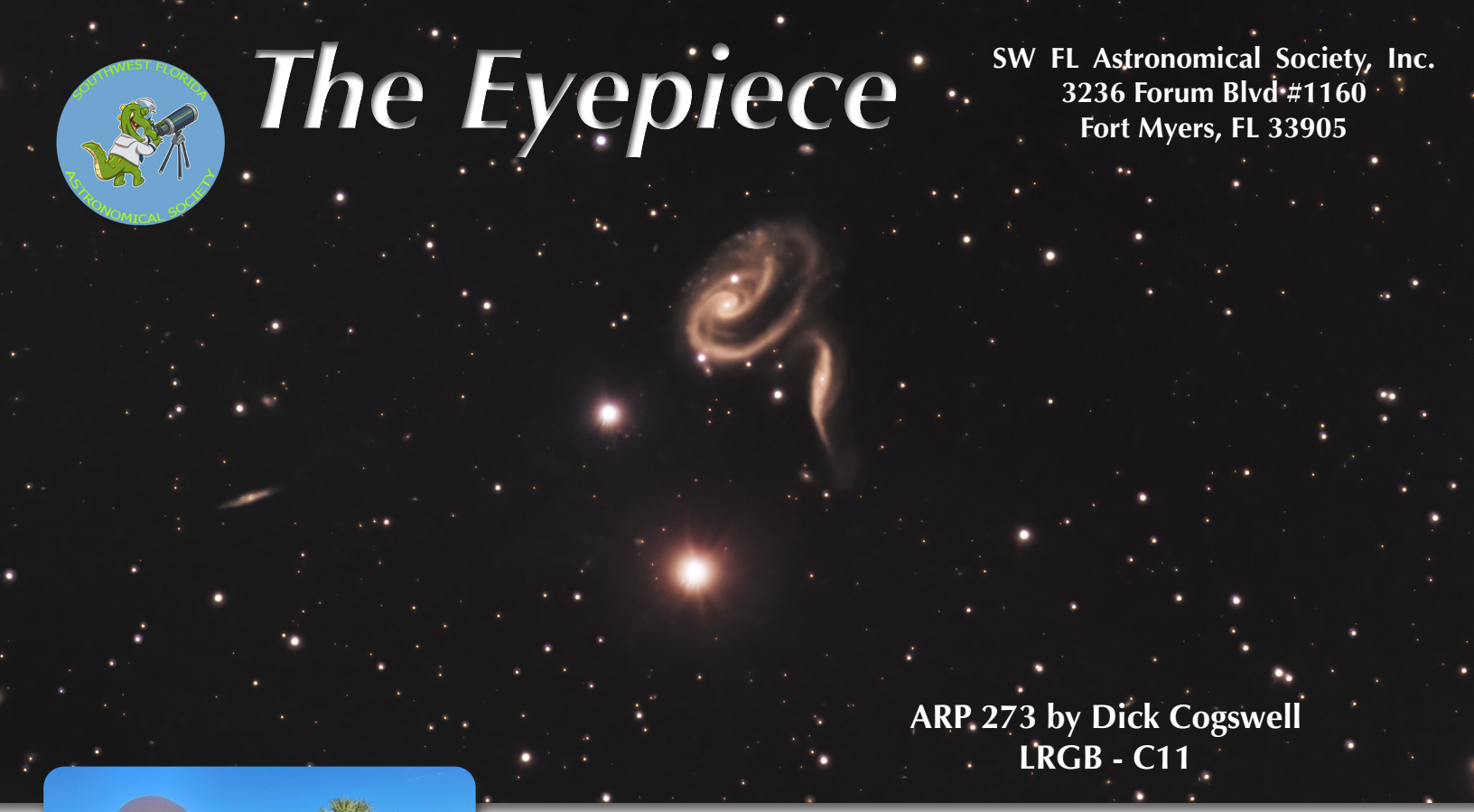
The Eyepiece

SW FL Astronomical Society, Inc.
3236 Forum Blvd #1160
Fort Myers, FL 33905



ARP 273 by Dick Cogswell
LRGB - C11

Editor - Mike Jensen

Hi Everyone & Happy New Year! We're entering the new year with new hope for better weather, new targets and a new set of speakers.

If you haven't done so, please renew your membership. Here's the link: https://theeyepiece.org/membership/

Now that the new year (and new budget) is here we will be purchaseing at least one new computer to help us reduct those technical woes. Should be done very soon.

Outreach - We do a LOT of outreach in our community and it takes more than just Brian getting out there and setting up a table. Even if you can only help and attend for a few hours, please try to get out to one of our outreach events in Ft. Myers or with Tom Segur in Port Charlotte at the Punta Gorda Observatory or in one of the Port Charlotte parks.

Basic Info - While we encourage everyone to try to attend our meetings in person because we feel it's a better experience for everyone, we understand that sometimes becaue of certain circumstances you may need to attend on Zoom. No prob, we've got you covered, thanks to Tom Klein.

Please save this.

Link to join Zoom meeting: https://widener.zoom.us/j/91008062016

PRE MEETING DINNER
Buffalo Wild Wings
Thursday 4:45pm
9390 Dynasty Dr #101,
Fort Myers, FL 33905

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Unsure about Light Pollution and how it affects observing or astrophotography? Click here to read a great article!

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Monthly Meetings

Our monthly meetings are held on the **first Thursday of each month**. **The meetings begin at 7:00pm**.

Each meeting is usually a combined live and Zoom meeting.

The in person meeting is held at:
Calusa Nature Center/Planetarium
3450 Ortiz Ave,
Fort Myers, FL 33905

Each meeting will have the same Zoom link/meeting ID.

Below are the dates for the meetings of 2024:

Jan. 5, 2024
Feb. 1, 2024
Mar. 7, 2024

Link to join Zoom meeting:
https://widener.zoom.us/j/91008062016

Port Charlotte/Punta Gorda Observing Dates

Night Sky Observing At Moore Observatory & Solar Observing In PG & PC

Our Observatory Team opens up the Moore Observatory at FSW Charlotte Campus (26000 Airport Road, Punta Gorda) on the second Friday of each month. Observation sessions typically begin about 30-45 minutes after it is dark enough to see the stars and continue as long as stargazers linger. Prior to complete darkness, visitors can not be admitted into the observatory as the equipment needs to be setup and aligned with the stars each time but early arrivers are welcome to enjoy views of the lake and the scenery of the campus from the lakeside picnic tables. The public sessions are free and held weather permitting.

Here is the schedule for 2024:

- Jan 12, 2024
- Feb 9, 2024
- Mar 8, 2024
- Apr 12, 2024
- May 10, 2024

Our observing team also sets up solar telescopes on the 4th Saturday of the month (from 9am - Noon) to look at the Sun, looking for solar flares, prominences and other solar phenomena. All events are in Port Charlotte or Punta Gorda.

Solar Observing/Park

Jan 27, 2024	Bayshore Live Oak
Feb 24, 2024	Gilchrist
Mar 23, 2024	Ponce deLeon
Apr 27, 2024	Bayshore Live Oak
May 25, 2024	Gilchrist

President's Report

Brian Risley - President

Hope you all had a Happy New Year.

It is Dues time. Annual Dues for 2024 are $30.00 and can be paid online at https://theeyepiece.org/membership/ If you want to mail dues information is also available on that webpage.

My wife Chris and I went down to the Big Cypress Swamp Heritage Festival on the 2nd. They are estimating 700 people came out. We had our display set up and solar telescopes. Lots of sunspots but the clouds were a bit of a problem off and on.
Joe Dermody and I went down to Big Cypress for their first night of the season on the 9th. Weather was pretty good. They had a big turnout. Jupiter and Saturn were great.

The Seahawk Park Star Party on the night of the 16th was a total wash-out. I do want to thank Joe Dermody for stepping up to cover it.
We are working on getting the 2024 Seahawk Star Parties scheduled.

The schedule for the Big Cypress Astronomy nights is: 1/13/24, 2/10/24, 3/9/24.
Other upcoming events: STEMtastic is at Centennial Park/Caloosa Sound on Feb 10th, 2024.
Cape Coral Parks and Rec Rotary Park Star Party is Friday March 8th, 2024. (This follows the Burrowing Owl Festival there on Saturday Feb 24th 2024, so we can really publicize it.)

Our speaker this month is Dr. Mario Motta, M.D. an avid amateur astronomer and a member of the Society at 7:00 pm on Thursday January 4, 2024 at the Calusa Nature Center Planetarium. Dr. Motta will present in person his talk entitled "The Life and Legacy of Russell Porter and early days of Stellafane".

I do want to thank John MacLean for all his efforts in getting us these excellent speakers.

GUEST SPEAKER PRESENTATIONS SERIES

We are excited to announce the initiation of the new "SWFAS Guest Speaker Presentations" series of talks. These will cover astronomical science and space exploration along with practical astronomy and astrophotography talks by various subject matter experts. We are lining up prominent scientists and researchers to explain the science and technology behind the exciting discoveries being made in recent years in astronomy.

The following presentations are already scheduled and we will be firming up talks in 2024 on a month-to-month basis.:

Jan. 4, 2024	Dr. Mario Motta, Club Member speaking on **The Life and Legacy of Russell Porter and the early Stellafane years.**
Feb 1, 2024	Joe Dermody - Eclipses
Mar 7, 2024	Dr. Rana Essedine - University of Florida
Apr 4, 2024	Dr. Amy Williams - UF

Jan. 4th, 2024

the

Dr. Mario Motta - The Life and Legacy of Russell Porter and the early days of Stellafane
Presented In Person at the Planetarium!
Jan. 4, 2024

OPEN TO ALL SWFAS MEMBERS AND THE PUBLIC - More Info & Zoom Links at https://theeyepiece.org/

Upcoming Speakers

The Life and Legacy of Russell Porter and the early days of Stellafane

Presented by Dr. Mario Motta
January 4, 2024

2023 marked 100 years since the first gathering of the Springfield Telescope Makers in 1923, on Breezy Hill in Springfield Vermont. The prime mover of the founding of Stellafane was Russell Porter, who was a unique individual with an amazing career ranging from arctic explorer, architect, artist, and engineer on the Mount Palomar 200 Inch Hale telescope. What we remember him fondly for however is his leading role in fostering amateur astronomy and telescope making. Prior to his efforts, if an amateur astronomer wanted a telescope, the choices were to buy a very expensive scope from the Clark or Brashear companies, or import one from England. Thus, only very wealthy individuals such as a Percival Lowell could become amateur astronomers. Porter self-taught himself how to grind and polish telescope mirrors for personal use, and then taught others how to accomplish this. This group eventually became the Springfield Telescope Makers. Being based in Springfield Vermont, it helped that the town had a workforce that excelled in precision gear and mechanical construction aiding in telescope making. This eventually attracted the attention of Ingalls, an editor from Scientific American (SA), who wrote a seminal article in 1925 in SA, that led to a worldwide interest in telescope making. His talk will describe the early Stellafane years, and the amazing career of Russell Porter.

Experiences Viewing Eight Solar Eclipses

Presented by Joe Dermody
Feb. 1, 2024

Joe Dermody divides the year between his home state of Michigan and Florida. His education ranged widely from international broadcasting to physics and mathematics. The high point of Joe's career was building custom hybrid microelectronic circuits by hand under a stereomicroscope in a clean room. A few of those one of a kind circuits continue to orbit the Earth in military communications and surveillance satellites. For the past two years, Joe has been a NASA "Solar System Ambassador" in their volunteer educational outreach program co-sponsored by the Jet Propulsion Laboratory and the California Institute of Technology. An avid amateur astronomer for more than 60 years, Joe has experienced eight total solar eclipses and will share stories and advice based on those unforgettable events.

The Astronomical League Report

The Astronomical League
Submitted monthly by John MacLean

As a member of the Southwest Florida Astronomical Society you are automatically also a member of the Astronomical League, a nationwide affiliation of astronomy clubs. Membership in the AL provides a number of benefits for you including receipt of The Reflector, the AL's quarterly newsletter, use of the Book Service, through which you can buy astronomy related books at a 10% discount. You can also participate in the Astronomical League's Observing Clubs. The Observing Clubs offer encouragement and certificates of accomplishment for demonstrating observing skills with a variety of instruments and objects. These include the Messier Club, Binocular Messier Club, the Herschel 400 Club, the Deep Sky Binocular Club, and many others. To learn more about the Astronomical League and its benefit s for you, visit http://www.astroleague.org

RASC 2024 Observer's handbooks & Calendars

The Astronomical League announced in late September that the USA Version of the RASC (Royal Astronomical Society of Canada) 2024 Observer's Handbooks and Calendars are available for PRE-ORDER on the League Sales web store at
https://store.astroleague.org/
https://store.astroleague.org/index.php?main_page=index&cPath=12

The Astronomical League sells these items each fall at a fantastic price with their members in mind. tock will arrive in typically in November and typically ship in December in time for Christmas.

The League suggests ordering early to ensure availability, as stock will be limited once the order comes in. Clubs may place group orders with versions of the RASC Calendar for 6+ units and for the RASC Handbook for 10+ units, both on the League Sales web store. Free shipping and discounted prices apply.

Reflector Magazine

The latest December 2023 copy of the Reflector magazine was emailed on December 13. It is also available via the web at https://www.astroleague.org/reflector

Monthly highlight of the Astronomical League Observing Programs

(Article prepared by SWFAS Astronomical League Coordinator John MacLean)

The Astronomical League Herschel Observing Programs

We have previously covered the Messier and Caldwell lists. For the observer that has "bagged" both these lists, the Astronomical League provides two sequential programs that provide a "what's next" challenge to the advanced observer that can take several years to complete. Both lists are compiled from subsets of the 2,478 deep sky objects catalogued by William Herschel and his sister in the 1700s and subsequently included in the New General Catalog (NGC.) The use of computerized Go-To technology for object acquisition is allowed.

Hershel 400 Observing Program

This program had its origins around in the late seventies when members of the Ancient City Astronomers Club in St Augustine selected 400 objects that could be seen with a minimum of 6 inches aperture (the most popular instrument size of the day) in a relatively dark site. Seventeen of the objects are included in the Messier catalog and forty-four are included in the

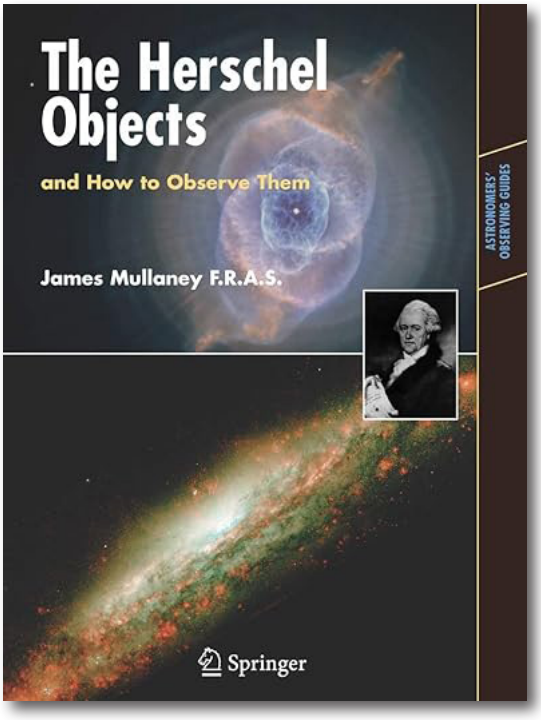
Caldwell listing. All objects are northern hemisphere targets. Included are 231 galaxies, 34 globular clusters, 6 nebulae, 100 open clusters, 5 combined clusters and nebulae, and 24 planetary nebulae. The AL website has the 400 targets listed by Constellation and by NGC number.

Hershel II Observing Program

In 1997, another subset of 400 Herschel objects was selected by the Rose City Astronomers of Portland, Oregon as the Astronomical League's Herschel II list. This set is a step up from the first program and contains 323 galaxies, 41 open clusters, 21 nebulae, 9 planetary nebulae, 3 combines cluster nebulae, and 3 globular clusters. Most of the objects are between magnitude 11 and 13. Many will be visible with 8 inches aperture but 10 inches is specified as the minimum to ensure all are captured. The League also strongly suggests that observers wishing to formally attempt the program purchase the Herschel II Observing Program booklet from the League bookstore.

Additional Reading material regarding observing the Hershel catalog

A very interesting and useful resource on the web is well known author and frequent Sky & Telescope contributor Rod Mollise's "Uncle Rod's Astro Blog." Between 2009 and 2012 Rod observed the entire 2,478 Herschel list. He started with the Herschel 400, the "best of the best", then moved on to the Herschel II list which took him a few more months using a 12 inch dob equipped with digital setting circles. The remainder of the 1,678 objects were completed over the next three years and the task is documented in the blog providing detail as to equipment and supporting software used - Google "Uncle Rod's Herschel Project". His instrument of choice was an 11 inch Go-To CAT.



Regarding the Herschel 400, Rod points out that certainly the objects are viewable with a 6 inch scope from a good dark site, but an 8 inch will provide more detail and a minimum of a 10 inch dob, like the Orion IntelliScope, would be ideal. He also points out the need in a project of this scope for planning software to keep track of completion status and to plan for the next observations (e.g. Skytools 3, Deep Sky Planner, Eye and Telescope) along with charting programs such as Stellarium and Cartes du Ciel.

In addition to the Astro League's Herschel II booklet, the following books are available for purchase:
Herschel 400 Observing Guide by Stephen James O'Meara (used a 4 inch refractor, so charts are sometimes not so useful for those using larger apertures)

The Herschel Objects and How to Observe Them by James Mullaney (covers the entire list)
The Cambridge Atlas of Hershel Objects by James Mullaney and Wil Tirion (covers the entire list)
The Downloadable Observing Guides section in Alvin Huey's faintfuzzies.com site provides a free resource for the listings and charts for both the Herschel 400 and Herschel II catalogs.

The Extremely Large Telescope

The Extremely Large Telescope will transform astronomy

It will be the world's biggest optical telescope by far—and a powerful time machine

ESO's Extremely Large Telescope construction site

The Economist Dec 6th 2023

Submitted by Tom Klein

It is the colours of a sunset that inspire Joseph Anderson, an astronomer at the European Southern Observatory (eso) in the high Atacama desert, in northern Chile. "They start off very blue and turquoise. And gradually, as it gets more purple, then we're getting closer to observing the universe." Once night falls the sky is dominated by the star-spangled curve of the Milky Way. If there were any extra left to give, more than two kilometres above sea level, your correspondent's breath would have been taken away.

The Atacama is home to more than a dozen different astronomical observatories, and for good reason. It is far from the light pollution of civilisation. The air is thin and dry, which improves what astronomers call the "seeing". And the desert averages 325 cloudless nights each year. Dr Anderson is standing on top of a mountain called Cerro Paranal, showing off the Very Large Telescope (vlt). The VLT is made up of four individual telescopes, each individually one of the largest in the world, alongside another four much smaller ones. It is Earth's most productive astronomical facility, yielding more than one scientific paper each day. In 2004 it took the first picture of an extrasolar planet—one that orbits a star other than the Sun—and was the first instrument to track individual stars whipping around the enormous black hole at the centre of the Milky Way.

But it may not hold that title for much longer. An hour's drive from the VLT, atop Cerro Armazones, a 3,046-metre peak, sits the half-finished bulk of the elt, or Extremely Large Telescope. (eso is a fan of quotidian names.) Like so many big projects, the ELT is behind schedule. But when it is finished—in 2028, on current plans, at a cost of €1.5bn ($1.6bn)—it will be, by far, the biggest optical telescope in the known universe. The result, says Robert de Rosa, an astronomer at eso, will be "a step change in what we can do in terms of observational astronomy".

Optical telescopes use a series of mirrors to capture light from space and redirect it to their various instruments. A bigger mirror can collect more light, which means it can both see dimmer things and resolve them in finer detail than a smaller one. The elt's main mirror will have a diameter of 39.3 metres, more than four times that of the vlt's big telescopes (8.2 metres) and over three times that of the present record-holder, the 10.4-metre Gran Telescopio Canarias (gtc), in the Canary Islands. Since a telescope's power depends on the area of its mirror, looking

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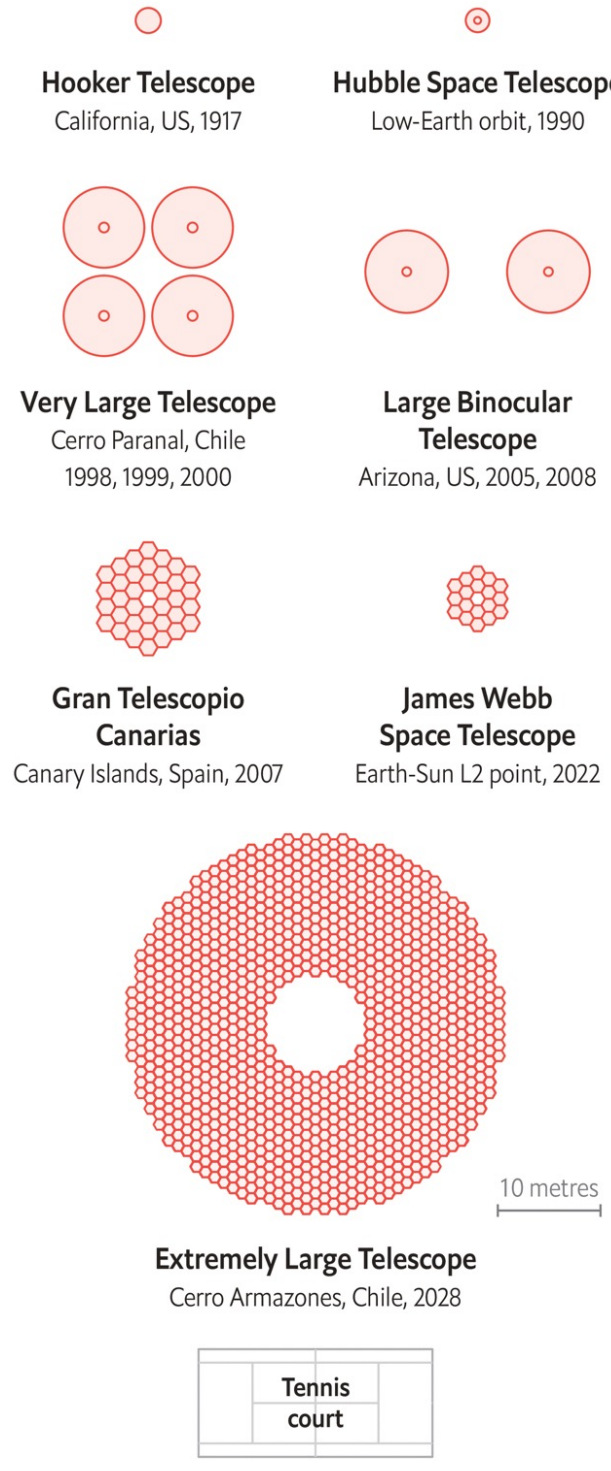
Size comparison of selected optical telescope primary mirrors



Source: European Southern Observatory

The Economist

only at the diameter understates the difference. The gtc has a collecting area of around 75 square metres. The elt will boast 978 square metres, a little smaller than four tennis courts (see diagram 1).
That size will be a boon for many branches of astronomy. The elt will shed light on everything from the role of black holes in shaping the large-scale structure of the universe to how dark matter and dark energy affect the rate at which it is expanding, and even whether the supposed constants of physics really are constant over vast intergalactic distances.

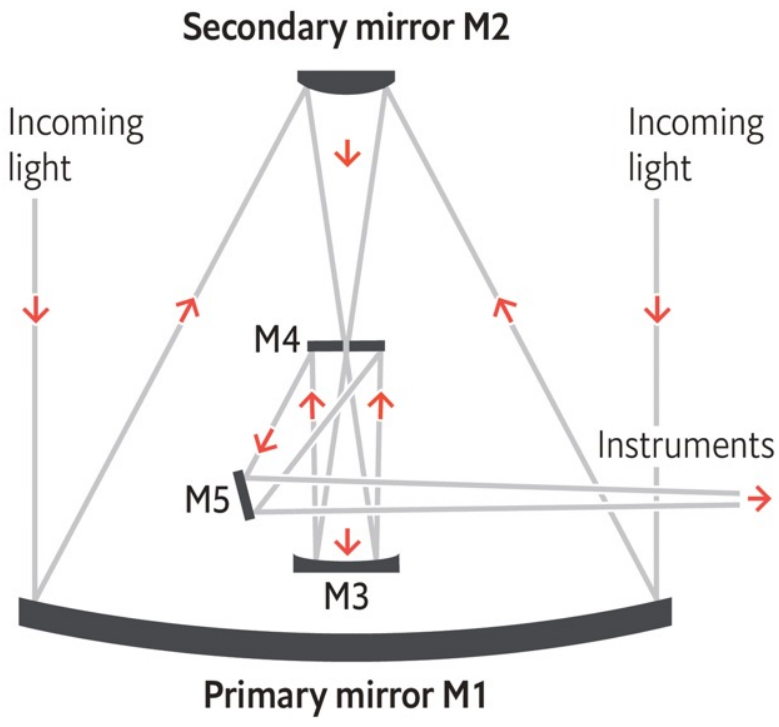
It should also provide a big boost to the study of planets outside the solar system. These days, the existence of most exoplan¬ets is inferred from the effects they have on the light from their parent stars. Taking pictures of them—so-called direct imaging—is rare. Of the roughly 5,500 known exoplanets, scientists have pictures of only around 1% of them.

Time and relative dimension in space
The elt's enormous mirror will allow astronomers to separate the faint light of a planet from the overwhelming glare of its star from dozens of light-years away. The result should be a direct-imaging bonanza. And direct imaging will also help reveal the chemical composition of exoplanet atmospheres, and whether any show signs of potential alien life.

And because telescopes are also time machines, the elt will allow scientists more insight into what happened shortly after the universe began. Since the speed of light is finite, astronomers see distant objects not as they are today, but as they were when the light that arrives in their instruments first set out. Astronomers are keen to use the elt to investigate how stars and galaxies formed when the universe was young. Early results from the James Webb Space Telescope, launched in 2021, have already turned up an array of stars and galaxies that seem too old to fit easily into existing theories of universal evolution. The elt could help resolve that mystery.
Assuming, that is, that everything works. When your correspondent visited, the 80-metre-tall steel dome that will shelter the telescope was still being built. Each segment takes around 20 minutes to lift and slot into place; a further six hours are needed to tighten each of the 200 bolts. Work must finish before night, lest gusts of wind blow a panel loose. Once finished, the entire 5,500-tonne dome will be able to rotate so that the telescope can follow the stars as they move across the sky.

One of the few downsides of doing astronomy in Chile is that the country is prone to earthquakes. The telescope will therefore float atop a thin layer of oil. The oil, in turn, will sit atop hundreds of rubber shock absorbers, with the whole lot built on a 3-metre concrete foundation. That will isolate the dome both from earthquakes and any vibrations from the offices and laboratories next door.
The most impressive parts are the mirrors, of which the elt will have five. Astronomical mirrors are precise, delicate things. Even the comparatively small mirrors of the big vlt telescopes are so heavy that, if not supported properly, they would shatter under their own weight. Engineers must lift them with a special harness with 15 hooks when they need cleaning.

Extremely Large Telescope, side view **2**



The elt's main mirror is so big that it cannot be made as a single piece. Instead Schott, a German optics firm, will make 798 separate pieces that will act as a single mirror. Each is a slightly curved, 1.5-metre-wide hexagonal slice of high-tech glass ceramic that undergoes almost no thermal expansion. The segments are cast in Germany, polished in France, and then mated with supports produced in the Netherlands before being transported to Chile.

Each is checked to ensure it has survived the trip unscathed. Ricardo Parra, an elt engineer, likens the process to ringing a bell. Vibrations are induced in the glass, and measurements made by accelerometers in strategic locations. The segments are finished by coating them with several further layers of chemicals, including a 100-nanometre layer of silver that provides the reflectivity. (A nanometre is a billionth of a metre) That silver is protected from tarnishing by a layer of hard silicon nitride glass. Even so, the eso thinks each segment will need re-coating every two years.

Getting all 798 segments to work together presents another set of difficulties. To produce a usable image each segment must be held in a precise position, with an accuracy of just tens of nanometres. Each is backed by a system of sensors and motors that can subtly deform the surface of the glass in order to correct for warping due to everything from small temperature variations to the changing angle of gravity as the mirror moves and tilts.

The primary mirror is just the first stop (see diagram 2). Light hitting it will be redirected towards a secondary and tertiary mirror, which are designed to correct various subtle optical defects. At around 4 metres across, each could be an impressive telescope main mirror in its own right.

The job of the fourth mirror is to counteract the vagaries of Earth's atmosphere. The reason stars appear to twinkle when seen from the ground is that the atmosphere is constantly churning. Frédéric Gonté, an instrumentation engineer at eso, compares the effect to peering into water. "Try to see the ground of the swimming pool, you can see it is moving," he says. "The atmosphere is doing that to us."

Space telescopes avoid this problem by flying above the atmosphere. Ground-based ones can rely instead on a technology called adaptive optics. This involves deforming the surface of a mirror to cancel out the distortions imposed by the air. The technology is not unique to the elt. Many modern telescopes sport it, including one of the vlt's big telescopes (it is being added to the other three). But the elt's sheer size makes it more susceptible to atmospheric distortion than smaller telescopes. More than 5,000 actuators behind the elt's fourth mirror will make tiny, rippling adjustments to its shape a thousand times each second. Without the adjustments, the elt's images would be hopelessly blurred.

Working out exactly how the mirror must be deformed, millisecond by millisecond, requires the presence in the sky of something whose shape is known in advance. Comparing what the telescope actually sees with what it should see reveals the state of the atmosphere at that particular moment, allowing the system to counter¬act it. Often the object in question is a bright star near the object being studied. If no convenient star is available, though, astronomers can create an artificial one. "Laser guide stars" are made by firing four bright orange laser beams upwards so that they converge in a single point around 90 kilometres up, above the atmosphere's thickest layers. Because the system knows exactly what the ersatz star should look like, it can make whatever mirror-twisting adjustments are needed.

You might think that once the elt is up and running, all other telescopes will be rendered obsolete. That is not really true, for even a machine such as the elt cannot do everything. The twin Keck telescopes in Hawaii, for example, once the world's largest, have mirrors that are a comparatively puny ten metres across. But they have the advantage of sitting on a substantially taller mountain, where the seeing is even better than it is in Chile. And the fact that there are two of them means they can serve twice as many astronomers at once.

The vlt, and other multi-mirror telescopes, can also use a technique called interferometry, a clever way of combining signals such that resolving power depends not on the size of individual mirrors, but on the distance between them. For the vlt that is more than 100 metres. On the other hand, that resolving power comes at the cost of a narrower field of view. The elt is not competing with telescopes like the vlt, says Dr Gonté. "It's completing."

Ain't no replacement for displacement

But when it comes to detecting the dimmest and most distant objects, there is no substitute for sheer light-gathering size. On that front the elt looks like being the final word for the foreseeable future. A planned successor, the "Overwhelmingly Large Telescope", would have sported a 100-metre mirror. But it was shelved in the 2000s on grounds of complexity and cost. The Giant Magellan Telescope is currently being built several hundred kilometres south of the elt on land owned by the Carnegie Institution for Science, an American non-profit, and is due to see its first light some time in the 2030s. It will combine seven big mirrors into one giant one with an effective diameter of 25.4 metres. Even so, it will have only around a third the light-gathering capacity of the elt.

A consortium of scientists from Amer¬ica, Canada, India and Japan, meanwhile, has been trying to build a mega-telescope on Hawaii. The Thirty Metre Telescope would, as its name suggests, be a giant—though still smaller than the elt. But it is unclear when, or even if, it will be finished. Construction has been halted by arguments about Mauna Kea, the mountain on which it is to be built, which is seen as sacred by some. For the next several decades, it seems, anyone wanting access to the biggest telescope money can buy will have to make their way to northern Chile.

The construction site of ESO's Extremely Large Telescope at Cerro Armazones, in Chile's Atacama Desert

Radio Telescope on the Moon

A Radio Telescope on the Moon Could Help Us Understand the First 50 Million Years of the Universe

In the coming decade, multiple space agencies and commercial space providers are determined to return astronauts to the Moon and build the necessary infrastructure for long-duration stays there. This includes the Lunar Gateway and the Artemis Base Camp, a collaborative effort led by NASA with support from the ESA, CSA, and JAXA, and the Russo-Chinese International Lunar Research Station (ILRS). In addition, several agencies are exploring the possibility of building a radio observatory on the far side of the Moon, where it could operate entirely free of radio interference.

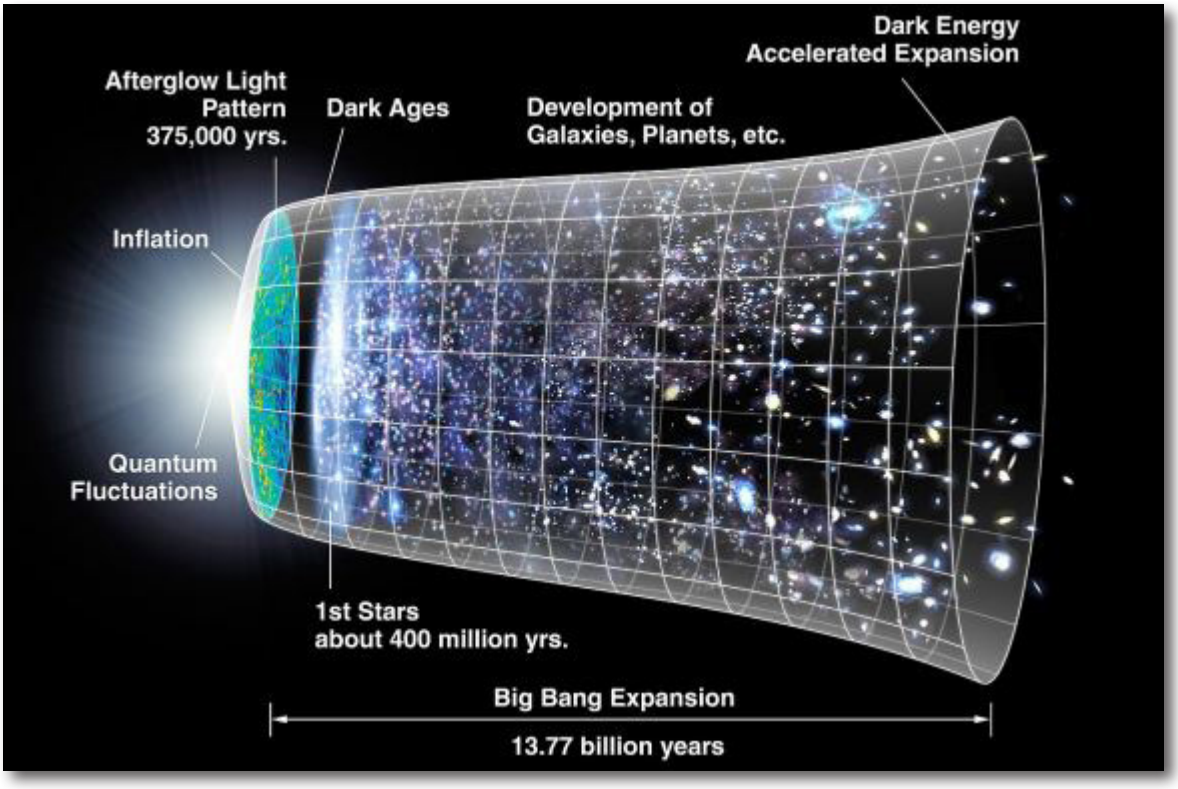
For years, researchers have advocated for such an observatory because of the research that such an observatory would enable. This includes the ability to study the Universe during the early "Cosmic Dark Ages," even before the first stars and galaxies formed (about 50 million years after the Big Bang). While there have been many predictions about what kind of science a lunar-based radio observatory could perform, a new research study from Tel Aviv University has predicted (for the first time) what groundbreaking results this observatory could actually obtain.

This study was led by Prof. Rennan Barkana and Dr. Rajesh Mondal, an astrophysics professor and a postdoctoral researcher (respectively) with the School of Physics and Astronomy at Tel Aviv University. The paper that describes their conclusions, "Prospects for precision cosmology with the 21 cm signal from the dark ages," has been published in Nature Astronomy. As they argue, the study's findings show that the measured radio signals can be used to test the Standard Model of Cosmology and determine the composition of the Universe.

The Cosmic Dark Ages, which occurred roughly 130,000 to 1 billion years after the Big Bang, has traditionally remained elusive to astronomers (hence the name). Essentially, light from this cosmological period is redshifted to the point where it is only visible in the radio spectrum. What's more, the only sources of photons from this period are the remnant radiation from the Big Bang – which is visible today as the Cosmic Microwave Background (CMB) – or are visible as the 21 cm line (or hydrogen line) caused by the reionization of neutral hydrogen.

These radio waves can only be studied from space, where they are free of atmospheric interference and other radio sources. On the far side of the Moon, a radio observatory would also be safe from radio interference caused by our Sun. Establishing an observatory there would still be a major challenge. As Prof. Barkana explained in a recent Tel Aviv University statement:

"NASA's new James Webb space telescope discovered recently distant galaxies whose light we receive from the



cosmic dawn, around 300 million years after the Big Bang. Our new research studies an even earlier and more mysterious era: the cosmic dark ages, only 50 million years after the Big Bang. Conditions in the early Universe were quite different from today.

"The new study combines current knowledge of cosmic history with various options for radio observations, in order to reveal what can be discovered. Specifically, we computed the intensity of radio waves as determined by the density and temperature of the hydrogen gas at various times, and then showed how the signals can be analyzed in order to extract from them the desired results."

For astronomers hoping to push the boundaries of cosmology, the Cosmic Dark Ages offer an opportunity to study the first stars and galaxies in the Universe. For their study, Barkana and Mondal argue that a lunar radio observatory could measure radio signals to determine the composition of the early Universe, the expansion rate of the cosmos (thereby testing the theory of Dark Energy), and perhaps gain insight into the mystery of Dark Matter. These are all integral to the Standard Model of Cosmology, known as the Lambda-Cold Dark Matter (LCDM) model.

They also found that with an array consisting of multiple radio antennas, scientists could accurately measure the amount of hydrogen and helium shortly after the Big Bang. A precise determination of both would reveal valuable information on how ordinary matter formed from hydrogen, which fueled the creation of the first stars, gradually giving rise to heavier elements, planets, and eventually life. Last, they found that with an even larger array of lunar antennas, it will also be possible to measure the weight of cosmic neutrinos – a critical parameter in developing physics beyond the Standard Model of Particle Physics. As Prof. Barkana concluded:

"When scientists open a new observational window, surprising discoveries usually result. With lunar observations, it may be possible to discover various properties of dark matter, the mysterious substance that we know constitutes most of the matter in the Universe, yet we do not know much about its nature and properties. Clearly, the cosmic dark ages are destined to shed new light on the Universe."

Further Reading: EurekAlert, Nature

Astro Sig Schedule 2024

All Meetings at 6:30pm

January 16th
February 13th
March 19th

ASTRO SIG MEETING ZOOM LINK

https://us02web.zoom.us/j/86238788613?pwd=aHhKajluQ2hNejI4YVFyczIxM1R4QT09

Meeting ID: 862 3878 8613
Passcode: 730698

ABOUT THE ASTRO SIG

Every month we get together on a Zoom call with a pretty loose agenda and manage to have an absolute blast talking about Astrophotography. I hope you'll join us if you're interested in Astrophotography.

IMAGING TRIPS TO BIG CYPRESS

Big Cypress National Park is about a 75 minute drive from Ft. Myers and it is probably one of the darkest areas in the state of Florida. We have a great place to set up and frequently meet astrophotographers and observers from other parts of the state.

The best way to stay tuned in to our impromptu field trips is to get on our Astro SIG Google Groups email list. Contact Mike Jensen.

The Astrophotography SIG

Our Astro SIG group is really growing in strength. From a meeting perspective, we are small, but our email list is about 40 and of those about 10 consistently contribute images for use on our website and in the newsletter. I truly believe that some of our images are unequaled in quality.

Many of our group are out imaging almost every possible night and reporting the results on our email group.

I am especially proud at the way our group shares lessons learned and methods taken to get the best our of there gear and the best images. Please see our images beginning on the next page.

What's Going On in the SIG Group?

By Mike Jensen,
SIG Founder/Leader

Typically this time of year we should be just jammed full of targets to photograph, but this year the Winter Nebula Season seems like Summer, cloudy! Ugh! I mean seriously cloudy. I've been able to image maybe 4-5 nights this season since Nov. 1st. The rest of the active astro photographers are doing about the same depending on where they live. So, when a new image is released for the group to view, it's a major happening! As you can see from this month's newsletter and the video I'm presenting, it's worth it.

If you're wondering if the Astro SIG is for you, here's what we did in our most recent gathering (in December). John Udart presented his 12 easy steps to Narrowband imaging using the PixInsight software and Scott Cruzen presented an overview of the Cyril software. Both softwares are used for image stacking and processing.

We also had our usual Q & A on a variety of topics as well as the customary ribbing of oversupplied members and new purchases (which create more clouds).

I hope you can join us at our next meeting.

Eastern Veil Nebula (Caldwell 33) by John Udart

Brand/Type of Telescope/Lens: William Optics GT71, 71mm Lens, 336mm Focal Length
Mount: Sky-Watcher EQ6-R Pro
Exposures: Integration: 68x300s (5.67 hrs.), OSC with Optolong L-Extreme 7nm Filter (Ha & OIII)

Processing Software: PixInsight

NGC891 by Scott Cruzen

Sometimes called the “Outer Limits Galaxy” because it was one of the images used in the credit roll of the 1960’s TV series “The Outer Limits”. There are also many other galaxies in this image, though some appear as just small smudges due to their distance.
Brand/Type of Telescope/Lens: Astro-Tech 130mm EDT APO Triplet Refractor with 0.8x focal reducer/field flattener
Mount: SkyWatcher EQ6-R Pro, ASIAir Plus
Exposures: ASI533MC Pro OSC camera with Optolong UV/IR filter
278 x 3 minute exposures

Processing Software: SiriL/SiriLic, GIMP, DarkTable, Topaz

SH2 - 171 by Mike Jensen

Brand/Type of Telescope/Lens: Sky Watcher EQ6 - R Pro goto mount. ZWO 1600 MM pro camera, ASI Air Plus. WO 61
Exposures: All 300 secs: 51 Blue, 54 Green, 44 Red, 162 Ha (Hydrogen Alpha), 75 Iodized Oxygen, 69, Sulphur
Processing Software: PixInsight plus plugins, Photoshop.

This image was processed as a Narrowband images (HOS). I tried it SHO but the lack of O, and S helped make my processing decision fast. This is two nights of imaging from my back yard, a Bortle 5 location

The Moon by Mike Jensen

Brand/Type of Telescope/Lens: Sky Watcher EQ6 - R Pro goto mount. ZWO 1600 MM pro camera, ASI Air Plus. WO 61.
Exposures: 779 frames video taken at 6ms at 1920x1080 resolution. Most planetary images are shot with video for several reasons. There is a fair amount of thermal heat rising from the Earth so you have to pick the best frames. Also the targets (Moon, Sun, Jupiter, Saturn) are all moving ang moving faster than our typical deep sky objects.
I processed 20% of the 779 images, so 156 frames. They were stacked and processed in ASI Studio/ASI Video Stack Planetary Video Stacking software (how easy is this?) For a Mac user, it's great! I used a mono camera, and tried a few times to create an RGB image (this is the Green channel). More moon images in 2024!

NGC2146 by Scott Cruzen

Peculiar Barred Spiral Galaxy and NGC2146a Spiral Galaxy in Camelopardalis
Brand/Type of Telescope/Lens: Astro-Tech 130mm EDT APO Triplet Refractor with 0.8x focal reducer/field flattener
Mount: SkyWatcher EQ6-R Pro, ASIAir Plus
Exposures: ASI533MC Pro OSC camera, Optolong UV/IR Filter
65 x 3-minute exposures

Processing Software: SiriL/SiriLic, GIMP, DarkTable, Topaz

NGC 1365 by Dick Cogswell

Brand/Type of Telescope/Lens: Celestron 14 Edge 2700mm
Mount: AP 1100
Exposures: 88 4-minute exposures in LRGBHa

Processing Software: APP, PS, Bx, DN

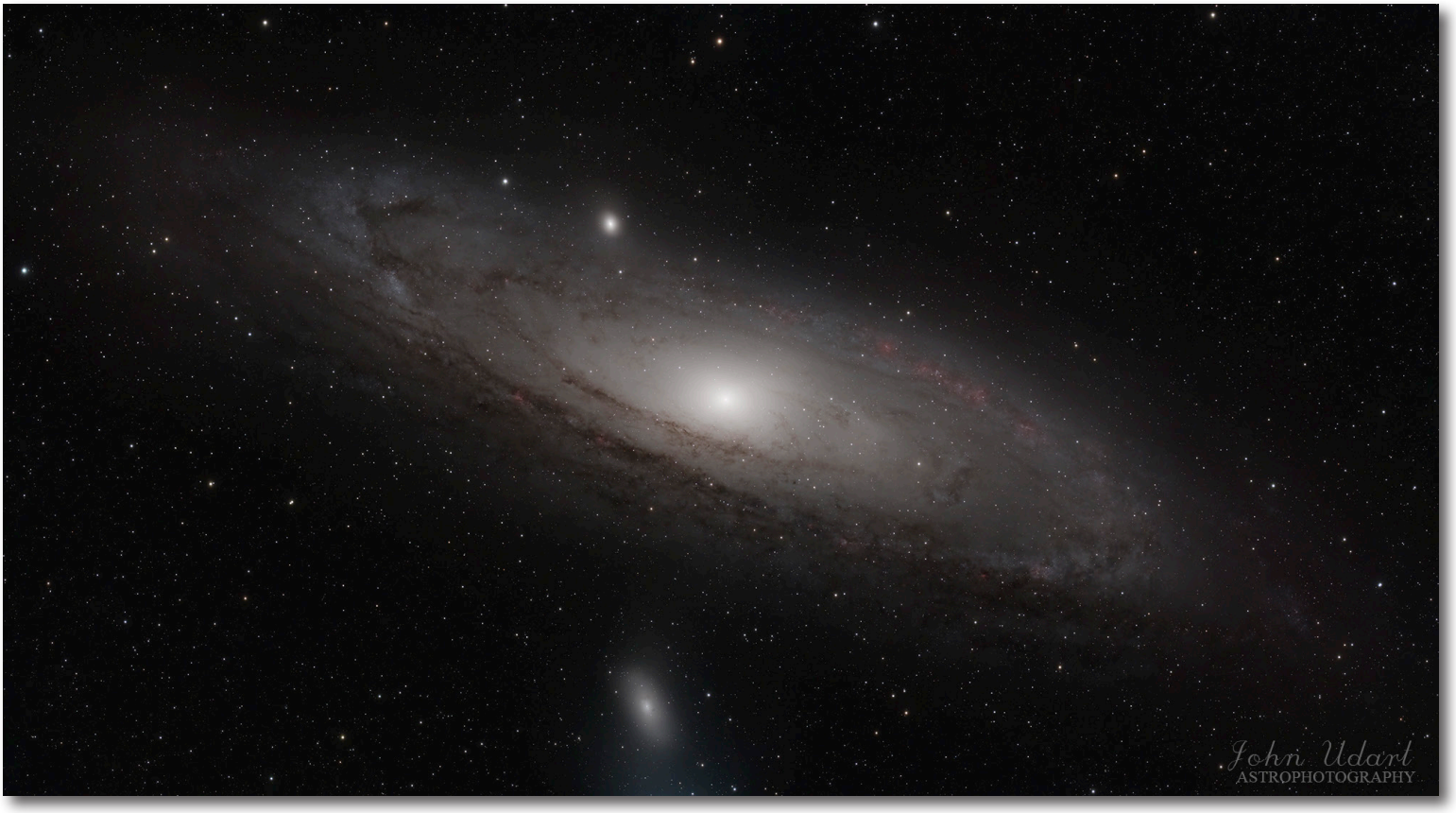
IC 434 Horsehead Nebula by Dick Cogswell

Brand/Type of Telescope/Lens: Celestron 14 Edge 2700mm
Mount: AP 1100
Exposures: 104 4-minute exposures in RGBHa

Processing Software: APP, PS, Bx, DN

NGC 2903 by Dick Cogswell
Brand/Type of Telescope/Lens: Celestron 14, 2700mm f/l
Mount: AP1100
Exposures: 104 4-minute exposures in LRGBHa

Processing Software: APP, PS, Bx, DN



Andromeda Galaxy M31 by John Udart

Brand/Type of Telescope/Lens: William Optics GT71, 71mm Lens, 336mm Focal Length
Mount: Sky-Watcher EQ6-R Pro
Exposures: 272x180 second exposures, OSC with Optolong L-Pro & Optolong L-Extreme

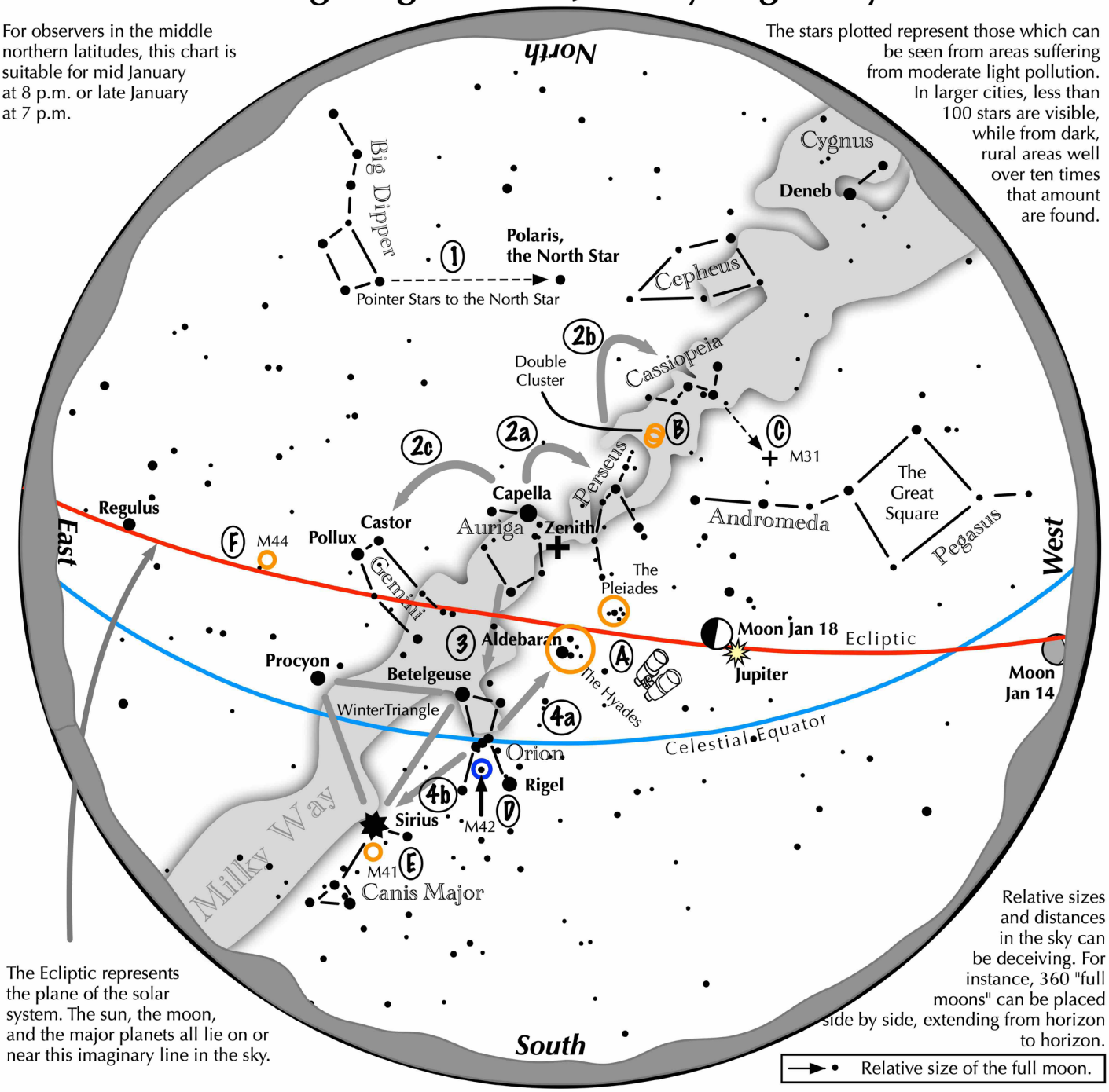
Processing Software: PixInsight

Sky Chart

Navigating the mid January Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid January at 8 p.m. or late January at 7 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→• Relative size of the full moon.

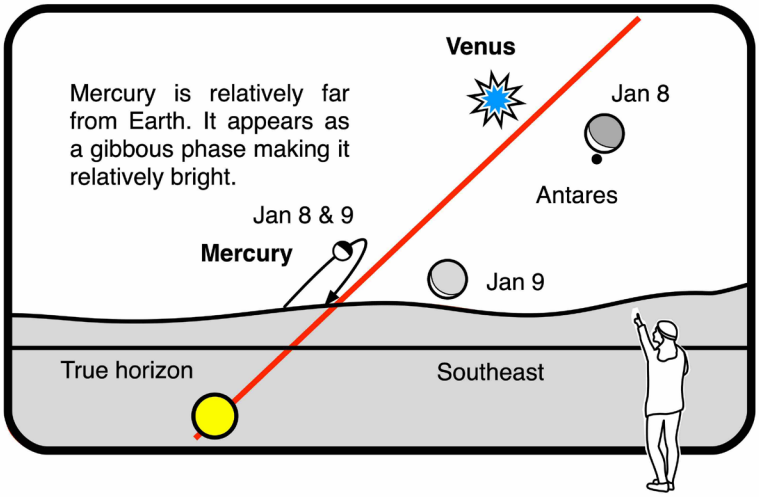
Navigating the winter night sky: Simply start with what you know or with what you can easily find.

1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next Jump southeastward from Capella to the twin stars Castor and Pollux of Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star, Rigel.
4. Use Orion's three Belt stars to point to the red star Aldebaran, then to the Hyades, and the Pleiades star clusters. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius.

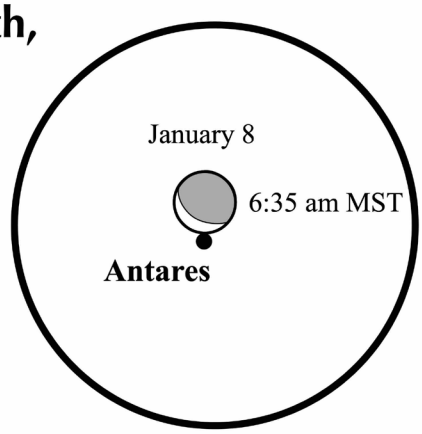
Binocular Highlights

A: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **B:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** M42 in Orion is a star forming nebula. **E:** Look south of Sirius for the star cluster M41. **F:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.

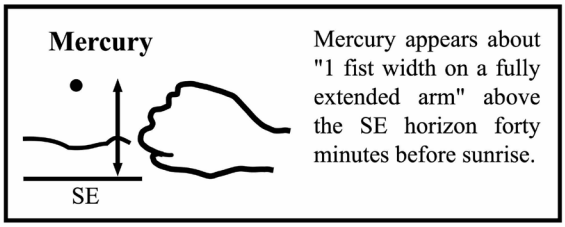
If you can observe only one celestial event this month, see this one:



View through 10x50 binoculars on January 8



January 8 and 9, 2024: Mercury, Venus, and the moon forty minutes before sunrise in the southeast



Mercury appears about "1 fist width on a fully extended arm" above the SE horizon forty minutes before sunrise.

The Scene:

The crescent moon, Antares, Venus, and Mercury in the morning twilight

On January 8, the crescent moon approaches Antares low in the southeast 90 minutes before sunrise.

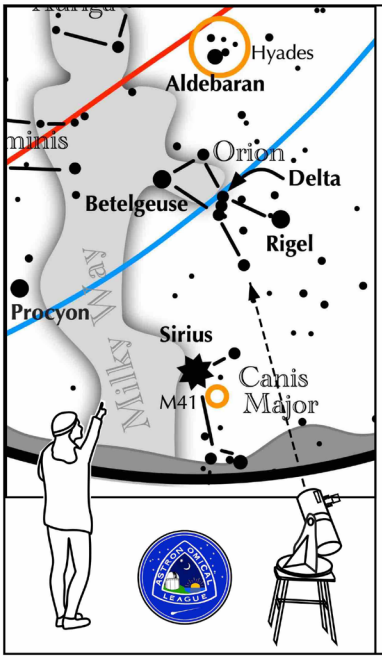
- The moon occults Antares for viewers living in the southwestern portion of the US. (NM, UT, AZ, and So CA.)
- The event begins at 6:39AM MST, location dependent.
- Use common household binoculars to watch the occultation and begin viewing at 6:35 MST.

* The very bright object to the moon's left is Venus.

- 40 minutes before sunrise, look for Mercury low in the southeast to the far lower left of Venus.

On January 9, an even thinner crescent moon lies right of Mercury and below brilliant Venus.

ASTRONOMICAL LEAGUE Double Star Activity



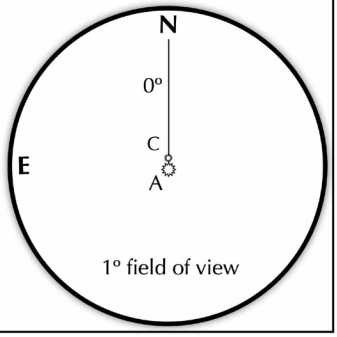
Other Suns: Delta Orionis (Mintaka)

How to find Delta Orionis on a January evening

Face southeast. Look at Orion above Sirius. Orion's Belt is the three stars of equal brightness between bright Rigel and Betelgeuse. Delta Orionis is the western star of the Belt.

Delta Orionis
A-C separation: 53 sec
A magnitude: 2.4
C magnitude: 6.8
Position Angle: 0°
Colors:
yellow-white
blue-white
Component B is a 14th magnitude star, not visible in most small telescopes.

Suggested magnification: >20x
Suggested aperture: >3 inches



Meeting Minutes

Southwest Florida Astronomical Society, Inc. member minutes December 7, 2023 Calusa Nature Center Planetarium and Zoom

Opening Remarks….. President Brian Risley called the meeting to order at 7:04 PM welcoming the 48 participants (32 in person and 16 on zoom). He turned the meeting over to John MacLean, Program Committee Coordinator, to introduce the evening's guest speaker.
John gave a well defined introduction to Doctor Olivia Harper Wilkins, Astrochemist NASA Goddard Space Flight Center.

Program….. Exploring the Invisible Chemical Universe with Radio Astronomy….Doctor Wilkins entertained us with her path of education, starting with the Green Bank Radio telescope in West Virginia to her current position at NASA. She illustrated the history of Radio Astronomy beginning with Karl G Jansky's 1932 discovery of radio waves traced to the centre of the Milky Way, how astrochemistry met up with radio astronomy enabling rapid growth in the number of known molecules in interstellar and circumstellar space, thus expanding the roster of laboratories to new distances within the galaxy. Many questions were asked. All applauded her for her thorough presentation.

Society Business Happenings:

Voting results…both President Risley and Treasurer MacLean presented the results of the members voting on the slate of Officers and the 2024 Budget. The results for both issues were unanimous with 67 votes counted. Only 56 votes are needed for a quorum.

Annual Audit Process….John MacLean advised that Dan Dannenhauer had been thoroughly completing the audit process for the past several years, but since Dan is now Secretary, the board thought it best to ask for a member to volunteer, thus avoiding a conflict of interest. Sean Dey volunteered to handle before the end of the year, without objection from the membership.

Past Outreach Events:

Charlotte….Tom Segur advised that 30-40 participants attended the FSW Observatory on November 10th for the viewing of Jupiter and Saturn. Tom also advised that the November 25th event at Gilchrist Park was clouded out.

Lee… Brian Risley advised that the November 11th Seahawk Park Star Party was clouded out. Brian also stated the the Big Cypress Swamp Heritage Festival on December 2nd went well even though it was partially clouded. Brian received an easel depicting M81 and M82.

Upcoming Outreach Events:

Charlotte…..Tom Segur advised that there will be a 6:30PM December 8th viewing at the FSW Observatory. Tom also stated that there will be a Solar Observing event on December 23rd at Ponce de Leon Park.

Lee…Brian Risley asked for a volunteer to handle the Seahawk Park Star Party on December 16th as he will be out of town. Joe Dermody volunteered.
Brian further outlined the Big Cypress night events of 12/9/23, 1/13/24, 2/10/24, and 3/9/24.
STEMtastic will be held at the Caloosa Sound Convention Center on February 10, 2024.
Burrowing Owl Festival at Rotary Park Cape Coral on 2/24/24. Rotary Star Party at Rotary Park Cape Coral on

3/8/24.

Officer and Committee Reports:

Vice President's Report: Mike Jensen asked for all to attend in January just like they did at this December meeting. He thanked those who attended his dinner at 4:45 PM, stated that his future communications will improve and that Mario will give a slide presentation on the life and many achievements of Russel Porter in our January meeting.

Secretary's Report: Dan Dannenhauer asked that his November minutes in the newsletter be approved. John MacLean moved such and seconded by Tom Tinker. Moved without objection.

Treasurer's Report: John MacLean stated that his full report can be viewed in the Newsletter and proceeded to review the beginning balance, income, expenses and final balance of $2,769.38. Linwood Ferguson motioned for approval and seconded by Phil Jensen.
Moved without objection.

Equipment Coordinator: Brian Risley began discussing what is available and what needs some repairs. Dan Dannenhauer asked that Tony Costanzo be given the opportunity to hold an auction as he has volunteered more than once. Mike Jensen said good idea, and that as Vice President he will contact Tony to create and handle such. All agreed.

Program Committee Coordinator: John MacLean illustrated the many scheduled speaker events through May of 2024. Mike Jensen applauded John for really doing a stellar job. The best the Society has ever had. All agreed… good job John! Said President Risley.

No other committee reports were given. President Risley asked for a motion to adjourn….. so moved by Mike Jensen and seconded by Joe Dermody. Ending at 8:47PM……..Dan Dannenhauer, Secretary