WESTMINSTER ASTRONOMICAL SOCIETY, INC. (WASI)

Membership News

Volume 41 – Number 1 Winter 2025

Message from our Society's President, Wayne (Skip) Bird

Howdy People and Welcome to Wayne's World,

I just returned from sunny and warm Florida (70's) to cold and breezy Maryland (30's, Hey I hear cold clear air is the best for seeing), unless your breath fogs the lens. which brings up one of the many topics of today's rant (I'm up for reelection in Jan, so here is your chance to get away from my dictatorship). With weather like we have in our area YOU could really use an Observatory just like the one the club has FOR SALE. (see pics on OUR website). OR any off the other astronomy related things we have FOR SALE. In fact if you have anything (cars, boats, trucks, homes, property, beach front condo, gold bullion, volunteer time, etc.,) you would like to donate, will, pass on, get rid of, etc., lets talk. As mention before we have a large lending library and assorted scopes, bino's, and etc's to check out from the club. Drive it before you buy it, how much better can it be? So get a hold of Curt and start emptying his basement.

I would also like to take a couple of lines to again thank all those people who have helped out in the years past when it comes to outreach. Without your help our club would not be the fun place that many people come to love and cherish (Thanks Laurie, Al and others who made the holiday party a success), if you weren't there you missed out. Jackie has the pics to prove it (PS you owe me a pic of the grand prize Al won).

Lets hope the next 40 years of our club are just as much fun as the past 40 have been. I hear the 50th anniversary is going to be really special (that's a hint to whomever is planning it).

Elections are this month so please come to the Jan meeting and vote (If you are not there you can still be elected for an office) so show up to make sure you are not railroaded into an office. Be the change you would like to see.

THE FOLLOWING IS A PAID POLITICAL ANNOUNCEMENT!

The Westminster Astronomical Society has grown a lot in recent years. We now have about 170 members. The Board and Officers want to ensure that WASI continues to serve our members' interests... but it's not really clear what those interests are! So, we'd sure appreciate it if you could take a few minutes to fill out this survey. You can access it here: https://tinyurl.com/2wkv88zb"

Until next time..... Astronomy is Looking Up!

Skip

WASI News

All WASI members are also members of the Astronomical League. The AL has many great resources; it's worthwhile to check out the web site (https://www.astroleague.org/). One fun aspect is the League has many observing challenges (https://www.astroleague.org/observing-program-division/) for which you can earn a pin or certificate. There's a form on our website you can use to submit your observations to the AL—find it here: https://westminsterastro.groups.io/g/main/files/Observing & Challenges/Outreach Awards/OutreachSubmissionForm-1.xls .

Did you know these newsletters are archived on our web site? Issues dating all the way back to 1984 are there. Find them at https://www.westminsterastro.org/mda-3/. And our groups.io page is chock-full of useful info, like our Wiki which is here: https://westminsterastro.groups.io/g/main/wiki.

We have quite a bit of used gear for sale (including an observatory dome!). See the list here: https://www.westminsterastro.org/for-sale/.

Looking for volunteers! We could sure use someone to manage the Zoom recordings or our membership meetings and posting those to YouTube. And we could use a "hospitality director" to make sure people have signed up for providing refreshments at the meetings. You don't have to be there each month, but should ensure that someone gets the refreshments and sets them up, and puts them away in the back of the room (WASI will pay for these).

Join us at the January meeting (January 8) for officer elections. And if you haven't picked up your lanyard and membership pin, please do so at the meeting.

Tom Milley getting his plaque from the Astronomical League for his fantastic work on WASI's web site.

Chuck Gaither's son getting a scope from Gary Hand.

Using the Observatory and Bear Branch's Grounds

The Westminster Astronomical Society has a great relationship with the folks at Bear Branch Nature Center (BBNC) based on mutual respect for each organization's needs and concerns. Two of the benefits WASI members enjoy are access to Bear Branch's dark site for observing, and the use of our observatory. These are located on Carroll County's Bear Branch Nature Center property. It's important to follow a few rules to nurture our relationship with the County and be in compliance with current written agreements.

The park is officially closed at dusk. If you would like access to it for the use of the observatory, or just to enjoy the dark skies, perhaps with your own equipment, please adhere to these procedures:

1. If you want to use the site after dark, you must request permission first.
    a) Send a request to Jeff Burns (jeff.burns@orano.group) and Laurie Ansorge (lvhager@comcast.net) at least 48 hours in advance. It's OK to ask for access for several nights.
    b) Jeff or Laurie will contact Bear Branch's staff (cc'ing the other) and collect any additional information (e.g., if others are using the property).
    c) Only after an affirmative answer are we allowed on the site after dark. The police enforce this for all of the County's parks.
    d) If you are requesting use of the observatory, and wish to share your time with others, you will be the main responsible party.
    e) Members appreciate getting a message when the site is open for viewing!
    f) Please don't contact BBNC about WASI activities. We work through agreed upon designated contacts.
2. Sometimes WASI will send an email to the membership letting us know we have access on a particular night. Please feel free to come! But first, email Jeff and Laurie. WASI and County insurance requires that we know who is there after dark - the email is our form of documentation.
3. When we have advertised public star parties (for example, the standing one on the second Saturday of every month in conjunction with the Planetarium show), there is no need to ask for permission or to notify Jeff and Laurie that you will be coming.
4. Do note that at times there are some conflicts with BBNC's activities. They may have the parking lights on. Do not ask for them to be turned off, as we are their guests and the lights will be turned off at the end of the function. Our agreement notes the need to preserve dark skies.
5. Recognize that we do not have permission to use the Nature Center's building unless there is a public event going on, like a planetarium show.
6. We go to a dark site for, well, darkness! It's best if you can arrive while it's still light out. Otherwise, please be respectful of observers who may be there and follow these safe observing practices:

a) Please drive carefully with your headlights off, as there may be people milling around.

b) Please turn off your interior lights to minimize white light in the observing area.

c) Please turn off all lights as soon as you park. Use red or amber flashlights as you exit your vehicle, unload your car, and during observation sessions.

d) If you are already there observing, recognize that some lights on approaching cars are inevitable, so maintain a sense of humor and decorum. Some stray photons won't kill anyone. You can preserve your night vision by looking away.

7. The police do patrol the site and are aware of our activities. Per our agreement with the County, members must carry and be prepared to present a current membership card. Cards and replacements can be requested from: treasurer@westminsterastro.org.

8. Please don't leave anything behind when you leave.

9. This is a wilderness area. Try not to do anything that will attract wildlife, for their safety and yours.

10. Use of the observatory is only for those of us who have been certified to operate it by the Observatory Director (Jeff Burns). He conducts training sessions from time to time and welcomes any WASI member who wishes to become certified. It's a pretty easy process! And we'd very much like to have more members using that big telescope.

11. If you're there during the day to do maintenance on the observatory, please stop by BBNC's office and let them know what you're up to. The same 48-hour notice is a courtesy since BBNC has limited, busy staff. Of course, they do have the right to postpone our access in favor of their priorities.

A quick summary:

- Send a requests to use the property or observatory to Jeff Burns (jeff.burns@orano.group) and Laurie Ansorge (lvhager@comcast.net) at least 48 hours in advance.
- Wait for an affirmative response, and additional details on use of property.
- Bring your membership card.
- Be "light" responsible.
- Take back what you brought.

Back to Basics—Kepler's Three Laws

Tycho Brahe was a 16th-century Danish astronomer back before the telescope had been invented. His instruments were mostly quadrants and the like which let him measure the position of stars and planets with great precision. He compiled extensive tables of these positions. Alas, he rejected Nicolaus Copernicus's heliocentric (sun-centered) model of the solar system, which had been published just three years before Brahe's birth. But Johannes Kepler, who was his assistant for a year, did find Copernicus compelling, and went on to use Brahe's data to formulate his famous three laws of planetary motion.

Kepler was a deeply religious man who tried to reconcile planetary motions with scripture, and in fact the first edition of his work *Mysterium* sought to use the bible to tease out the truth between geocentrism and heliocentrism. Indeed, he felt the Earth itself had a soul.

He was more an empirical thinker than theoretical; in trying to understand the motion of Mars he tried some 40 models before hitting on the idea of the planet following an ellipse around the sun.

Kepler felt there was a correlation between music and motion, which he called the "music of the spheres." By some sort of analogy to music he came up with his third law.

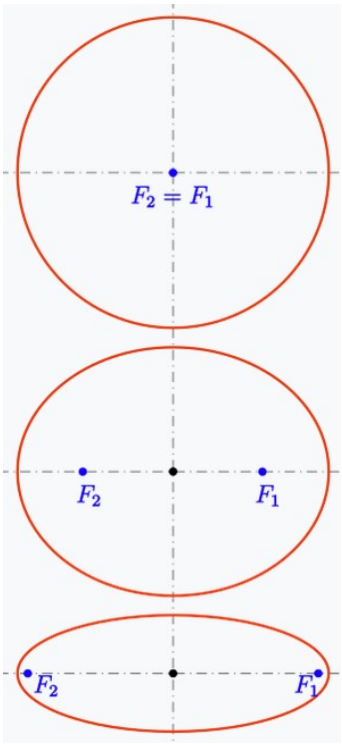
Kepler's three laws are simple and foundational to astronomy. They are:

Kepler's First Law: Planets orbit the sun in ellipses with the sun at one of the ellipses' foci. Of course, in our solar system the planets' orbits are practically circles; the Earth's orbit varies only about 2% from being perfectly round. But other objects, like comets, have highly elliptical paths, coming close to the sun from very distant locations.

While it was Copernicus who popularized the idea of a heliocentric solar system, he got quite a bit wrong. He thought planets travel in circles, and had to invoke complex epicycles to explain their motion.

An ellipse is a flattened circle whose "flatness" is given by its eccentricity. A value of zero means a circle; any value of one or more means a figure that is open like a parabola. Comet Tsuchinshan-ATLAS's eccentricity is 0.9998981, which means its orbit is an ellipse squished about as flat as can be.

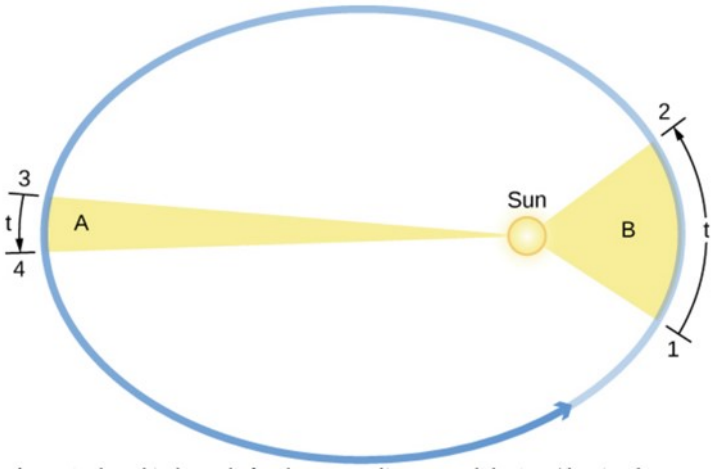
Astrophotographers who do post-processing on their computers know about eccentricity, as the goal is to have round stars—those with eccentricities as close to zero as possible.



Ellipses with different eccentricities. At the top, a circle. Points F1 and F2 are the foci.

Back to Basics—Kepler's Three Laws Continued

Kepler's Second Law: A line between the sun and a planet sweeps out equal areas in equal intervals of time. This is most obvious for an object with a highly-elliptical orbit, like a comet, and is illustrated by this diagram:



In the time it takes a planet to move from position 1 to 2 it will sweep out an area B; as it moves from position 3 to 4 it will sweep out area A which is the same as B. For this to happen, the planet is moving much faster as it goes from 1 to 2 than when it leisurely strolls from 3 to 4. Consider Tsuchinshan-ATLAS: it spent a few weeks near the sun, posing for so many snapshots, but will be hanging out in the distant Oort cloud for the next 80,000 years.

Kepler's Third Law: The square of a planet's orbital period is proportional to the cube of the length of the semi-major axis of its orbit. That's a mouthful! If we assume orbits are nearly circular, what this means is the distance from the sun to a planet, cubed, is proportional to the square of the time it takes to go around the sun. Mathematically, if P is the period and D the distance:

$$P^2 = cD^3$$

"c" is a constant, but if the distance is in astronomical units (the distance from the Earth to the sun) and the period in years, the constant is 1.

Why does this matter? Suppose you were the lucky discoverer of Uranus. Keeping an eye on it you'd eventually notice that it orbits the sun in 83.7 years. How far is it from the sun?

The period squared is 7005.7. Take the cube root of that and you get a distance of 19 astronomical units, which is correct. So by watching something as simple as time to orbit a star, one can get the object's distance from that star.

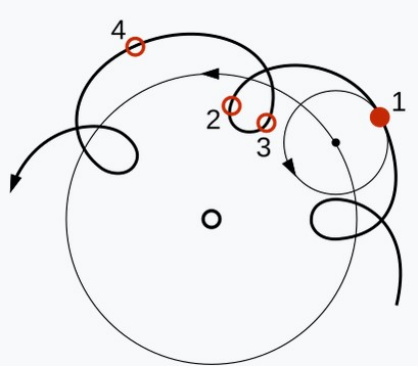
Astronomers routinely use this relationship to measure, for example, the distance between stars that orbit each other. (There's a bit of added complexity because they actually orbit around their common center of mass.)

Observing Notes—The Red Planet This Month

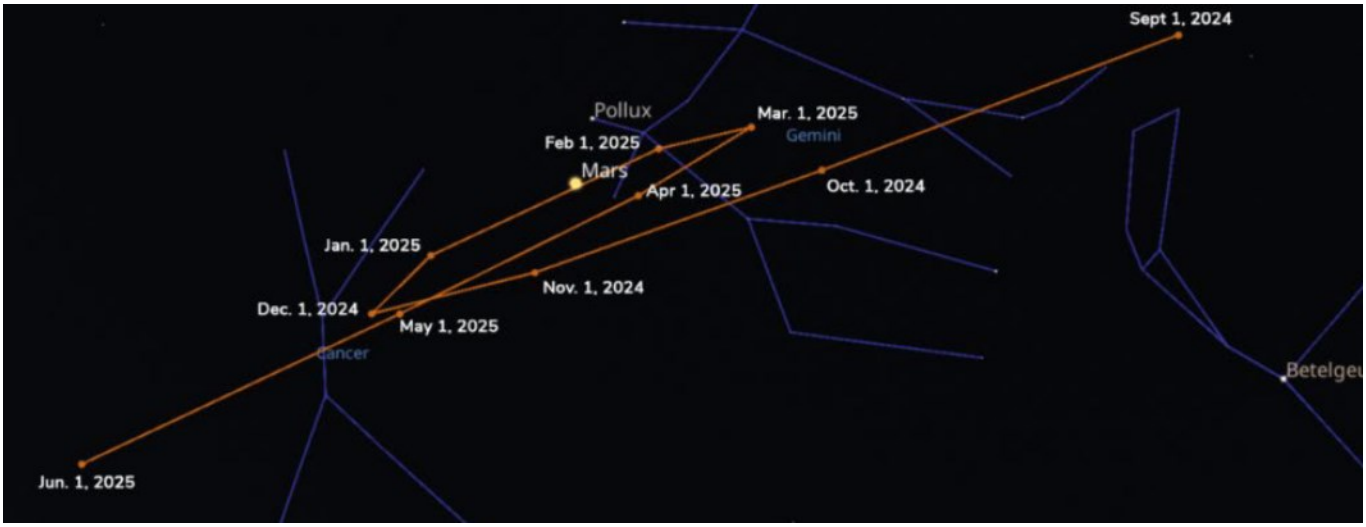
As noted above, Kepler's third law tells us that the outer planets move more slowly in their orbits than the inner ones. We'll see this dramatically this month as the Earth catches up with Mars. On January 18th Mars reaches "opposition", which means our blue orb is directly between it and the sun. This is also the time when we're closest to the red planet (about 40 million miles). This event occurs only once every 26 months, which limits when a manned (peopled?) spacecraft can launch. You don't want to encounter Mars when it is on the other side of the sun, as that would entail a very long voyage.

Since the Earth is passing Mars, the latter's motion is "retrograde". Instead of appearing to us to advance, it seems to move backwards against the fixed stars. This confused early observers, who thought the sun and planets revolved around our home. Models were made that included complex "epicycles" to explain this conundrum.

All those mysteries disappeared when the current heliocentric model was understood.



Epicycle used to explain Mars' motion—Earth is the dot at the center.



Mars' retrograde motion against the fixed stars over the next few months.

So keep an eye on Mars to see this once-confounding motion. But wait—there's more! If the sky is clear be sure to keep looking up on January 13, when the moon will occult the planet. That is, the moon will move between us and Mars for an hour or so.

Here in the Westminster area we can expect the moon to first cover Mars about 9:16 PM on that day. The planet will reappear about 10:31PM the same night.

Planetary Motion and Dark Matter

Kepler does tell us that outer planets move more slowly in their orbits than the inner ones, which explains Mars' retrograde motion. But why? Here's a bit of high-school math that explains some interesting phenomena.

Start with another question: Why do planets orbit the sun? They're moving pretty fast—why don't they just zoom off into space? General relativity tells us that a massive object like the sun distorts space-time. But simple Newtonian mechanics explains this as well. There are two primary forces acting on a planet: the gravitational force from the sun, which is trying to suck us into that furnace, and the centrifugal "force" from the planet's motion. (Purists will object to calling this a "force" but the effect is the same). This is like spinning a rock around you on a string: the rock wants to fly away, but is constrained by your pulling at the string.

Newton told us that the gravitational force is just GmM/R^2, where G is a constant, "m" and "M" are the masses of the sun and the planet, and R is the distance between them.

Centrifugal force is MV^2/R, where V is the speed of the planet in its orbit. Since the two forces must balance (otherwise the planet would fly off or crash into the sun):

$$\frac{GmM}{R^2} = \frac{MV^2}{R}$$

Solving for V:

$$V = \sqrt{\frac{Gm}{R}}$$

As R gets bigger (the distance from the planet to the sun increases), the speed goes down. And, sure enough, the Earth moves around the sun at 67,000 MPH, while Mars is loafing along at 54,000 MPH. And that explains why our planet overtakes Mars.

Interestingly, this holds on galactic scales as well. Or rather, it should hold! Stars far from the center of a galaxy should move more slowly than those closer in. But they don't, by and large. And no one knows why. So astronomers coined the name "dark matter" to account for this. If there was more mass—the "m" in the second equation were bigger—then the speedy stars would make sense. But we just don't know if dark matter exists. Some propose Weakly-Interacting Massive Particles (WIMPs) to explain things, though no one has ever detected one. It's possible that on large scales Newton was wrong. Or maybe not. This is one of the greatest mysteries in astronomy today.

Vera Rubin was one of the astronomers who discovered that stars don't move as they should. The Vera Rubin Observatory in Chile, which should come on line this month, will gather data we hope will help explain this mystery.

But what an exciting time to be connected with astronomy!

Astrophotos From Our Members

Matt Orsie's Seestar S50 at work. On left, dark nebula LDN 673 in Aquila. On the right, the Iris reflection nebula NGC023 and associated dark nebula in the immediate area.

Astrophotos From Our Members

Laurie Ansorge's new Celestron Origin Smart Scope continues to impress:

M42—The Great Orion Nebula

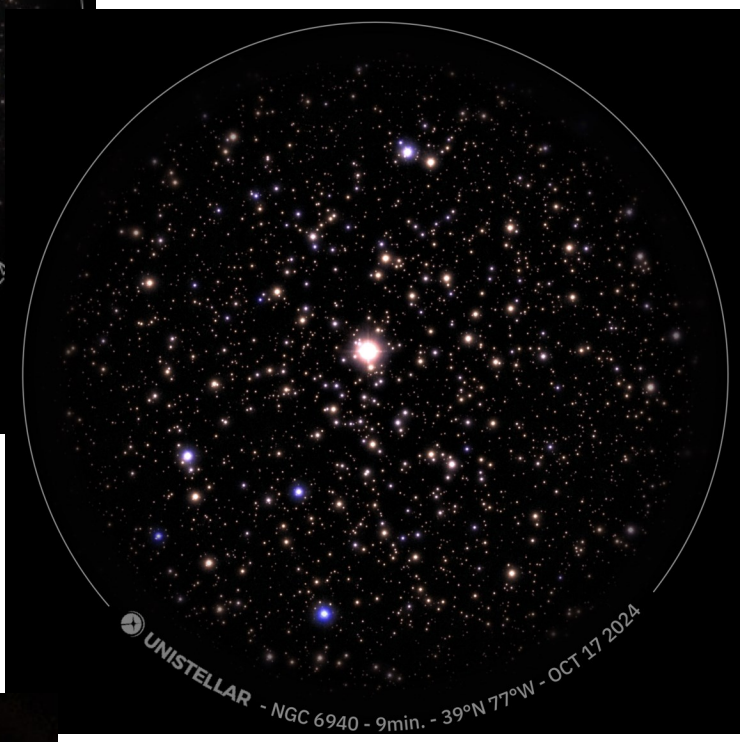
The Sculptor Galaxy is an intermediate spiral galaxy in the constellation Sculptor. The Sculptor Galaxy is a starburst galaxy, which means that it is currently undergoing a period of intense star formation.

NGC6790—a Planetary Nebula in Aquila

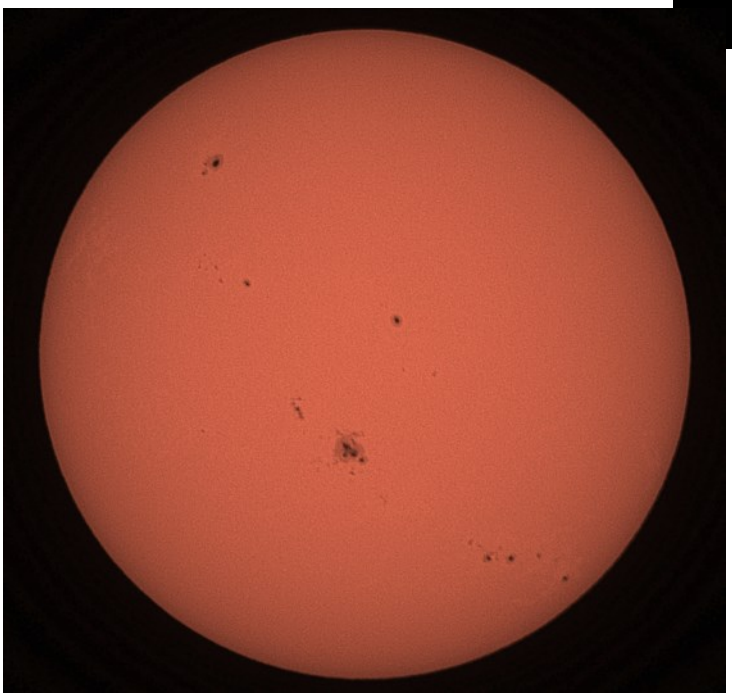
Astrophotos From Our Members

Laurie sent some pictures taken by her eVscope.

NGC 7380 is an open cluster in Cepheus, discovered by Caroline Herschel in 1787. The surrounding emission nebulosity is known colloquially as the Wizard Nebula. Caroline was the first paid female scientist; King George III awarded her 50 pounds per year.



NGC 6940 is an open cluster in the constellation Vulpecula. It was discovered by Caroline's brother William Herschel in 1784.



We're at the top of the 11-year solar cycle now—look at the sun's active regions!

Astrophotos From Our Members

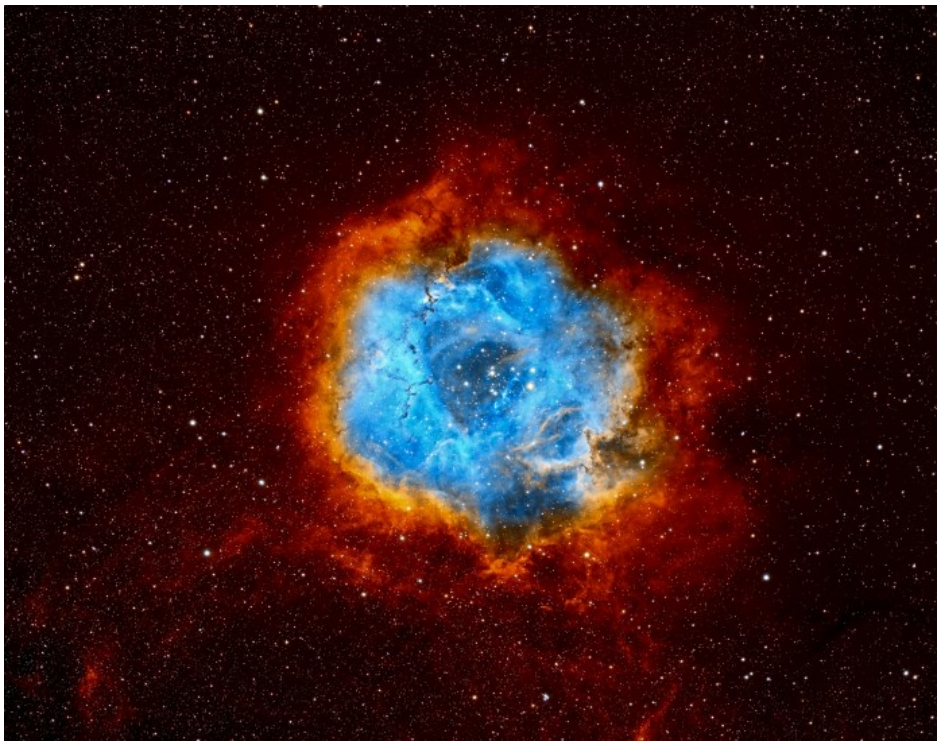
Laurie has an entire stable of smart telescopes. These are from her Odyssey-Pro.

M33, the Triangulum Galaxy, is in that eponymous constellation. It's the third-largest member of the local group, after the Andromeda and Milky Way galaxies.

Comet C/2023 A3 (Tsuchinshan-ATLAS) - the recent one so many of us observed. It was remarkable how well cell phones could capture this beauty.

Astrophotos From Our Members

Mikey Mangieri took these astounding astrophotos.



The Rosette Nebula, taken with a WOZS61 telescope and ASI 1600MM camera. This is composed of a little over 8 hours of integration time. It's a giant molecular cloud in the monoceros region of the Milky Way. Mikey used RGB filters, as well as Hα, SII and OIII. The latter three capture narrow wavelengths to highlight emissions associated with a Balmer transition of hydrogen, and so-called "forbidden" transitions of ionized Sulphur and doubly-ionized Oxygen.

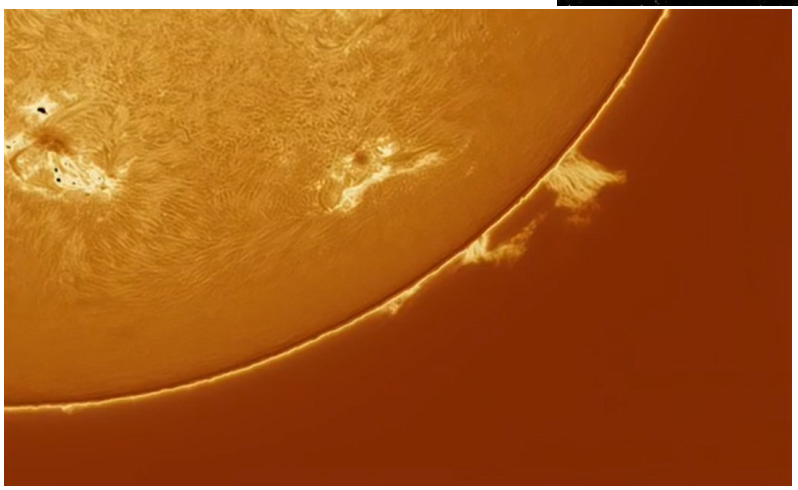
This is a Star Cloud in the Andromeda Galaxy known as NGC206. Taken with an Edge-HD11 and an ASI2600MM camera with LRGB filters. It's rather amazing that one can resolve individual stars in another galaxy with amateur gear. These are all hot, young stars forming what's known as an OB association.

Astrophotos From Our Members

David Weisman sent in a nice variety of images.

This is a great image of the Bubble Nebula, taken with an Askar 500 and an ASI2600mm camera using the SHO Hubble palate. SHO means he used a SII filter mapped to the red channel, an Hα filter mapped to green, and an OIII filter for blue. 4 hours of integration time.

Here's M31 using the same scope and camera, but using RGB filters. 4 hours of integration time. That small but brighter area in the middle of the galaxy, to the right, is the star cloud (NGC206) that Mikey caught on the previous page..



This is a still from a dramatic video David caught using a Lunt 40 mm hydrogen alpha telescope.

WASI FAQs

Library - Did you know we have over 700 books about astronomy in our WASI library? There are available to WASI members. Here's the complete card catalog: https://westminsterastro.groups.io/g/main/files.

Loaner telescopes - We also have a telescope lending library. If you'd like to borrow a scope, talk to Curt Roelle.

Astronomical League - All WASI members are also members of the Astronomical League. Check out their 80+ observing programs, many of which come with awards: https://www.astroleague.org/

Newsletter - Please send pictures, articles, and ideas for the newsleter to jack@ganssle.com.

Facebook - We're active and sharing images on our Facebook page, found here:

Join/Renew membership link: https://www.westminsterastro.org/join-wasi/

If you've already entered your contact information (renewing), skip the "database" link: https://paypal.me/WAstroSInc

Dues are payable via PayPal on the link above, by check or cash (and through your bank's on-line bill payment). Membership Dues are $25/year for individuals or family, and youth under 18 is $5/year.

- On time payment means eligibility for the annual incentive .
- Keep access to the members-only groups.io pages/information
- Receive members-only access/notifications on Night Sky Network
- Keep/get discount rates for popular astronomy magazines
- Borrow from the WASI scope/literature library

Files and club member correspondence & wiki links are found here: https://westminsterastro.groups.io/g/main. Remember to set your communication preferences.

Outreach/event calendar is found on: https://nightsky.jpl.nasa.gov/index.cfm. Set your communication preferences here as well.

Changed address, email or phone? Please update your information and send a message to the webmaster and/or treasurer@westminsterastro.org.

We meet monthly on the 2nd Wednesday of the month:
Back to Basics from 7:15 PM − 7:30PM; General Meeting 7:30PM − 9:30PM
Bear Branch Nature Center Carroll County; 300 John Owings Rd.; Westminster, MD 21158
Website: https://www.westminsterastro.org/ (Zoom info for hybrid meetings)