WESTMINSTER ASTRONOMICAL SOCIETY, INC. (WASI)

Membership News

Volume 42 – Number 1 Winter 2026

Message from our Society's President, Skip Bird

Howdy and Welcome to Wayne's World

Actually Good Bye to Wayne's World. Yes, your days of torture and my domination is ending, Something the Mayans predicted thousands of years ago. My reign is coming to an end, however you are not free of me just YET! This means for you to get free from my RULE you must elect some other sucker (I mean distinguished leader). I have just a few words of advice (have you figured out it is never JUST A FEW WORDS) for the new Ruler. RUN!!! If that doesn't work for you I guess You will have to lead with Compassion, Understanding, and Empathy. 😂😂😂😂 Sorry had to get another joke in. IF you do everything the opposite of what I did you will have a long and successful reign, I'm sorry.

Speaking of long and successful reigns I just want to take the time to thank everyone who has been, is and will be a member of this club. This is one of the greatest adventures of my life. It has been fun, informative, and a gigantic portion of my journey through the ages (my ages). I have laughed, cried, mentored, been shown wonders I never would have know if I wasn't for this club. IT has been a honor, a privilege, and a humbling experience being allowed to lead this club down the path into darkness and astronomy domination, (HINT-Turn around and go a different way). Our club hasn't gotten to be this successful from my efforts but, from the efforts of the previous presidents upon who's shoulders I stood on, as I take my swan dive back into oblivion. To all the future leaders of this club: Go forth and multiply. Live long and Prosper.

I warned you "I'm a Rambling Man".
Until Next Time..... Astronomy is Looking Up!
Skip

WASI News

The January 14 membership meeting will have an **election of officers**. All positions are open. Skip, as president, is term-limited so can't run again. We'll miss his leadership, but we definitely need someone to run for president, and if you are interested in any other office, do throw your hat in the ring. With the exception of Treasurer, these offices have reasonably light duties. Positions are: President, Treasurer, First VP, Second VP, and Secretary.

Some Pictures From Skip

Notes From Our Observatory

One of the benefits of WASI membership is access to our observatory. This building, located at Bear Branch Nature Center, houses a 14" Celestron SCT, a telescope that's probably quite a bit larger than most amateurs have access to. A selection of eyepieces, a beautiful Williams Optics scope, and even a solar scope are also housed here.

Not long ago we upgraded the SCT's mount to one from Astro Physics. This easy-to-use instrument is rock solid and tracks nearly perfectly.

Any WASI member who has undergone a few nights of training is allowed to use this facility, subject to our standard operating procedures. Bring your friends and wow them through the eyepieces. Or attach your camera and capture some stunning astrophotos. Some of us plug our laptops into the mount and use N.I.N.A. to control it.

Al Ansorge, WASI's Planetarium Director, has been using both the Williams Optics scope and the SCT for astrophotography. He writes: "Here is a repeat of Saturday's try at the California Nebula. Shot with the Williams Optics scope, NINA is driving the scope and handling the pointing.

"This is using the club equipment, to which you as members are encouraged to use. Encouraging better and more use is a strategic goal the club has adopted. Any ideas or suggestions or shortcomings in how the club does business concerning use of the equipment are actively sought, and to a large degree I/we are sharing these experiences to drum up interest."

Back to Basics— Stardust

We are stardust
Billion year old carbon

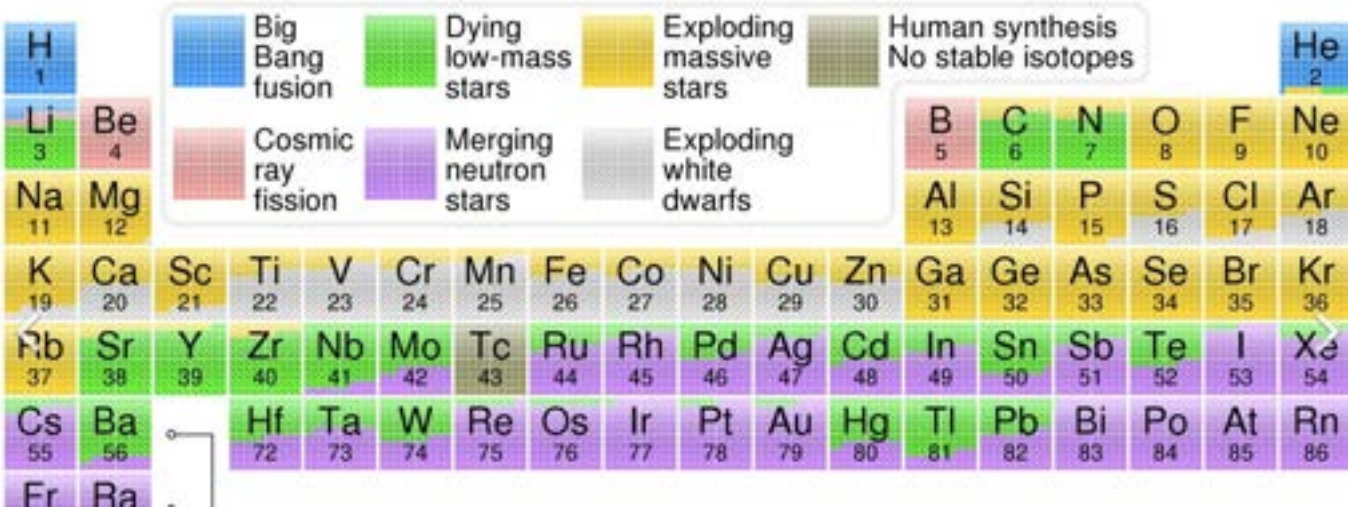
Joni Mitchell, Woodstock

Though Joni Mitchell is no scientist, she nailed the truth in these lyrics. 13.8 billion years ago, as the universe first formed, there was only hydrogen, helium, and a miniscule amount of lithium. Even today it's comprised mostly of H and He, but happily for planet- and people-formation, heavier elements were created. Yet 98% of the universe is still only those two lightest of elements.

Remember the periodic chart of the elements from, uh, **element**ary school? It lists each of the hundred or so elements, light ones like H and He up top, heavier down lower. What it doesn't show is where these came from. The following picture illustrates their origin.

You are 70% water—hydrogen and oxygen. The former came from the big bang, so in part you're a bit older than your birth certificate attests (like 13.8 billion years). The oxygen in the water came from exploding stars, often type II supernovas where in a few seconds a star collapses and rebounds in an explosion that releases the energy of an entire galaxy for a few months. Heavy elements are released, including that oxygen.

That's pretty astonishing.



Perhaps you have a gold ring (Au in this chart, element 79). That element was formed when two neutron stars collided. These are stars as massive as the sun (330,000 times the Earth's mass), but the size of a city. The gravitation is so immense a spoonful of their material would weigh several billion tons. How incredibly exotic! Yet how casually we wear these shiny accoutrements, never thinking about the binary neutron stars circling each other, ever closer, till they collide and spew out that element. Which, over billions of years drifting through space, finds itself in a collapsing cloud of material that eventually forms a planet, finally becoming those few grams of gold on your finger.

Being involved with astronomy means a constant astonishment at the wonders of this universe.

Back to Basics— Dark Matter

Someone misplaced the universe. 95% of it is missing. Is it with your car keys?

Only 5% of the universe is ordinary "stuff" - matter, like atoms, as well as energy. (Astrophysicists often use mass and energy interchangeably since $E=MC^2$.) 68% of the universe is dark energy, and the remaining 27% is dark matter.

"Dark matter" is a placeholder, an empty phrase that means "we have no idea". There's something out there that causes stars and galaxies to move in ways that defy our current understanding.

The famously-irascible Fritz Zwicky studied galaxy clusters and, in 1938, realized their motion can't be explained by the amount of mass he observed in these clusters. He speculated that there must be something else out there, some sort of invisible something that has gravity.

Zwicky observed that the galaxies in the Coma Cluster were moving too fast for the observed mass. What does "too fast" mean?

Planets orbit their sun; stars orbit their galaxy, and galaxies move around in their groupings. Gravity binds these objects together, yet the energy of motion makes them want to fly apart. Consider swinging a rock around in a circle on a string: the force on the string holds the rock in a circle as it goes around you. Yet, cut the string, remove that force, and the rock will fly away.

It's the same situation with planets, stars and galaxies. Gravity keeps the Earth bound to the sun, but if that force disappeared, our home planet would fly through space out of the solar system. (General relativity gives a more nuanced explanation).

The Math

The gravitational force between two bodies is:

$F= GM_1M_2/R^2$, where M_1 and M_2 are the masses of the bodies, R is the distance between them, and G is a constant.

The centrifugal force that makes a body want to fly away is:

$F= MV^2/R$

Put those two equations together and the speed of a body, say, the Earth orbiting the sun, is:

$$V = \sqrt{GM/R}$$

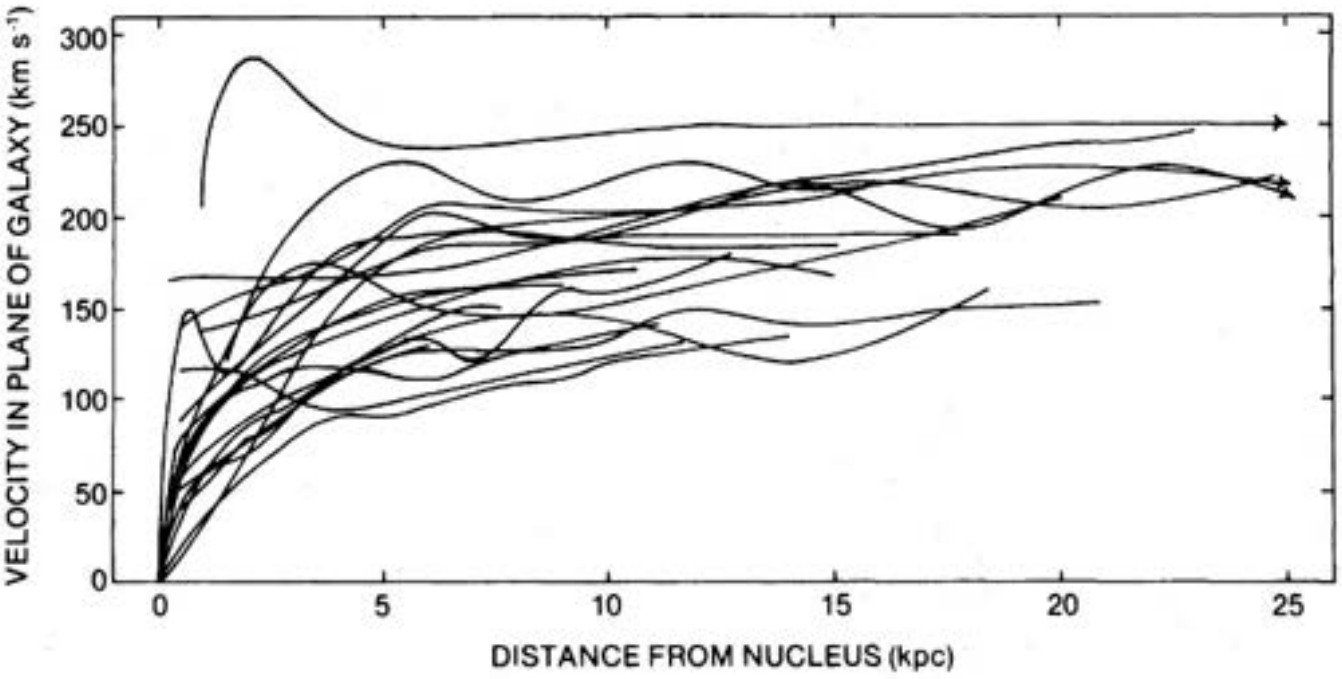
Clearly, as one moves away from the sun, or the center of a galaxy, R increases and V must decrease. But V stays constant. A puzzler, indeed!

The further a planet is from its star, the slower its motion in its orbit. Mercury careens at 48 km/s around the sun, the Earth at 30 km/s, and Neptune idles away at 5 km/s. But we don't see that in stars' motion around galaxies and galaxies in clusters.

While we'd expect stars far from the center of the Milky Way to be moving more slowly than those closer in, once we get a bit away from the center we see them all moving at more or less the same speed. The accepted explanation for this is that there's something massive that we can't see, because, from the equation in the inset, it's clear that the speed stays constant as distance increases only if the mass goes up as well.

Oddly, this unseen matter doesn't seem to interact with ordinary matter or radiation other than through gravity. Strange stuff, indeed!

Vera Rubin was an astronomer who studied the motion of stars. (The new Vera C. Rubin observatory in Chile has the largest camera ever built. One of its goals is the study of dark matter). She, working with Kent Ford, gathered some of the early data that showed these strange stellar motions.



Data from a paper by Vera Rubin and two others which shows the motion of stars in 21 galaxies. You'd expect those further out to be moving more slowly. *(from Rotational Properties of 21 Sc Galaxies With A large Range of Luminosities and Radii, Rubin, Ford, and Thonnard, 1979)*

Alas, no one knows what this extra, unseen, mass is. There are many theories, some with delightful names. WIMPs, or Weakly-Interacting Massive Particles, is one idea. Or, perhaps Massive Compact Halo Objects (MACHOs).

Maybe Newton et al were wrong. MOND (Modified Newtonian Dynamics) is an idea that Newton's laws can be modified to account for the observations.

Others think neutrinos could be the culprit. These are particles that whiz along at nearly the speed of light but are almost massless. Billion pass though your body every second. Core-collapse supernovas produce so much energy that one dying star can be as bright as a galaxy, but 99% of the energy released is in these invisible and almost undetectable particles.

Or, primordial black holes, formed around the time of the big bang, could be providing this unseen mass.

No one knows what is going on, but clearly there's some something rotten in the state of astrophysics, whether the physics itself needs change, or some new and as-yet-undetected particle, field, or something is out there.

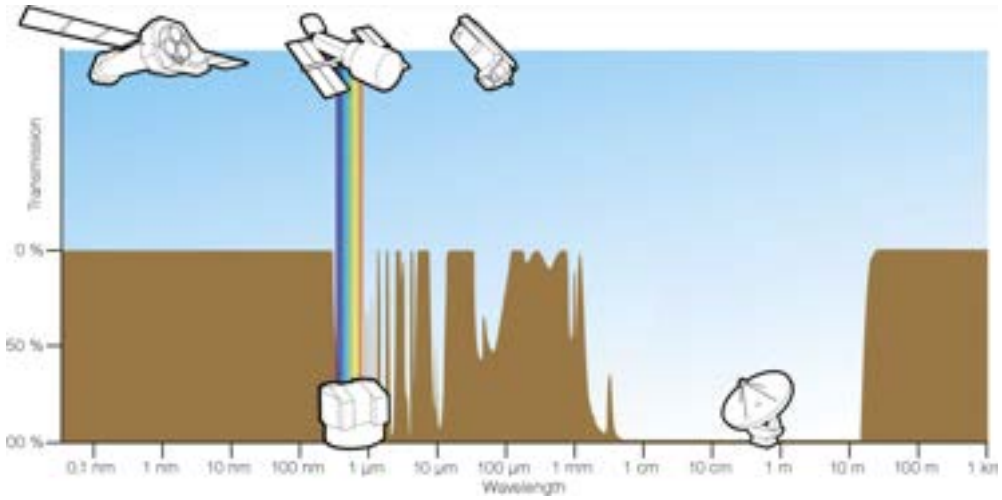
This is truly an exciting time to be involved with astronomy as there is so much that will be learned in the coming years.

Radio Astronomy

Most of us observe the universe at visible wavelengths since that's where our eyes work. The pros certainly do a lot of work with conventional optical telescopes, and they have a lot of fantastic instruments perched on mountains around the world and in space.

But they also peer deep into the cosmos at other wavelengths, from gamma rays to radio. The James Webb Space Telescope, for instance, images in the infrared, which is invisible to us.

The following diagram shows that the atmosphere is transparent to visible light, some infrared, and radio waves. Most everything else is blocked.



Few amateurs will have the resources to do astro from space, which limits us to the visible—and radio! Absent huge antennas we'll never get pretty images at radio wavelengths; the data shows up as graphs rather than pictures. But with radio astro one can collect data during the day, in cloudy weather, and even when it's raining. Turns out, the equipment is not expensive.

The Society of Amateur Radio Astronomers (https://www.radio-astronomy.org/) is a world-wide group of about 500 folks, some utterly rank amateurs, others with tremendous experience, who observe using antennas rather than optical telescopes. One of their offerings is the "scope in a box", a small dish with the associated electronics that sells for $350.

An even cheaper approach is to build a "disk Yagi" antenna, comprised of a number of small aluminum disks. The electronics is just a low-noise amplifier and a software-defined radio, about $45 each, some cabling, and a free bit of software. With this minimal setup it's possible to sense and graph the Milky Way's spiral arms.

Radio Astronomy—Continued

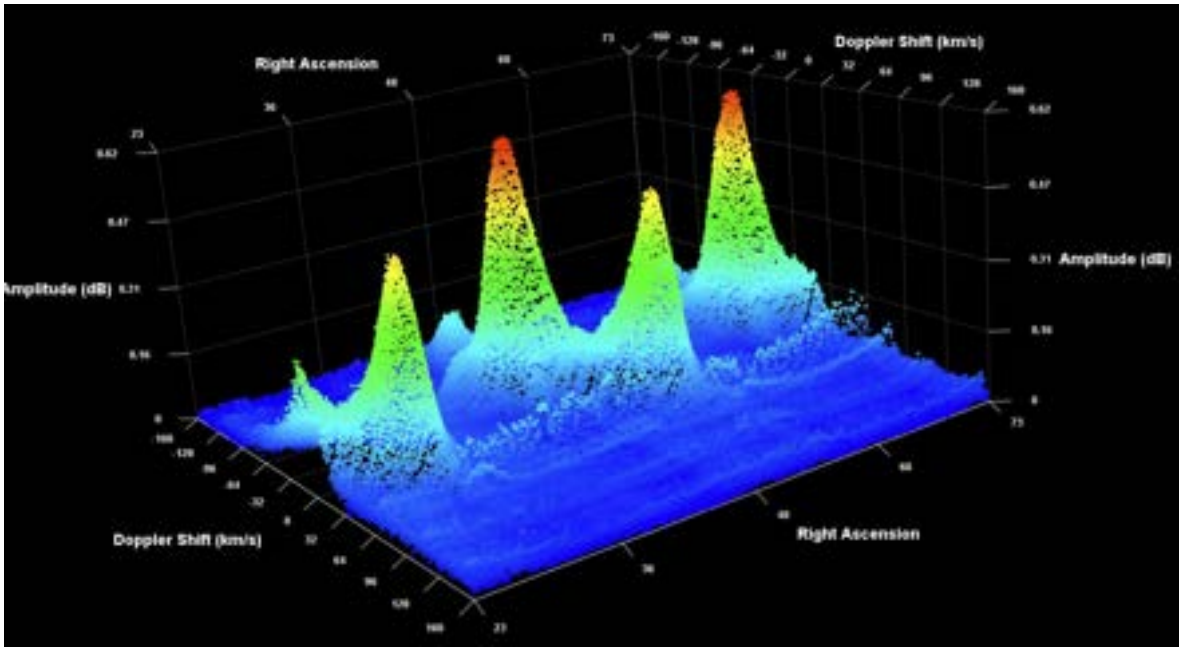
What can one “see” with this equipment? Though some SARA members do incredibly sophisticated studies of masers and other exotic deep-space sources, most observe the hydrogen 21 cm line.

Neutral hydrogen is just a proton and an electron. Both posses a characteristic called “spin”. The rules of quantum mechanics tell us how electrons are allowed to change state, and one hard and fast rule is that an electron’s spin cannot change.

But it does. Not often. Quantum says *never say never*, so the rule is that the chance of this happening is pretty close to zero. In fact, for any individual hydrogen atom, the electron’s spin will change only about once every 11 million years, on average. And when that happens a photon is released, a very, very low energy photon that’s almost impossible to detect. But there’s a vast amount of hydrogen in space, creating a measurable signal at 1.42 GHz, or 21 cm. Given an antenna, an amplifier, and a radio, amateurs can pick up this signal.

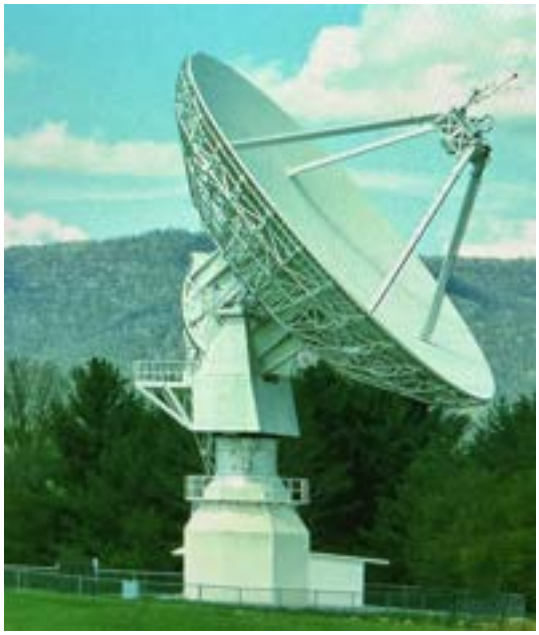
(If you’re imaging with OIII or SII filters you’re also observing a transition forbidden by quantum mechanics. But sometimes these transitions do indeed occur. Weird. But as Richard Feynman said, “If you think you understand quantum mechanics, you don't understand quantum mechanics.”)

All that hydrogen is moving, creating a Doppler shift. So the signal might be at 1.4204 GHz, or 1.4210, or some other frequency depending on how fast those clouds move. If things weren’t moving the radio would pick up just a single frequency yielding little useful information. Our galaxy’s spiral arms happily circle at different rates, so by detecting these frequency shifts we can map those arms.



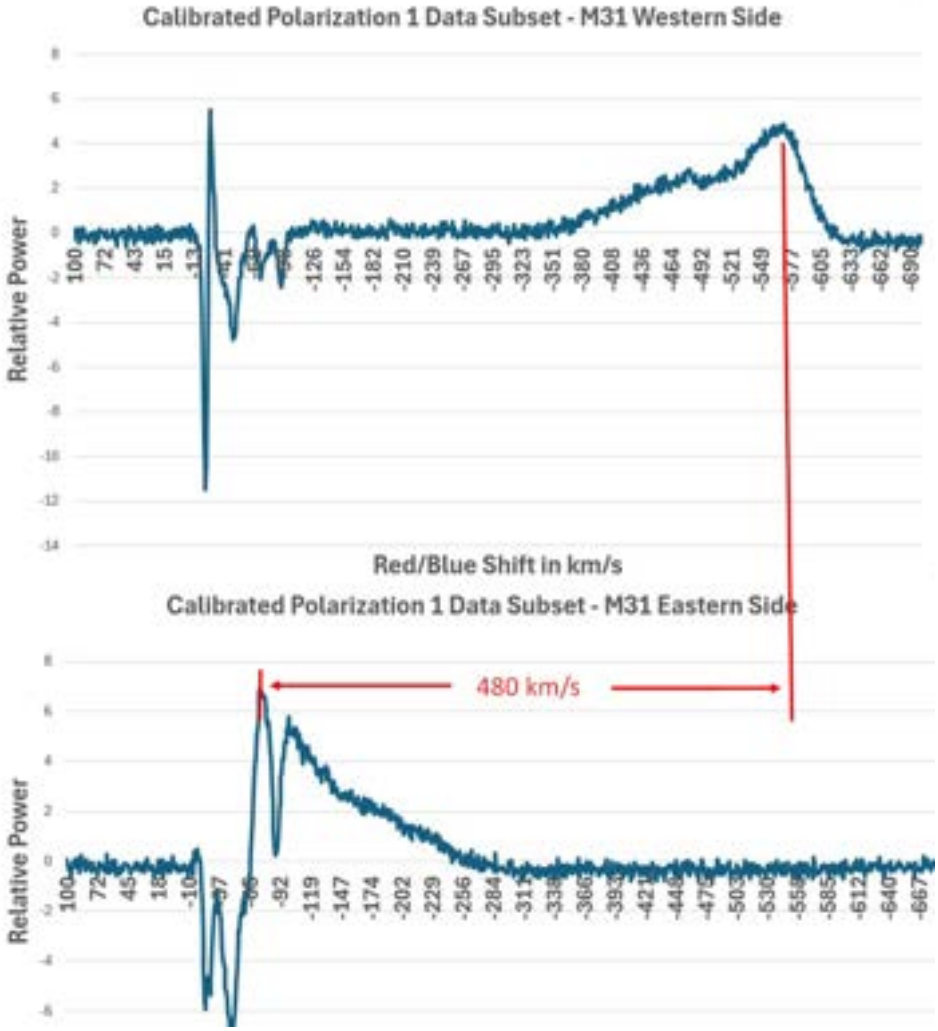
21 cm Doppler shifts using a disk Yagi antenna in Finksburg. The peaks are different spiral arms. This is just one of several ways of mapping this data. The Doppler shift has been converted to the speed of the arms in km/s.

Radio Astronomy—Continued



Green Bank Radio Observatory in Green Bank, WV has a collection of radio telescopes. Their 20 meter scope is a huge dish with pretty sophisticated electronics cooled to 15 degrees above absolute zero. There's a web interface so it can be controlled from anywhere in the world.

SARA members who have been trained can use this instrument. For free. Other than the $20/year membership fee.



Here's an example. How fast does M31, the Andromeda Galaxy, rotate?

One way to determine this is to observe the hydrogen gas in M31's far extents with the telescope. Since the galaxy is rotating, one side is coming at us, giving a blue shift (higher frequency), and the other going away, netting a red shift.

At 2.5 million light years distance, this is pretty far away and the signals are weak. I had the scope integrate 30 seconds of data for each observation.

Converting frequency to speed in km/s gives the graph to the left. A negative km/s means a higher frequency, or it's coming at us. The peak on the western side is at -570 km/s—pretty fast! The peak on the eastern size is around -90 km/s. The real rotation is half this (because we're looking at the total Doppler shift coming and going), or 240 km/s. That's within the margin of error of published data.

One might ask, why isn't the red shift shown as positive speeds? M31 is racing towards the Milky Way at about 300 km/s, biasing the result. Also note the weirdness near 0 km/s, which is a result of calibration data. To account for hydrogen in *our* galaxy, which is also detected, I also aimed the scope slightly away from M31 to get reference data and applied a mathematical correction, which gets zany near 0 km/s.

So, whether using pro gear or homemade systems, deep space is open to us rain or shine, day or night.

Astrophotos From Our Members

Evan Dincher used his S50 to get a very nice shot of the full moon:

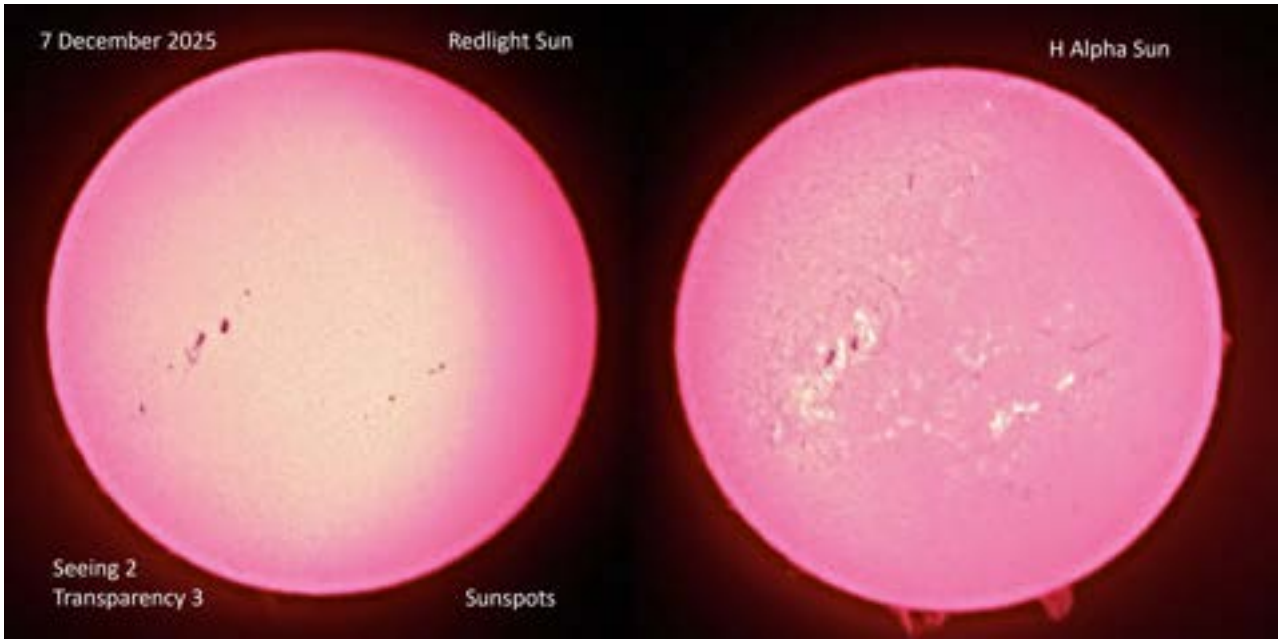
Konstantin Vishnevsky got this nice shot of comet 3I/ATLAS. It's composed of 459 subs, each 20s long, processed in Pixinsight using CometAlignment, BXT, NXT and SXT.

This comet is from outside of the solar system. It's on a hyperbolic loop that recently whipped around the sun, and is shooting of into interstellar space, likely to never return. It's only the third such visitor Earthlings have observed.

Astrophotos From Our Members

Chris Walters took this while camping at Wolfs Den Run State Park.

This is Jeffrey Kretsch's pair of solar observations from December 7. On the left, the sun in normal white light (i.e., through a telescope with a solar filter on it). On the right, the sun at about the same time from a true solar scope, one that passes light only at the hydrogen alpha wavelength of 656 nm. Note how the solar scope picks up the flares and prominences. As noted earlier in this newsletter, WASI has a solar scope in the observatory you can use.



Astrophotos From Our Members

From Konstantin Vishnevsky: “Here's my Rosette Nebula (NGC 2237) in a ‘fake’ Hubble palette. Captured with Seestar S50 in EQ mode using its built-in LP filter over multiple nights. Mix of 60s, 30s and 20s exposures.” Total integration time: 22h 37m 20s. Processed in PixInsight with BXT, NXT, SXT and with many masks to achieve the palette colors.

Mikey Mangieri took this picture of the Northern Trifid nebula (NGC1579) with his EdgeHD11 and ASI2600MM camera. There are three hours of RGB data and seven of narrowband.

Astrophotos From Our Members

Ray Santullo sent these two taken with his Dwarf 3. The Heart Nebula (IC 1805) was taken in Maine Bortle 4 sky 15 sec exposure, 156 stacked images. The Andromeda galaxy was taken in Maine Bortle 2 sky 15 sec exposure, 262 stacked images.

Astrophotos From Our Members

From Matt Orsie: Here's a recent capture with the Seestar S50. 4 1/2 hours in Bortle 4.5 skies. Siril using (2x drizzle), GraXpert and Photoshop for post processing.

This is Matt's Helix Nebula in an HSO palette using some new scripts in Siril and finished off in Photoshop. 1.5 hours, Bortle 4.5. Seestar S50.

Astrophotos From Our Members

Dave Weisman took these of Saturn with a Celestron Edge 9.25 with 2.5x Barlow lens with ZWO ASI585MC- processed with AutoStakkert, Registax and Photoshop

Astrophotos From Our Members

Jackie Donaldson sent these of the Horsehead Nebula and M42 taken with her new Dwarf 3 and processed with Seti Astro Suite Pro and Photoshop. She writes: "The DWARF 3 smart telescope features a 35mm f/4.3 apochromatic objective lens, a Sony IMX678 CMOS sensor with a resolution of 3840 x 2160 pixels, and an effective focal length of 737mm. It includes built-in filters for various imaging needs and is designed for both astrophotography and terrestrial photography, all while being compact and portable at just 2.9 pounds."

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 - Send pictures, articles, and ideas for the newsletter to secretary@westminsterastro.org.

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. Or, save money and sign up for 2 years ($40), or 4 years ($80).

- On time payment means eligibility for the annual incentive.
- Access to the club's observatory (after training).
- 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 7:00 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)