IO - November 2023

Eugene Astronomical Society, PO Box 591, Lowell, OR 97452
www.eugeneastro.org
Annual Club Dues $25
President: Robert Asumendi 541-743-5877
Secretary: Randy Beiderwell 541-342-4686
Additional Board members:
Dan Beacham, Amy Baker, Sylvia Collazo.
EAS is a proud member of The Astronomical League

Next Meeting Thursday, November 16th, 7:00 p.m.

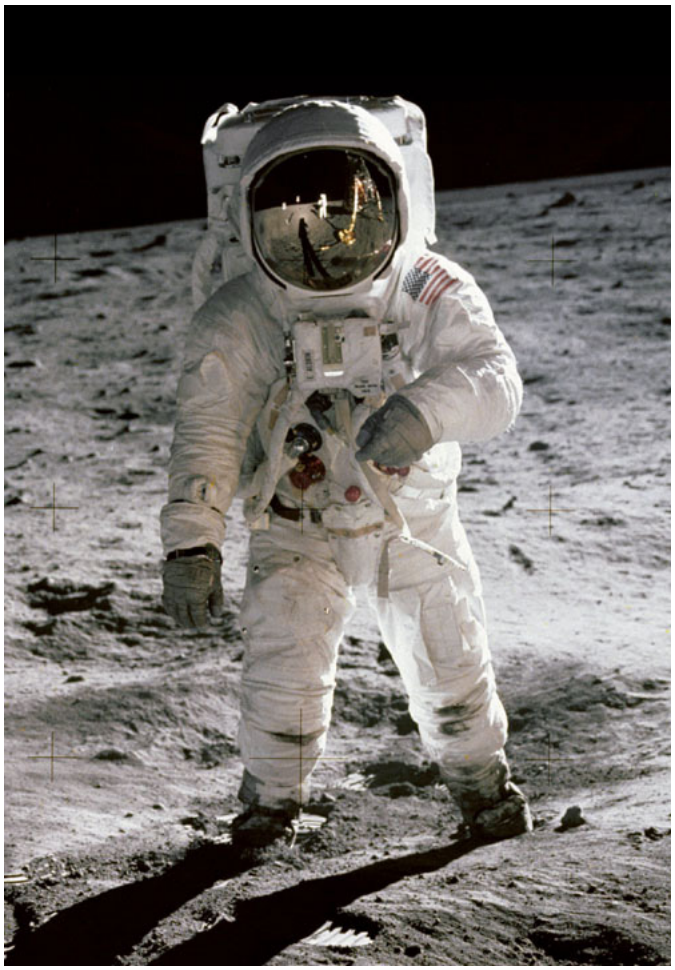
Remembering Apollo 11

By Jeff Phillips

For our November meeting, Jeff Phillips will give a talk about the Apollo 11 mission to the Moon.

Jeff writes: "I was six years old when my father got a job with Chrysler Missle Division. Chrysler rockets launched the first American satellite, the Explorer 1, as well as the first American Astronaut, Alan Shepard. Chrysler also built the smaller Saturn I that launched the Apollo orbital missions before the bigger Saturn V was ready. As a boy, other kids would smuggle a transistor radio into school to listen to baseball games. I would smuggle a radio to school to listen to space launches. For this month's Eugene Astronomical Society meeting I've put together some slides and video to honor the day fifty-some years ago when humans first walked on the Moon."

This will be a meeting to remember. Don't miss it! 7:00 on November 16th at the planetarium.



Buzz Aldrin on the Moon, July 1969.
Photo by Neil Armstrong.

Dues are Past Due!

EAS membership runs from October thru September. If you haven't renewed already, please mail your dues to the Eugene Astronomical Society, PO Box 591, Lowell, OR 97452. Dues are still the same low $25 they've been for years. Make your checks payable to Eugene Astronomical Society. You may also pay dues via PayPal to j.oltion@gmail.com. Send $26 to cover PayPal fees. Note that joining the email list does not make you a member of the club. You must fill out an application and pay your dues in order to be an active club member.

October Meeting Report

What's Up
By Aneesa Haq

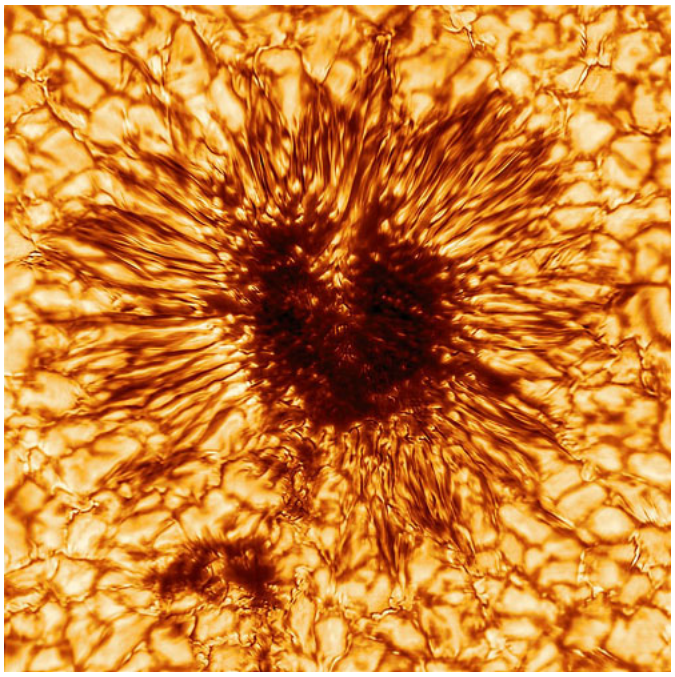
DKIST Experiences
by Alea Kootz

Supernovae
By Karmin Peterson

Our October 19th meeting was crammed with activity. We started out with our official annual business meeting, at which we elected board members. Board members' terms run for two years and we have a five-person board, so we typically have two positions up for election or reelection one year and three the next. This year we had three. Andy Edelen, our stalwart president for the last five years, has moved to Delaware so his position was open, and Ken Martin's term expired and he chose not to go for re-election. Dan Beacham's term was due as well, but he volunteered to continue on and was re-elected with a unanimous show of hands of active club members. Amy Baker and Sylvia Collazo were elected to fill the other two open seats.

We had a busy night ahead of us so we moved on quickly to the "What's Up" portion of our meeting, done this time by Aneesa Haq, who also did the "What's Up" last February. Tonight Aneesa showed a retrospective of photos from the October 14th eclipse, then went into a short explanation of how eclipses occur. She also alerted us to the upcoming Orionid meteor shower (early morning on October 22nd) and the Andromeda Galaxy, which is prominent in the autumn sky not long after sunset.

After Aneesa's talk, Alea Kootz, a professional astronomer who came to town for the eclipse, talked to us a little bit about her time helping design and build the Daniel K. Inouye Solar Telescope atop Haleakala Mountain on the Hawaiian island of Maui. She gave us an insider's view of the design of the scope and talked about her role in refining its control motors' accuracy down to the femtosecond. (That's 10^{-15} seconds. Very brief.) She told us about the immense heat generated at the four-meter mirror's focal point: enough to melt the steel protective shield that drops into place to protect the optics in case of a problem. The scope's operators get four minutes to close the dome or cover the mirror before the steel begins to melt. During first light, the intense sunlight overheated a fingerprint on the edge of a sapphire disk, which exploded like a gunshot. So the intense sunlight generated by this amazing telescope is not to be messed with, but the solar images it produces are like no others. In fact, one of the biggest problems Alea reported is that there's no other scope on Earth that can confirm the DKIST's findings. Looking at it from the viewpoint of an amateur astronomer, that's not a bad problem to have!



A sunspot viewed through the DKIST. Courtesy NSO/NSF/AURA

After Alea's talk, we dived into our feature presentation of the evening: Karmin Peterson's program about supernovae. Karmin became interested in supernovae when the one in M101 blew this spring, and he went down the rabbit hole of research just for his own edification. He shared quite a bit of that new knowledge with the rest of us, going over the two main types of explosion: Type I where a white dwarf star in a close binary orbit siphons off hydrogen from a companion star until it reaches critical mass to explode, and

type II in which an already-massive star runs out of fuel and collapses, then explodes.

Karmin went over the nuclear reactions that happen at the core of a star and how as a star ages it becomes more and more stratified as it attempts to burn heavier and heavier elements. Eventually it reaches iron, which requires more energy to burn than it returns, thus cooling rather than heating the core of the star. Without the heat engine to provide an outward force to counter the star's immense gravity, gravity suddenly takes over and the star collapses inward. The shock wave when everything piles up at the center reverberates back outward and blows up the star, scattering star stuff everywhere, including into the cloud of gas and dust that created the Earth, and us. We are made of star stuff!

Karmin is an astrophotographer, so he took several images of the supernova. He's also a professional musician, so he used that research to help him write a song about supernovae, which he performed at the end of the meeting. It was indeed a catchy tune, and a cleverly written one at that. He got a good round of applause afterward, and it was well deserved.

Karmin Peterson plays his original composition, "Supernova." Photo © by Jerry Oltion

The entire meeting was a joy from beginning to end. This is how an astronomy club meeting should go: Club members sharing their knowledge and their talents, visitors sharing their astronomy-related experiences, and the rest of us appreciating our chance to be part of it all. Many thanks to everyone who helped make it so.

EAS Officers for 2023-2024

Immediately following the general meeting, the newly elected board of directors met to select officers for the upcoming year. Since Andy Edelen, our president for the last five years, has moved to Delaware, Robert Asumendi volunteered to fill the position and he was voted in unanimously. Randy Beiderwell, our secretary for the last three years, volunteered to continue on in that capacity. Though the titles of Telescope Lending Coordinator and Outreach Coordinator aren't officially designated in our bylaws, they're important positions nonetheless, and Dan Beacham will continue on in both of those capacities. Sylvia Collazo has agreed to take on the newly created position of Youth Coordinator, making sure younger people feel welcome in the club and helping the club to assist in promoting astronomy to the next generation(s). Amy Baker will continue to be our Zoom Mistress and Meeting Coordinator.

The club is in good hands with our continuing and newly elected board members. A big THANK YOU to all five who agreed to donate their time to keep the club running smoothly.

Thank You, Andy!

For the last five years, our club has been led by Andy Edelen, who became president when Diane Martin stepped down in 2018. Andy kept the club running smoothly and kept us active even through the Covid years when we were restricted to Zoom meetings and had to suspend our star parties. When we could hold in-person events again, Andy was a tireless presence at them all. He ran most of our meetings and was present at nearly all our star parties, usually bringing the club's flagship telescopes to provide an extra thrill for the public (and for the rest of us, who often abandoned our own scopes to have a look through Andy's).

Andy has an encyclopedic knowledge of the night sky, knowing all the Messier objects and thousands of NGC objects by heart. Ask him for the NGC numbers of the two satellite galaxies of M31 and without pause he'll tell you they're NGC 147 and 185. He'll also tell you to check out NGC 278, a small but beautiful face-on spiral galaxy, while you're in the neighborhood.

Andy with Bob the Dob. Note the infamous rock counterweight featured in *Sky & Telescope* magazine.

Andy and his telescope, "Bob the Dob," have been familiar companions at out-of-town observing sessions, where we could count on him to suggest neat objects to look at, often ones we'd never heard of before. Andy's "Constellation of the Month" column has proven to be one of the most popular features in this newsletter, introducing us to the wealth of wonders in the night sky one constellation at a time.

Andy and Cheryl and their daughter, Sinikka, have recently moved to Delaware, where Cheryl was offered a much better position at the University of Delaware than she had here at the University of Oregon. We will miss them, but Andy plans to keep his membership in our club active and he plans to continue writing his "Constellation of the Month" column, so we'll still be in touch and still benefit from his knowledge and his sense of humor. (He does a mean Monty Python pepperpot impression, guaranteed to keep you awake and giggling in the wee hours of a long observing session.)

So Andy, many thanks for the camaraderie and companionship, and for helping run the club for five great years. We hope to keep in close touch, and promise not to text you at 1:00 a.m. (4:00 your time!) to ask what's the NGC number of that spiral galaxy next to Stephen's Quintet. At least not too often.

Welcome New Members!

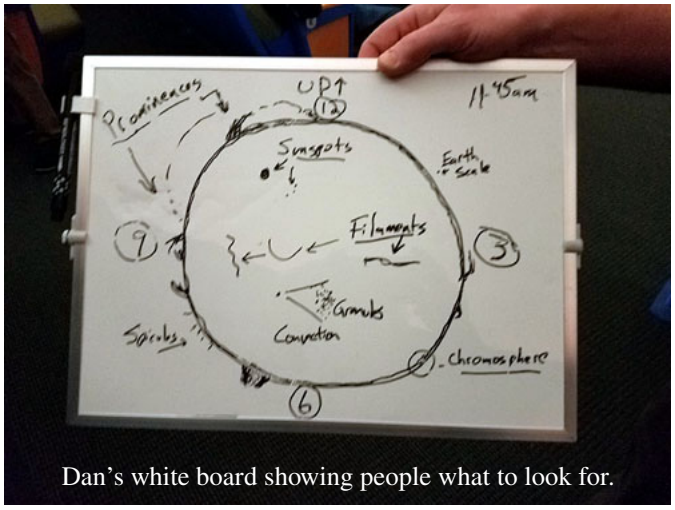
EAS welcomes four new members and one returning member this month: New members: Lance Williamson, Dale Davaz, and Guy and Jennifer Daeges. Returning Member: Greg Haider. Welcome (and welcome back) to the club! We hope to get to know you and help you enjoy the night sky with us.

Solar Sunday Report

Due to conflicting schedules and poor weather we only had one chance to put on a Solar Sunday in October, but it was a good one. Dan Beacham brought his H-alpha scope, Carlos Delgadillo brought his white-light solar scope, and Jerry Oltion brought a regular Dobsonian to provide a view of Venus by day. Several other club members helped wrangle people and provide information.

As usual, people were astonished to realize that they could see a planet in broad daylight, especially when Jerry helped them find it by naked eye just above a convenient treetop. People were equally astonished by the view through the solar scopes. The Sun was very cooperative that day, with several nice prominences and sunspots and filaments. Dan brought a white board and drew the various features so people would know what to look for. The prominences evolved over the course of the two hours we were there, providing new sights every few minutes.

It was a great time! We hope for more soon.



Dan's white board showing people what to look for.


Dan Beacham showing the public the view through his H-alpha telescope.

Next First Quarter Friday: November 17th

Our October 20th star party was fogged out, as was our Saturday backup date. Welcome to autumn.

Our next First Quarter Friday star party will be November 17th. First Quarter Fridays are laid-back opportunities to do some observing and promote astronomy at the same time. Mark your calendar and bring your scope to the College Hill Reservoir (24th and Lawrence in Eugene) and share the view with whoever shows up. The reservoir won't be around much longer, so come enjoy it while you can.

Here's the schedule for the remainder of 2023. Star parties start at dusk or 6:00, whichever is later. (6:00 on 11/17)

November 17 (Moon 24% lit) December 22 (Moon 84% lit)

We have a tentative schedule for 2024, but with the College Hill Reservoir closing for renovation sometime this winter we're not at all sure where we'll be holding next year's star parties, nor even when for sure. Different sites might require different dates. But these are the Fridays nearest the first quarter Moon:

January 19 (71% lit)	February 16 (55% lit)	March 15 (39% lit)
April 12 (23% lit)	May 17 (74% lit)	June 14 (59% lit)
July 12 (42% lit)	August 9 (27% lit)	September 13 (79% lit)
October 11 (64% lit)	November 8 (48% lit)	December 6 (33% lit)

The most likely date for our Dexter dark-sky star party is July 27th

Fun Fact: The Size of the Sun

Most people know that it takes light from the Sun eight minutes to reach the Earth. But how long would it take for light to cross from one side of the Sun to the other? If we could imagine a light beam moving from one edge to the other (ignoring the curvature of its surface), we might guess it would take half a second, or maybe even a full second, but our imaginations play us false. The Sun is big. Really big. It's 865,370 miles across. Light travels at 186,282 miles per second, so it would take 4.65 seconds to cross the solar diameter.

How fast do coronal mass ejections move? In time-lapse movies they seem to leap away from the Sun, yet we know that can't be true because nothing can move faster than light. In fact, the fastest coronal mass ejections move at about 1,860 miles per second, or about 1% the speed of light. That means that a coronal mass ejection would take at least 500 seconds to cross the diameter of the Sun. That's about 8 minutes, which is coincidentally the amount of time it takes for sunlight to reach the Earth.

Still Happily Accepting Dues

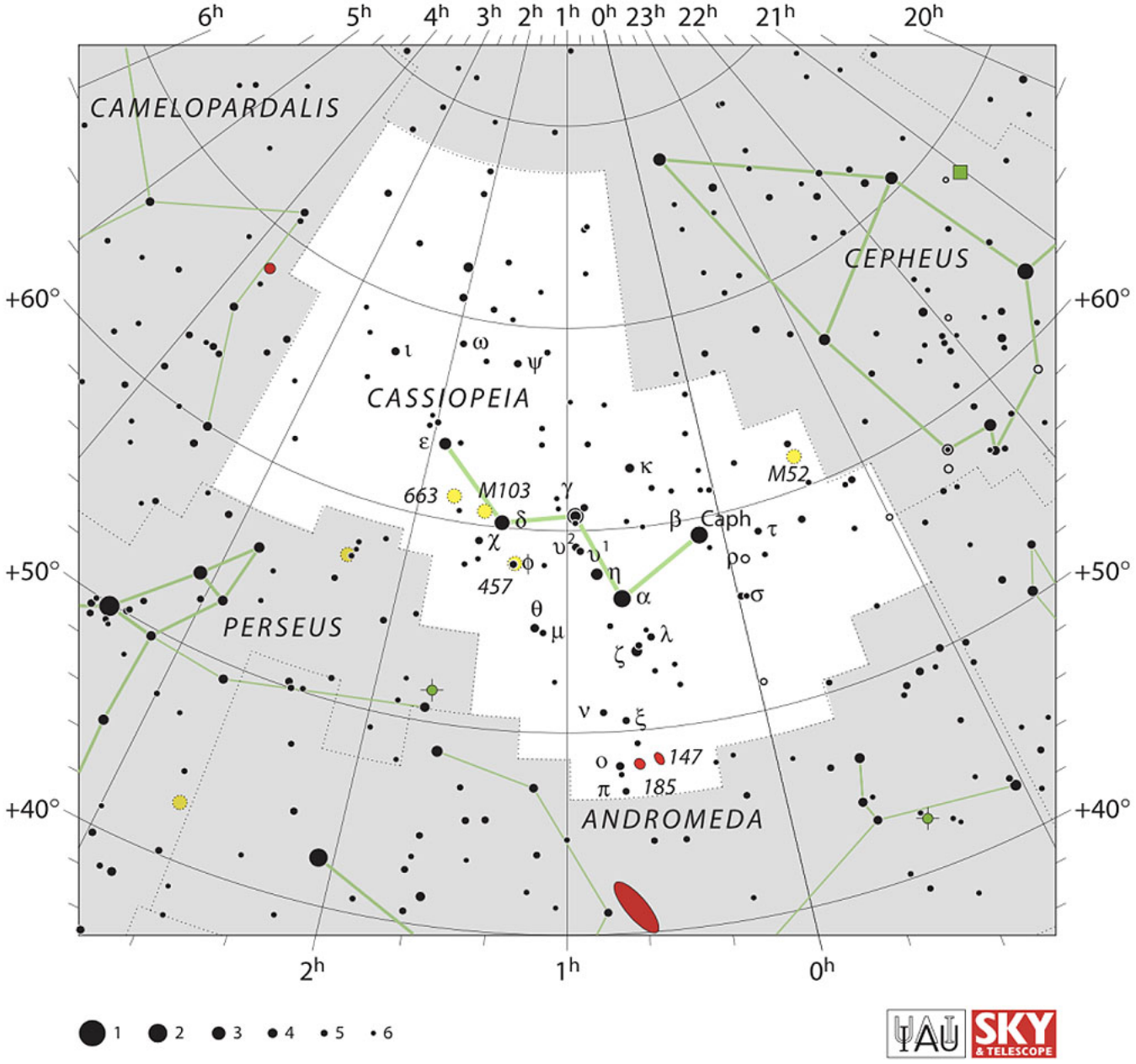
EAS membership runs from October 1 through September 31, so it's past time to renew if you haven't already. Please send your $25 dues to the Eugene Astronomical Society, PO Box 591, Lowell, OR 97452. Make checks payable to Eugene Astronomical Society. If you prefer to use PayPal, send your dues to Jerry Oltion at j.oltion@gmail.com and he'll pass them along to Randy Beiderwell, our secretary. (Send $26 to cover PayPal fees.) Please provide any updated contact information along with your dues!

Constellation of the Month: Cassiopeia

by Andy Edelen

Situated between Cygnus and Perseus, Andromeda and Polaris (the North Star), is the well-known constellation Cassiopeia. One of the night sky's most easily-recognized patterns, Cassiopeia looks alternatively like a capital 'W,' an 'M,' a '3,', or a Greek capital sigma (∑) based on its position relative to the pole. With its distinctive shape and year-round visibility, Cassiopeia is perhaps the third-most-recognized constellation after (the Big Dipper portion of) Ursa Major and Orion. The autumn Milky Way runs through Cassiopeia, making it a rich environment for binocular observers, while the database of the Sagauro Astronomy Club lists 136 deep-sky objects in Cassiopeia for users of telescopes (and there are certainly many more than that within the constellation).

What Aquila is to planetary nebulae and Virgo is to galaxies, Cassiopeia is to open clusters: there are



Cassiopeia, as seen on modern star charts. Courtesy IAU and *Sky & Telescope*.

106 open clusters known in the constellation as of this writing (open clusters are probably the most-commonly discovered objects in the heavens, so there may be many more as yet unplotted). This represents almost 10% of all of the known open clusters in the Milky Way! It also doesn't take into account the other objects — various types of nebulae and galaxies — that lurk within the Queen's realm. Two fine Messier objects (M52 and M103, both open clusters) can be found in Cassiopeia, but we'll bypass them this month in favor of some of the less-familiar showpieces of the constellation.

Cassiopeia ranks a surprising 25th out of the 88 modern constellations in area, and has a history dating back to the ancient Mesopotamians. But its role in the various mythologies is so extensive — due to its circumpolar placement and obvious, distinctive pattern, the constellation has had a prominent role in the mythologies of almost every Northern Hemisphere culture — that it would require a multi-volume series to cover them all. So we'll bypass the mythology this month, heading straight into the observational part of our survey, noting a few extra objects along the way than we normally would discuss.

Almost everyone is familiar with the five-star 'W' pattern of the constellation; that would be too easy to use as a naked-eye object. Our actual object for naked-eye observing this month is the star at the center

This month's objects in Cassiopeia. Image rendered in *Sky Safari 6*.

of the 'W', **Gamma Cassiopeiae**. Gamma Cas (or *Navi*, the backwards spelling of astronaut Virgil Ivan "Gus" Grissom's middle name; the star had no name in common use at the time of the Apollo missions yet was still an important navigational reference star) is of great interest visually *and* astrophysically; it's an irregular eruptive variable star of class Be and a spectroscopic binary to boot.

Let's start at the beginning, though. Gamma Cas varies in brightness from magnitudes 1.6 to 3.0, generally hovering around 2.2. This variation is due to an irregular disk of material that's rather chaotically thrown off by the star, which is a blue (B) subgiant that's well on its way to becoming a giant; the amount of material thrown off makes the star seem to change in brightness, and this irregularity makes the star's brightness hard to predict — it's also why the star is referred to as "eruptive." The 'e' in the star's classification comes from the fact that its spectrum contains emission lines, in addition to the standard lines of absorption seen in "normal" stars. (These lines can be seen in a standard visual spectroscope.) This radiation-emitting variable disk also places Gamma Cas in the class of stars known as *shell stars*; it's actually the first star to be so classified.

Curiously, Gamma Cas is rotating at an incredibly high rate of speed. This makes the star more oval than round, by a much greater degree than is our Sun; it's also partially responsible for the disk of ejected material. Notably, stars are brighter at the poles than they are at their equators, and this effect (*gravity darkening*) is much more pronounced on stars with such heavy ellipticity. In addition to all of this, Gamma Cas is a spectroscopic double star (meaning that the companion star is unable to be seen visually and is inferred by spectroscopic observation). The companion star orbits the bright 'A' star every 203 days. Two other stars very close to the A star are merely line-of-sight coincidences.

From a visual observer's standpoint, Gamma Cas can be the brightest of the five 'W' stars in Cassiopeia, or it can be only the fourth brightest. This variability is incredibly rapid, often changing by a magnitude over the course of *a single day*. Keep an eye on this one while you're out observing other objects and see if you can notice the changes!

Central Cassiopeia. Image rendered in *Sky Safari 6*.

Lurking nearby Gamma Cas are two wispy clouds of silicate dust. These are actually associated with the star, shining by its light, which is the only reason they can be seen at all. These are **IC 59** and **IC 63**, the so-called "Ghosts of Cassiopeia," a pair of reflection nebulae that require a larger telescope to be seen; they're our targets for a 12-inch telescope this month. IC 59 lies almost due north of Gamma by 24', while IC 63 lies northeast of Gamma by 22'.

Reflection nebulae are generally more difficult to observe than emission nebulae, given that they require light from a nearby star to shine; that nearby star often overwhelms the field of view. In the case of ICs 59 and 63, getting Gamma out of the field is a must. Nebula filters don't help here, either, as the light from the nebulae is not caused by fluorescence.

In a larger telescope, IC 59 extends east-west roughly 8' x 5'; IC 63 is a triangular 6' wedge extended SW–NE, and is brighter on the western vertex. Both shine with an irregular wispy light that suffers from subpar conditions; use a wide-field eyepiece under good conditions to track down these elusive spectres.

Most of Cassiopeia's well-known objects are open star clusters, several of which are among the sky's best. Our binocular target for this month, **NGC 457**, is one such famous cluster. Known as "The Stick-Man," "The Owl," "The E.T. Cluster," "The Dragonfly," and probably a host of other names, NGC 457 surrounds — and extends northwest from — the 5th-magnitude star Phi Cassiopeiae.

A bright, intriguing cluster, NGC 457 appears as a stick figure, with its legs to the northwest, its arms extended out to the northeast and southwest, and its eyes marked by Phi^1 Cas and 7th-magnitude Phi^2 Cas, also known as HD 7902, which is a double star with the 10.4-magnitude secondary 'B' component 42" to the west. (More properly, the companion star is at position angle 265°; position angle in astronomy is measured from north and runs east and south, so a north-south pair would be of position angle 180°, and a pair with the secondary due east would be of position angle 90°.) It's unsure if Phi^1 Cas is an actual member of the group; if at the cluster's distance of 7900 light years, Phi^1 would have an astounding luminosity of 275,000 times that of the Sun!

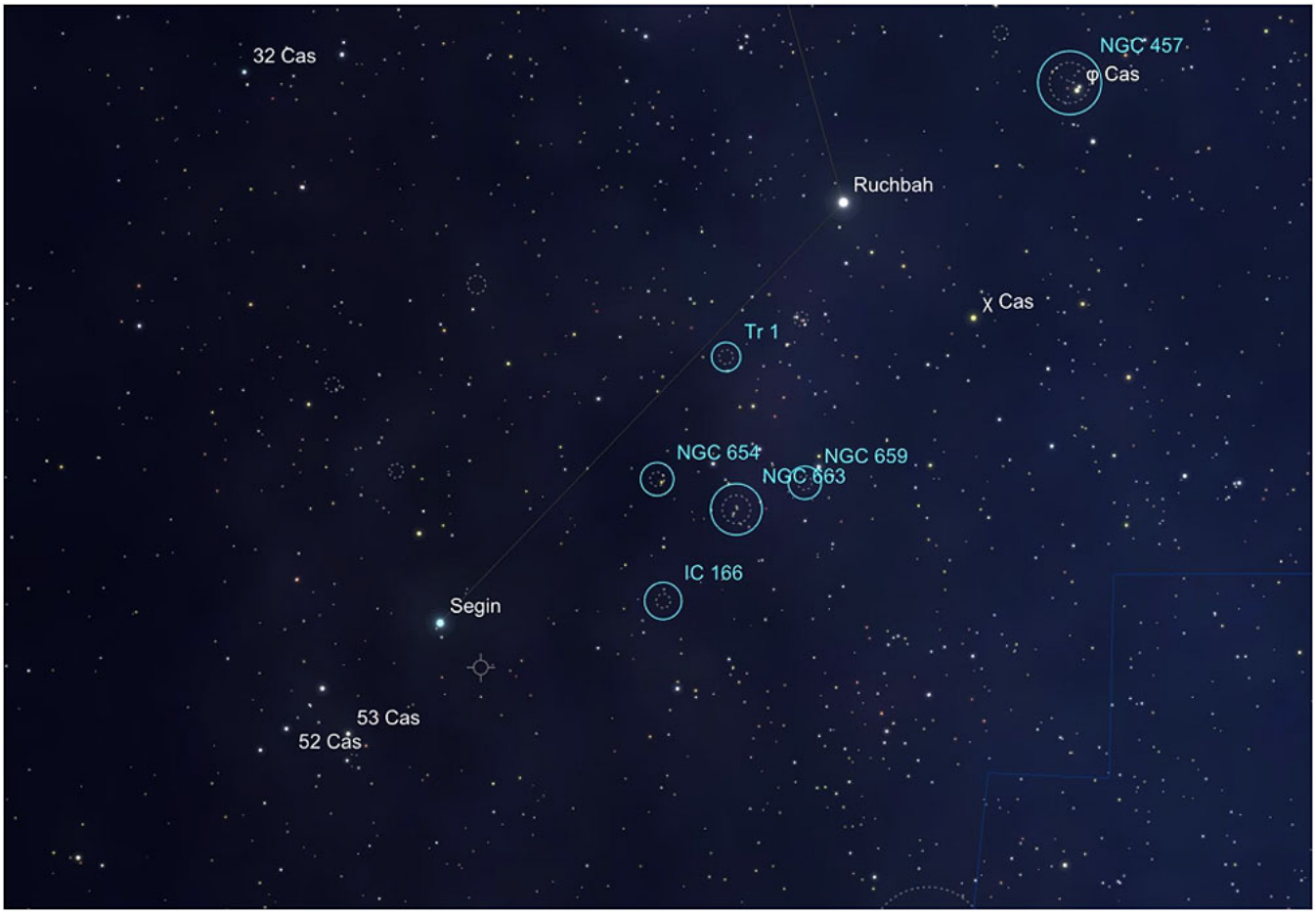
NGC 457 is an easy find in binoculars and finderscopes: draw a line southwest from Epsilon through Delta Cassiopeiae (the eastern side of the 'W') and extend that line a little bit less than half that same distance. Under optimal conditions, the cluster may even be suspected with the naked eye. It spans a third of a degree, and its stick-figure shape is apparent even in the smallest of optics. The cluster reveals about 75 stars to an 8-inch telescope, but only a few of those are visible in smaller binoculars, overlaid upon a vague haze in the stickman shape; twenty may be visible in the largest binoculars. Keen observers will note the presence of much-smaller **NGC 436**, 42' to the northwest, but at 4' diameter and quite rich, this cluster requires a telescope for a good view.

For 2-inch telescopes, we stay on Cassiopeia's east side, an area that's a fertile hunting ground for bright, showy open clusters. About halfway between Epsilon and Delta Cass, and just over a degree east of that line, is a splashy blotch of stars: **NGC 663**. One of Cassiopeia's brightest clusters, and visible to the naked-eye under exceptional conditions, NGC 663 sits among a quintet of clusters within a 1.5° circle. Three of these are suitable targets for binoculars, one for mid-sized telescopes, and the fifth is suitable only for large apertures.

NGC 663 is the brightest and largest of the five. A half-dozen of its stars can be resolved in standard 50mm binoculars, spread over a 9' circle; this number triples in a 2-inch scope. The cluster's four most-prominent stars are situated on its north end, with the richest concentration of stars south of the cluster's 8.5-magnitude lucida (brightest star). Several obvious double stars lurk among the cluster's membership.

A large number of Be-type stars (a la Gamma Cas!) are to be found in NGC 663, in part due to the cluster's young age (20-25 million years); with the cluster being so young, its hotter stars — including those of type Be — have not yet died out.

Explore the other nearby clusters after observing NGC 663. **NGCs 654** and **659** are also suitable for 2- to 4-inch telescopes; NGC 654 is a triangular cluster of some 30+ stars in a 5' area, with a 7th-magnitude



Clusters in eastern Cassiopeia. Image rendered in *Sky Safari 6*.

yellow giant star on its southeastern corner, while NGC 659 (the least of the three) is about 2' across and contains a sprinkling of stars whose brightest member is magnitude 10.5. NGC 654 lies 42' NNW of NGC 663, while NGC 659 lies 36' SSE of 663.

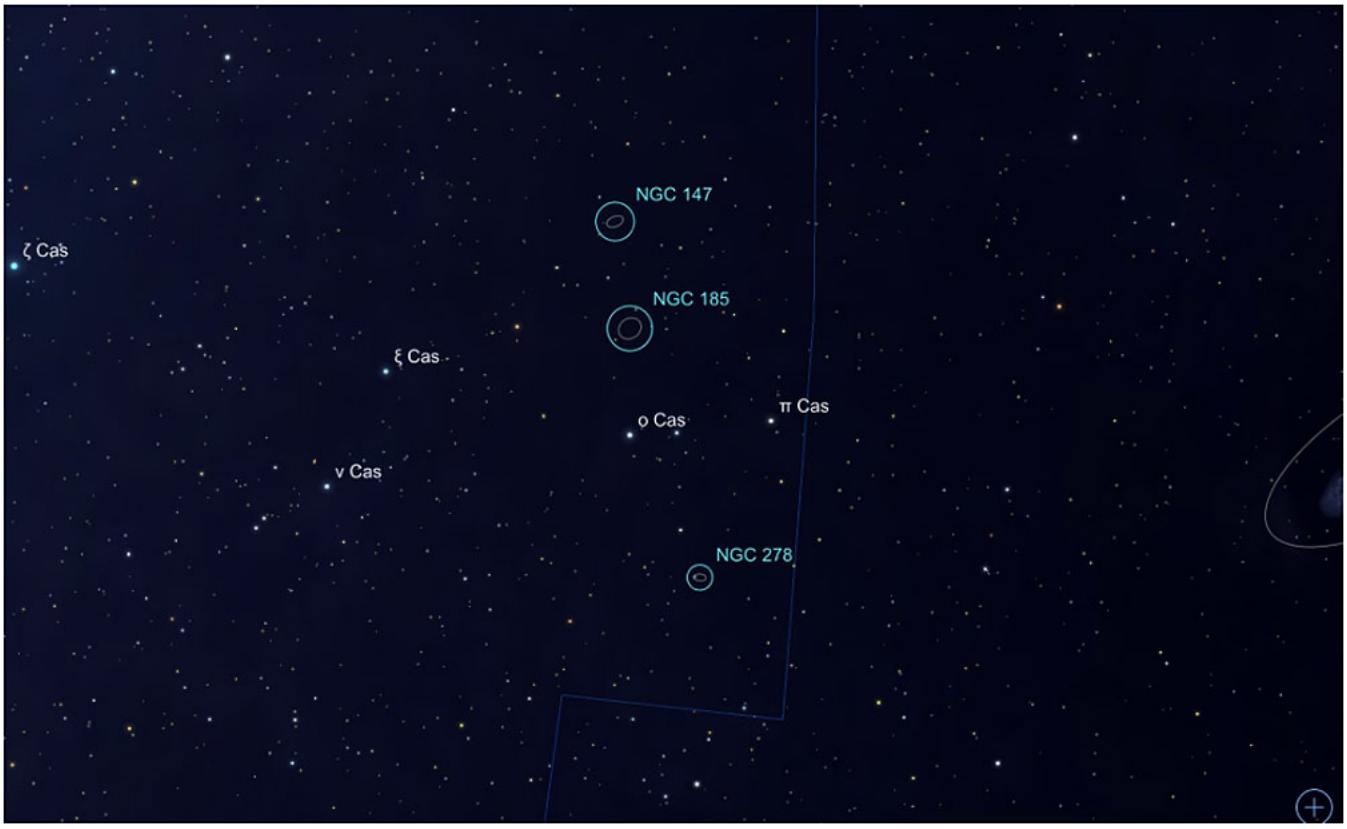
The other two clusters in the vicinity are visual opposites. **Trumpler 1**, our target for 10-inch telescopes this month, is a forgotten, obscure target 1.25˚ due west of NGC 663; this little (2' diameter) cluster has a NNW-SSE running line of its four brightest stars straight through the middle, all four of them equally spaced. (The cluster is an adequate target for somewhat smaller scopes.) If you find Trumpler 1 too easy, turn your telescope a degree northeast of NGC 663 for a faint, misty patch of stars that will be beyond the resolution of a 10-inch scope. This is **IC 166**, a spectacularly-rich but extremely faint cluster, 4' in diameter, with fewer than a dozen of its individual stars — all in the 14.5-15.5 magnitude range — visible, and then only in excellent conditions. The rest of the cluster is the epitome of "background glow." IC 166 was later "discovered" by Pluto discoverer Clyde Tombaugh, and also became known as Tombaugh 3; Tombaugh originally thought it a very faint globular cluster, and indeed, that's what it resembles in the eyepiece.

Our final cluster target this month lies on the opposite side of the constellation, halfway between the naked-eye stars Rho and Sigma Cassiopeiae. Caroline's Rose, catalogued as **NGC 7789**, is one of the northern sky's most-impressive open clusters, a 14' circle of over 200 stars, about half of which can be seen in a 6-inch scope. The vast majority of the cluster's stars are of 13th magnitude or fainter, so they'll be just on the verge of resolution in a 6-inch, giving the cluster a shimmering appearance under less-optimal conditions. Perhaps only Messier 11 in Scutum (q.v.!) is a more stunning sight among the open clusters that can be seen from Oregon. NGC 7789 was a discovery of Caroline Herschel, sister of William and the first great female astronomer of the telescopic era. Caroline discovered it on October 30, 1783, using a 4.2-inch telescope; its nickname, "Caroline's Rose," attests to her discovery, but also to the cluster's visual appearance.

Several long strands of dark nebulosity weave their way across the cluster's face, dividing portions of the cluster's haze into petal-like shapes. The overall effect is remarkably flower-like, although this doesn't show well on photographs. As with most of our other open clusters this month, NGC 7789 can be spotted in modest binoculars, but a 6-inch telescope is the minimum aperture to really observe the flower-like effect of the star-haze and dark nebulosity that makes the cluster so distinctive.

Our final objects — those for 8-inch apertures — aren't clusters; they aren't even in our galaxy. 4th-magnitude Omicron Cassiopeiae is our leaping-off point for three galaxies, two of them elliptical satellites of M31, the Andromeda Galaxy. **NGCs 147** and **185** are fairly well known because of their association with M31; NGC 185 lies just under a degree due west of Omicron Cas, while NGC 147 lies the same distance west-northwest of NGC 185.

These two galaxies are a study in visual contrasts. NGC 185 is a roundish (slightly elongated SW-NE) glow with a very slightly more-concentrated center, set in an isosceles triangle of 8th- and 9th-magnitude



Galaxies in southern Cassiopeia. Image rendered in *Sky Safari 6*.

stars. The galaxy's faint outer halo dissipates into the background sky indistinctly, without a definable edge. In my 12.5-inch telescope, I estimated the galaxy's size at 4.0' x 3.5', although it will likely appear smaller in an 8-inch; its listed size is considerably larger, but includes measurements of the outer halo as seen in photographs. As always, take listed sizes and magnitudes of objects with a healthy dose of salt when it comes to visual observing.

NGC 147 is a much tougher target. It's larger (5.0' x 4.0' in my 12.5-inch scope, oriented in the same direction as NGC 185) but much fainter and even more diffuse than 185. Eagle-eyed William Herschel discovered NGC 185 in November of 1787, but it took his son John 42 years to discover NGC 147, due to its faintness and diffuseness. It's very easy to sweep over NGC 147; under normal conditions (and a dark rural sky is a must), the galaxy is little more than eternity's breath on the eyepiece. With such ghostly, low-surface-brightness objects, it helps greatly to use a medium/low-power, wide-field eyepiece until the object is identified in the field, in order to provide enough space around the object to better see the contrast

between the object and the background. NGC 147 is notoriously difficult, so seeing it in less than a 10-inch scope is a considerable accomplishment.

NGCs 185 and 147 are bound both to each other and to M31, although they lie slightly closer to us than M31 does (2.1 million light-years' distance vs. 2.3 million). They are the third- and fourth-brightest satellites of M31 after M32 and M110, which can both be seen in a low-power field with M31. Although NGC 185 lies more than seven degrees from M31 as seen in our skies, others in M31's retinue of 20+ satellite galaxies lie much farther from their "parent" galaxy; Andromeda VI (the Pegasus Dwarf Spheroidal Galaxy) lies a whopping 19 degrees away from M31.

A third galaxy lies nearby Omicron Cassiopeiae, and we'd be remiss in not checking it out. NGC 278 lies just under 1.5 degrees east-southeast of Omicron, and is the brightest of Cassiopeia's many galaxies in terms of surface brightness; it's detectable in my 70mm refractor, but almost looks like an elliptical galaxy at first glance. NGC 278 is a small spiral galaxy of type SAB(rs)b: it has a weak bar across the nucleus (the 'AB' part), traces of ring structure (rs), and moderately tight arms (b). In my 12.5-inch scope, the galaxy spans 1.25' but is irregularly-bright, with a dark spot in the southwest part of the halo and mottled texture throughout. A 9th-magnitude star lies roughly 2.5' north of the galaxy. NGC 278 was one of the first non-Messier galaxies I observed with my 8-inch scope in the Cincinnati suburbs in the late '80s, so it may well be visible even in semi-urban skies around Eugene and Springfield.

NGC 278 is situated near NGC 185, but is not a satellite of M31 (nor any other Local Group galaxy of any sort), although its distance is poorly known; the galaxy lies anywhere from 15 to 95 million miles away from us.

There's a great deal more to be found in Cassiopeia than one article could ever cover; exploring its open clusters alone could fill several months' worth of columns. But merely scratching the surface of the constellation gives more opportunity for simultaneous exploration of the constellation's riches. Sweeping through the 'W' pattern of the constellation with binoculars or small telescopes will turn up dozens of objects worth the time to research and contemplate. And seeing that Cassiopeia is a circumpolar constellation — and therefore visible all year — there's no reason not to check out the Queen's deep-sky hoard.

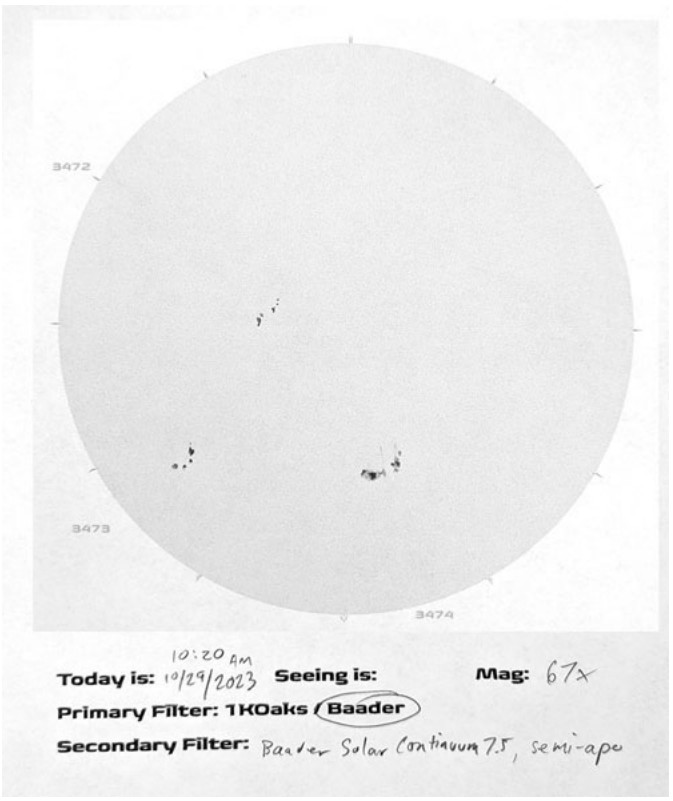
Gallery

October provided many good nights for astrophotography. We were all hoping for a good day for the October 14th annular eclipse, too, but we weren't so lucky. The day dawned foggy and cloudy, and it only cleared for a few seconds during ingress and a few more seconds during annularity. At least we got to see that much of it, and club members did get some photos of it. Here are some of what we got, and some other great deep-sky images as well. Zoom in a bit; they'll still look sharp at 200%

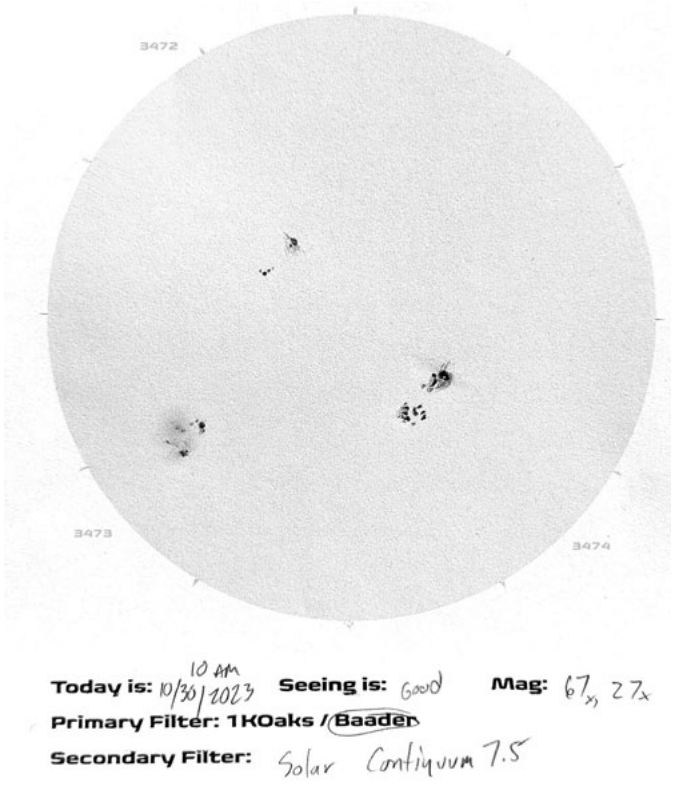
Ingress near annularity. Photo © by Karmin Peterson

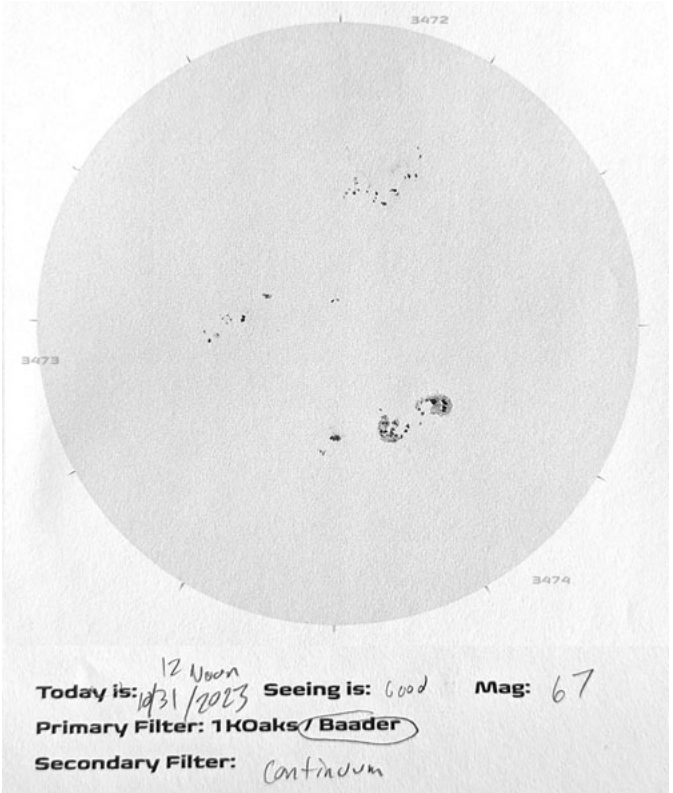
Annularity. Photo © by Dave Horton

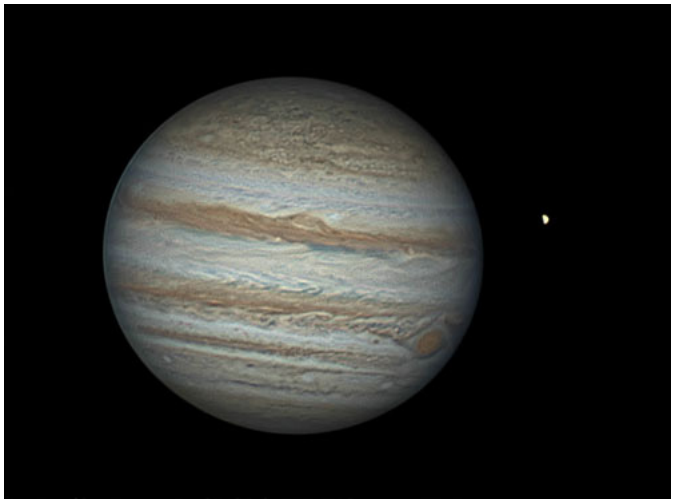
Robert Asumendi captured the atmosphere of annularity in this shot from the Eugene Science Center.
Photo © by Robert Asumendi.

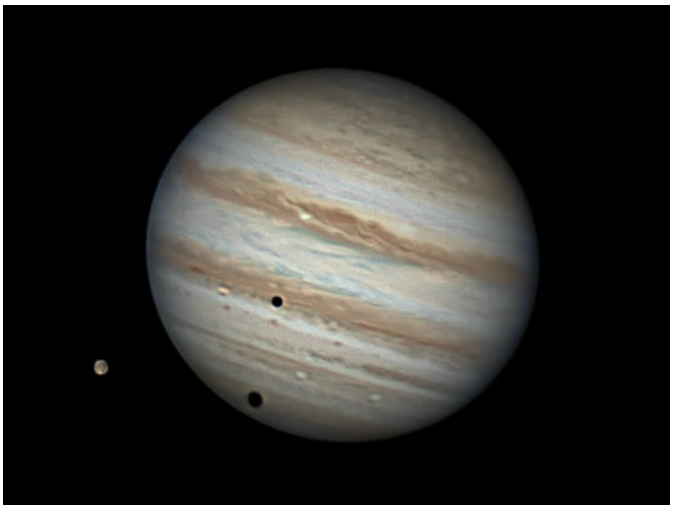


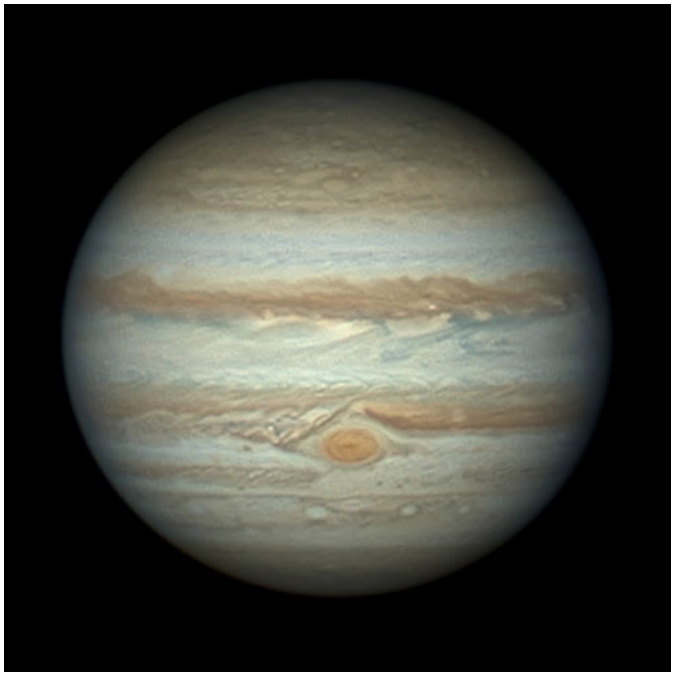
Robert Asumendi sketched the Sun on three consecutive days, capturing the evolution of three sunspot groups and the rotation of the Sun. Robert used his solar-filtered "Magic" binoculars, which he is calling the "Sunny" model binoscope.
Sketches © by Robert Asumendi.



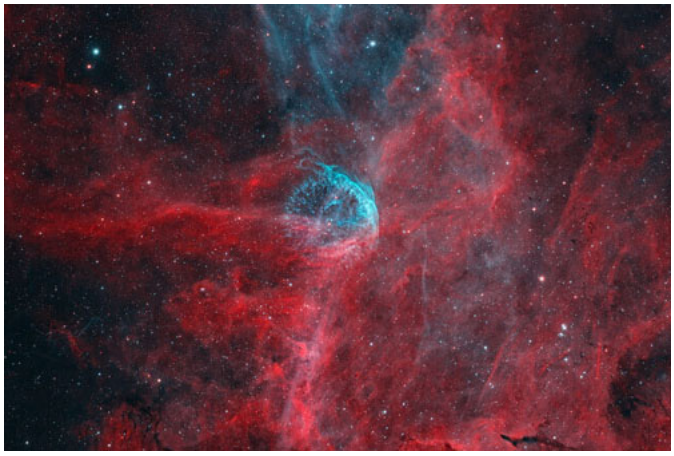




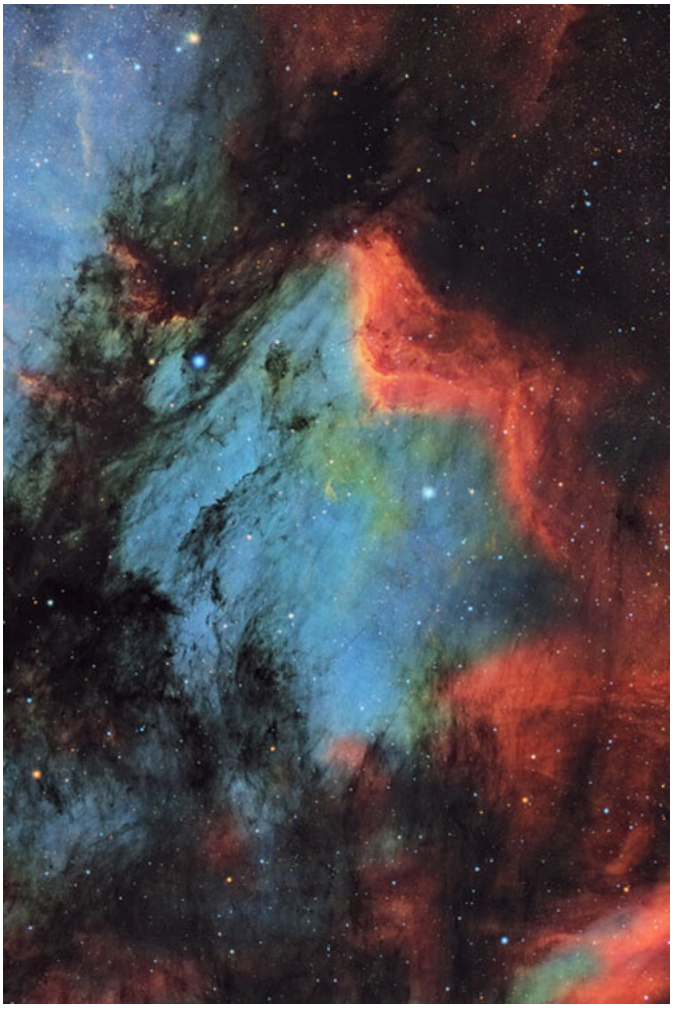




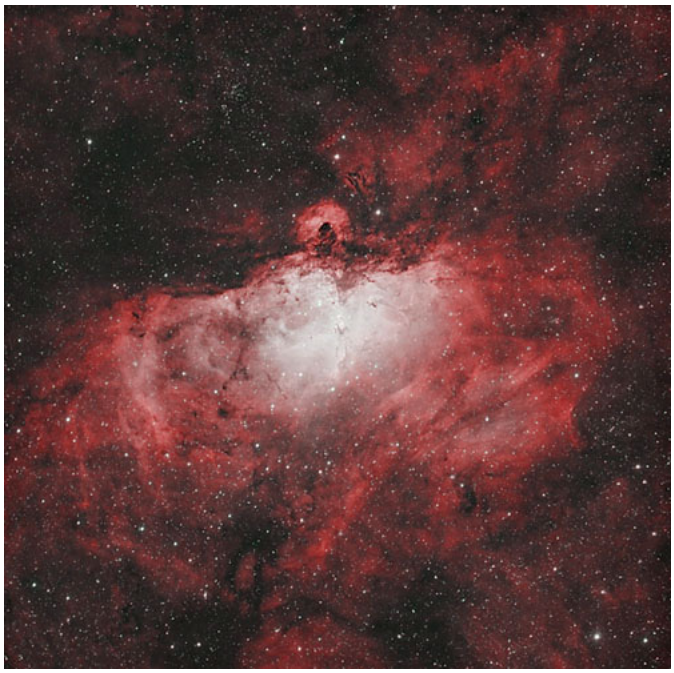
Jeff Phillips took three great images of Jupiter. To the upper left he caught Io just emerging from eclipse. Zoom in and you'll see that only half the moon is lit; the other half is in Jupiter's shadow. At upper right he caught a double shadow transit of Io and Ganymede, with detail visible on both moons. To the left he caught the Great Red Spot in the southern equatorial belt. Check out all the other detail visible, too. Photos © by Jeff Phillips



Wolf-Rayet 134, a young star with a strong stellar wind blowing a bubble of fluorescing gas around itself.
Photo © by Mark Wetzel.



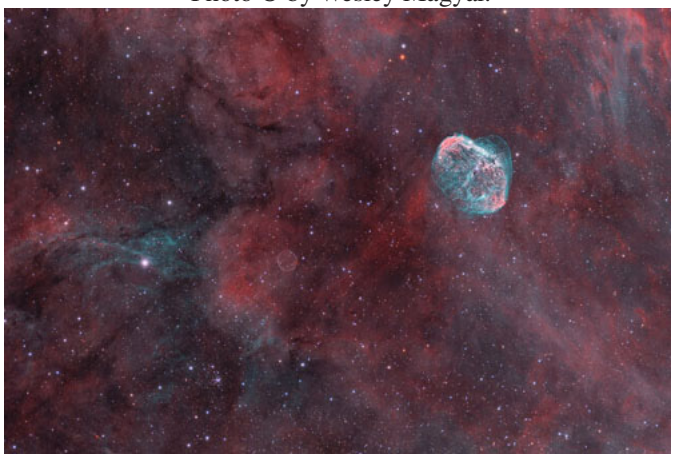
The Pelican Nebula in Cygnus.
Photo © by Mark Wetzel.



M16, the Eagle Nebula.
Photo © by Wesley Magyar.

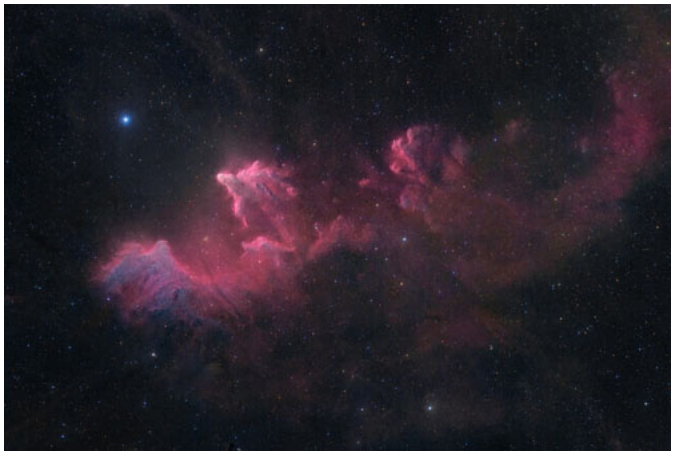
M42, the Orion Nebula.
Photo © by Wesley Magyar.

The Moon was less than 2° from Jupiter on the night of October 28th. Photo © by Karmin Peterson.

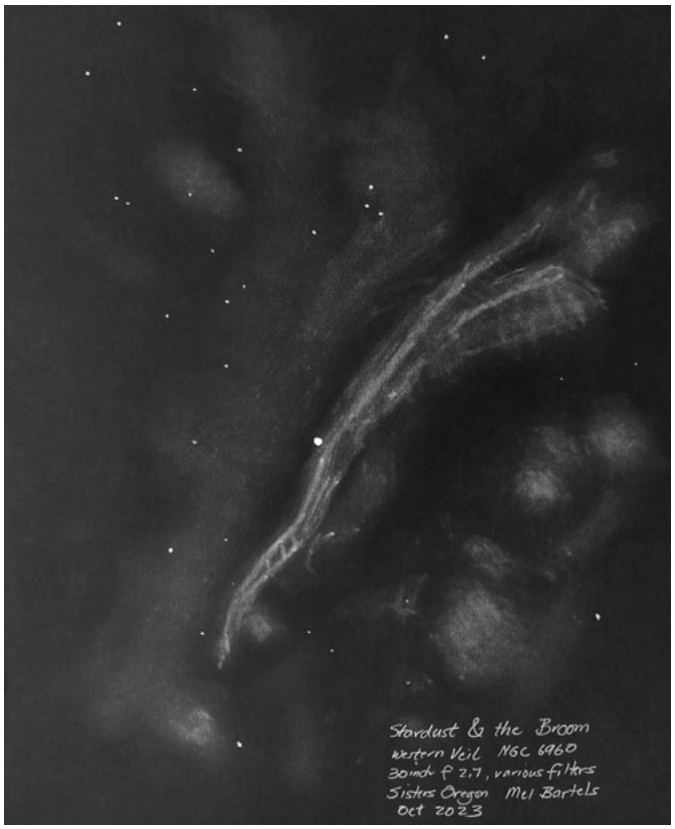


NGC 6888, the Crescent Nebula, and very faint to the lower left of center is the Soap Bubble Nebula (a planetary nebula).
Photo © by Mark Wetzel.

LBN 576, the Popped Balloon Nebula (a supernova remnant).
Photo © by Mark Wetzel.



IC 59 and IC 63, reflection nebulae lit up by Gamma Cassiopeiae at upper left. There are also emission components to both nebulae. Photo © by Mark Wetzel.



Right: Spurred by a photo of stardust to the west of NGC 6960, the Witches Broom (part of the Veil Nebula in Cygnus), Mel Bartels went on a hunt for it in his 30" telescope...and found it. Here's his sketch of what he saw. The bright star just outside the Witch's Broom is 52 Cygni, and the large hazy patch paralleling the Broom is the dust cloud.
Sketch © by Mel Bartels.

NGC 884 and 869, the Double Cluster in Perseus. Note the soft haze of emission nebula to the right, and the red giant stars scattered about. Photo © by Mark Wetzel.

Observing in November 2023

Nov 5, 00:37 AM	Nov 13, 1:27 AM	Nov 20, 2:50 AM	Nov 27, 1:16 AM
Mercury Set: 5:18 PM	Mercury Set: 5:21 PM	Mercury Set: 5:28 PM	Mercury Set: 5:38 PM
Venus Rise: 2:53 AM	Venus Rise: 3:06 AM	Venus Rise: 3:19 AM	Venus Rise: 3:32 AM
Mars lost in sun	Mars lost in Sun	Mars lost in Sun	Mars lost in Sun
Jupiter Set: 6:44 AM	Jupiter Set: 6:07 AM	Jupiter Set: 5:35 AM	Jupiter Set: 5:04 AM
Saturn Set: 00:40 AM	Saturn Set: 00:09 AM	Saturn Set: 11:39 PM	Saturn Set:11:12 PM
Uranus Rise: 5:13 PM	Uranus Set: 7:13 AM	Uranus Set: 6:44 AM	Uranus Rise: 6:15 AM
Neptune Set: 2:50 AM	Neptune Set: 2:18 AM	Neptune Set: 1:50 AM	Neptune Set: 1:22 AM
Pluto Set: 9:40 PM	Pluto Set: 9:09 PM	Pluto Set: 8:43 PM	Pluto Set: 8:16 PM

All times Pacific Daylight Time (March 12 – Nov 4, 2023 = UT -7 hours) or Pacific Standard Time (November 5, 2023 – March 9, 2024 = UT -8 hours)

Date	Moon Rise	Moon Set	Twilight Begin	Sun Rise	Sun Set	Twilight End
11/1/2023	20:38	12:28	06:11	07:49	18:02	19:40
11/2/2023	21:37	13:23	06:13	07:51	18:01	19:39
11/3/2023	22:41	14:06	06:14	07:52	18:00	19:38
11/4/2023	23:46	14:40	06:15	07:53	17:58	19:36
11/5/2023	23:52	14:06	05:16	06:54	16:57	18:35
11/6/2023		14:28	05:17	06:56	16:56	18:34
11/7/2023	00:56	14:47	05:18	06:57	16:54	18:33
11/8/2023	02:00	15:04	05:19	06:58	16:53	18:32
11/9/2023	03:03	15:21	05:21	07:00	16:52	18:31
11/10/2023	04:07	15:38	05:22	07:01	16:51	18:30
11/11/2023	05:14	15:58	05:23	07:02	16:50	18:29
11/12/2023	06:23	16:20	05:24	07:04	16:49	18:29
11/13/2023	07:36	16:49	05:25	07:05	16:48	18:28
11/14/2023	08:50	17:26	05:26	07:06	16:47	18:27
11/15/2023	10:02	18:14	05:27	07:08	16:46	18:26
11/16/2023	11:06	19:15	05:28	07:09	16:45	18:25
11/17/2023	11:59	20:26	05:30	07:10	16:44	18:25
11/18/2023	12:41	21:44	05:31	07:12	16:43	18:24
11/19/2023	13:13	23:04	05:32	07:13	16:42	18:23
11/20/2023	13:40		05:33	07:14	16:42	18:23
11/21/2023	14:02	00:22	05:34	07:15	16:41	18:22
11/22/2023	14:23	01:39	05:35	07:17	16:40	18:22
11/23/2023	14:43	02:54	05:36	07:18	16:39	18:21
11/24/2023	15:05	04:10	05:37	07:19	16:39	18:21
11/25/2023	15:30	05:27	05:38	07:20	16:38	18:20
11/26/2023	16:01	06:45	05:39	07:22	16:38	18:20
11/27/2023	16:39	08:00	05:40	07:23	16:37	18:20
11/28/2023	17:25	09:10	05:41	07:24	16:37	18:19
11/29/2023	18:22	10:10	05:42	07:25	16:36	18:19
11/30/2023	19:25	10:59	05:43	07:26	16:36	18:19

Begin Standard Time

All times are for Eugene, Oregon Latitude 44° 3' Longitude 123° 06'

Items of Interest This Month

11/3 Jupiter at opposition. Europa shadow transit 6:15 – 8:35. Europa is almost on top of its shadow.
11/4 Io shadow transit 8:58 – 11:08.
11/5 Daylight Saving Time ends. Yay!
11/9 Venus 1° above Moon at moonrise.
11/10 Europa shadow transit 7:51 – 10:11.
11/11 Io shadow transit 9:53 – midnight.
11/13 Uranus at opposition.
11/16 Ganymede and Europa pass one another ~8:30.
11/17 First Quarter Friday star party.
Europa shadow transit 10:26 – 12:46.
11/17-11/19 Leonid meteor shower.
11/18 Mars in superior conjunction with Sun.
Tethys shadow transit (Saturn) 8:35 – 9:55.
Io shadow transit (Jupiter) 11:48 – 1:59.
11/20 Tethys shadow transit 5:50 – 7:10.
Io shadow transit 6:17 – 8:27.
11/23 Jupiter's moons pile up on one side.
11/24 Ganymede shadow transit 6:06 – 7:47.
11/26 Moon 1° below Pleiades.
11/27 Io shadow transit 8:12 – 10:23.
11/28 Moon occults 4th magnitude 136 Tauri at 7:12 PM. Reappearance (dark side of Moon) at 7:58 PM.
11/30 Callisto crosses under Jupiter's S pole.