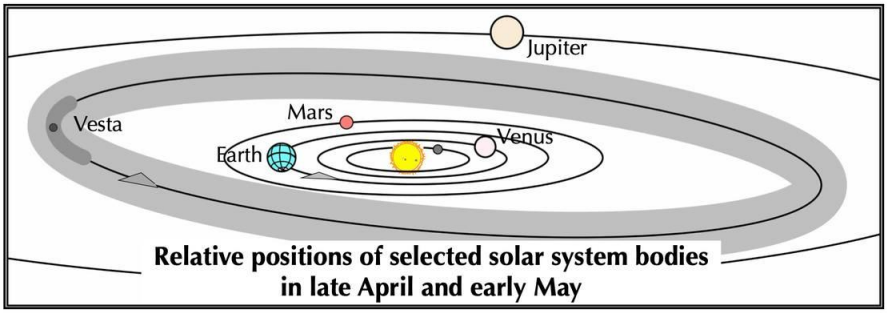




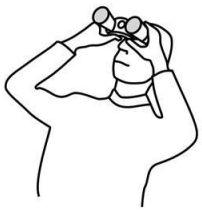
To find Vesta:

- Look toward the southeast after 11 pm in early April, and after 9 pm in mid April for Alpha Librae, aka Zubenelgenubi. It is mid way between Spica and Antares.
- About 10° north of Alpha is Beta, aka Zubeneschamali. How far is 10°? It is the width of a fist on a fully extended arm.
- Place Beta near the southern edge of the binocular field. From late March through early April, Vesta appears in the same field as Beta. For the rest of April, it moves up to two binocular fields northwest of Beta.
- Look 90 minutes after sunset from mid May through mid June for Beta.
- **Use the maps to locate the starlike point of Vesta.**
- On Apr 25, 5.3 mag. Vesta lies 10' south of the 4.5 magnitude 16 Lib.
- Vesta reaches opposition on May 2 when it is 110 million miles from Earth. It then shines at magnitude 5.3.

- Diameter = 326 miles, about 1/6 that of the moon.



Relative positions of selected solar system bodies in late April and early May



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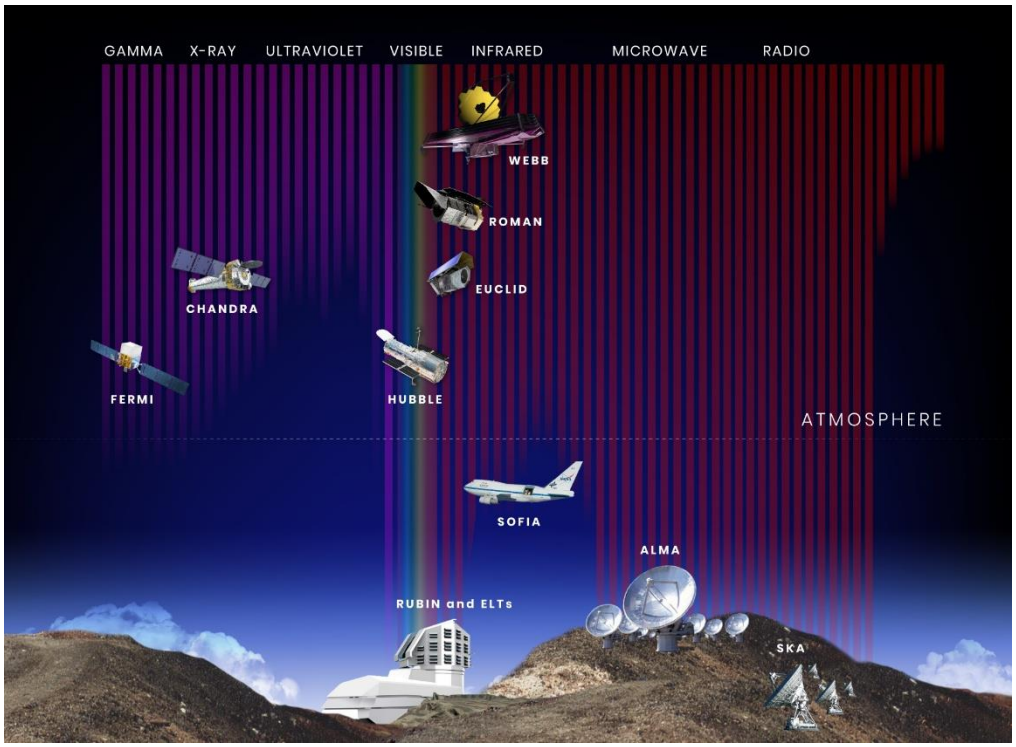
April's Night Sky Notes: Catch the Waves!

By Kat Troche

The Electromagnetic Spectrum

If you've ever heard the term "radio waves," used a microwave or a television remote, or had an X-ray, you have experienced a broad range of the electromagnetic spectrum! But what is the electromagnetic spectrum? According to Merriam-Webster, this spectrum is *"the entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light."* But what does **that** mean? Scientists think of the entire electromagnetic spectrum as many types of light, only some that we can see with our eyes. We can detect others with our bodies, like infrared light, which we feel as heat, and ultraviolet light, which can give us sunburns. Astronomers have created many detectors that can "see" in the full spectrum of wavelengths.



This illustration shows the wavelength sensitivity of a number of current and future space- and ground-based observatories, along with their position relative to the ground and to Earth's atmosphere. The wavelength bands are arranged from shortest (gamma rays) to longest (radio waves). The vertical color bars show the relative penetration of each band of light through Earth's atmosphere. Credit: NASA, STScI

Telescope Types

While multiple types of telescopes operate across the electromagnetic spectrum, here are some of the largest, based on the wavelength they primarily work in:

- **Radio:** probably the most famous radio telescope observatory would be the Very Large Array (VLA) in Socorro County, New Mexico. This set of 25-meter radio telescopes was featured in the 1997 movie Contact. Astronomers use these telescopes to observe protoplanetary disks and black holes. Another famous set of radio telescopes would be the Atacama Large Millimeter Array (ALMA) located in the Atacama Desert in Chile. ALMA was one of eight radio observatories that helped produce the first image of supermassive black holes at the center of M87 and Sagittarius A* at the center of our galaxy. Radio telescopes have also been used to study the microwave portion of the electromagnetic spectrum.

- **Infrared:** The James Webb Space Telescope (JWST) operates in the infrared, allowing astronomers to see some of the earliest galaxies formed nearly 300 million years after the Big Bang. Infrared light allows astronomers to study galaxies and nebulae, which dense dust clouds would otherwise obscure. An excellent example is the Pillars of Creation located in the Eagle Nebula. With the side-by-side image comparison below, you can see the differences between what JWST and the Hubble Space Telescope (HST) were able to capture with their respective instruments.

NASA's Hubble Telescope captured the Pillars of Creation in 1995 and revisited them in 2014 with a sharper view. Webb's infrared image reveals more stars by penetrating dust. Hubble highlights thick dust layers, while Webb shows hydrogen atoms and emerging stars. You can find this and other parts of the Eagle Nebula in the Serpens constellation. Credit: NASA, ESA, CSA, STScI, Hubble Heritage Project (STScI, AURA)

- **Visible:** While it does have some near-infrared and ultraviolet capabilities, the Hubble Space Telescope (HST) has primarily operated in the visible light spectrum for the last 35 years. With over 1.6 million observations made, HST has played an integral role in how we view the universe. Review Hubble's Highlights here.

The Crab Nebula, located in the Taurus constellation, is the result of a bright supernova explosion in the year 1054, 6,500 light-years from Earth. Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Infrared: NASA/JPL/Caltech; Radio: NSF/NRAO/VLA; Ultraviolet: ESA/XMM-Newton

- **X-ray:** Chandra X-ray Observatory was designed to detect emissions from the hottest parts of our universe, like exploding stars. X-rays help us better understand the composition of deep space objects, highlighting areas unseen by visible light and infrared telescopes. This image of the Crab Nebula combines data from five different telescopes: The VLA (radio) in red; Spitzer Space Telescope (infrared) in yellow; Hubble Space Telescope (visible) in green; XMM-Newton (ultraviolet) in blue; and Chandra X-ray Observatory (X-ray) in purple. You can view the breakdown of this multiwavelength image here.

Try This At Home

Even though we can't see these other wavelengths with our eyes, learn how to create multiwavelength images with the Cosmic Coloring Compositor activity and explore how astronomers use representational color to show light that our eyes cannot see with our Clues to the Cosmos activity.

How to submit content and suggestions

Please send any content submissions, questions, or suggestions to the RAS secretary at secretary@wro.org.