San Diego Astronomy Association

Celebrating Over 50 Years of Astronomical Outreach

March 2023

https://www.sdaa.org/
A Non-Profit Educational Association
P.O. Box 23215, San Diego, CA 92193-3215

Next SDAA Business Meeting
March 14th at 7:00pm
10070 Willow Creek Rd
San Diego, CA 92131
Via Zoom

Next Program Meeting
March 15th at 7:00pm
Live stream

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March 2023, Vol LXI, Issue 3
Published Monthly by the
San Diego Astronomy Association
Incorporated in California in 1963

Newsletter Deadline
The deadline to submit articles for publication is the **15th** of each month.

Program Meeting March 15th

Topic: HIRAX: A New Way to Study Hot Jupiters and Other Exoplanets.
Speaker: Dr. Ashley Baker Instrument Scientist and Research Associate in Astronomy with the Exoplanet Technology Laboratory at Caltech Optical Observatories

High-resolution Imager for Rapid Assessment of eXo-atmospheres (HIRAX) is an multi band instrument for rapid assessment of the spectrum of exoplanet atmospheres. This is a new high resolution instrument being developed for the Palomar 200-inch telescope that uses multiple narrowband filters to measure the sodium lines in hot Jupiter transits. Hot Jupiters are gas giant planets with orbital period less than 10 days. And these types of spectral measurements are usually done from space.

The March 2023 Program Meeting will be virtual via ZOOM

Link to SDAA Merchandise Store https://sdaa28.wildapricot.org/SDAA-Store

Link to Outreach Calendar https://calendar.google.com/calendar/embed?src=g-calendar@sdaa.org&ctz=America/Los_

San Diego Astronomy Association

San Diego Astronomy Association Board of Directors Meeting
February 14, 2023 – Unapproved and subject to revision

1. **Call to Order**
   The meeting was held via Zoom and was called to order at 7:04pm with the following board members in attendance: Dave Decker, President; Kin Searcy, Vice President; Mike Chasin Treasurer; Gene Burch, Recording Secretary; Alicia Linder, Corresponding Secretary; Dave Wood, Director; Bee Pagarigan, Director; Hiro Hakozaki, Director; Steve Myers, Primary Grid Reconstruction committee.

2. **Approval of Last Meeting Minutes**
   The January meeting minutes were approved.

3. **Treasurers & Membership Report**
   The treasurer's report was approved. Mike reported that our annual banquet was a success and we're still working with an attorney to resolve the counterfeit check that Chase Bank cashed on our account. We may have to resort to taking the case to Small Claims Court.

4. **Standard Reports**
   a. Site Maintenance Report:
      No report.

   b. Observatory:
      Winter weather continues to pound TDS. We got in one star party in January. Equipment is in great condition. The trench along the observatory wall remains open and unprotected.

   c. Loaner Scope Report:
      Two telescopes currently out (SDAA#004 Meade LX90, SDAA#027 Orion AstroView on CG-5GT). Both were due back in January, but dismal weather prevented a TDS meetup to exchange.

      February 18 will be the next loaner drop-off and pickup at TDS. I expect to have 4 scopes checked out on Feb 18 (#004 LX-90, #023 Orion XT10, #026 Zhumell 8", #028 Bushnell Voyager 8").

      Three telescopes have left the loaner fleet. SDAA#001a (Coulter Odyssey) was sold to a nonmember for $259 donation. SDAA#002 (Takahashi Newtonian) and SDAA#024 (Celestron SPC8) were both sold at the banquet auction. This not only raised funds for the club, but also freed up space in the storage container, making room for (hopefully) a few more 8-10" Dobsonian donations.

   d. Private Pad Report:
      We have 7 free pads and 10 people on the waiting list (one who is looking to upgrade).

   e. Program Meetings Report:
      Kin and Dave W went to MTRP to check out their audio/visual system for our in-person meetings there. It should be ready for our next in person meeting in March. Kin is working on speakers for April and May and June should be an in-person meeting with Jim Thompson from the Mt. Wilson observatory.

f. AISIG Report:
No report

g. Newsletter Report:
As always, the newsletter looks great – Thanks, Andrea!

h. Website Report:
The website was updated with the new Board and forwarding addresses were changed to the new Board email addresses. Some of the pictures on the Contacts page https://sdaa.org/contacts/ are low resolution. If you want a better picture posted, please send a replacement.

i. Social Media:
No report

j. Outreach Report:

Outreach Report – For January, 2023

Below is a summary of outreach event participation with numbers for January and for YTD:

2023	January	YTD
Events Completed	6	6
Events Cancelled	7	7
Total Attendance	420	420

1. Foul weather played havoc with our SDAA outreach events for the month of January, with 7 cancelled events; two schools: TDS Public Night, and Oakoasis County Park. We did complete our first regular School Event of the year at La Mesa Dale Elementary, with 225 attendees.
2. K.Q. Ranch, Jan 21st: This seemed to be one of the coldest nights out there! Late that night, Sonny Adams pushed Dennis' 12" Dob level to the ground and found Comet C2022 E3 (ZTF). There were only 20 campers that night because of the cold, but what a clear dark starry sky we had!

k. TARO Report:
TARO is still offline. The weather hasn't been co-operating with the time needed to get the system back online and tested.

l. Cruzen Report:
There was no December excursion due to holiday plans. The planned January excursion had to be canceled due to weather. February 18 the plan is to pour the concrete landing outside the "front" door to eliminate the tripping hazard at the door (and to help reduce tracked-in dirt). Bee and I will be working on getting a complete draft of the user manual put together and tested. And I'll get the donated laptop configured and connected to the G11 mount. We are on track for an April "soft" open, with some friendly guinea pigs invited to help test out the user manual and provide constructive feedback. The first formal training sessions and grand opening are still expected in March.

m. Merchandise Report:
Gene reported that we cleared out a lot of merchandise at the banquet and we now have a pretty good stock of items in our online store. We may put an article in the newsletter about our license plate frames to see if we can sell more of them.

n. Astronomical League Report:
Nothing to report.

o. JSF Report:
No report.

p. Primary Grid Reconstruction Report:
The electrical engineer for the project (Paul Ericson) has all the needed site usage info. We were able to gain access to the main breaker panel and provide photos to Paul.

Next steps:

1. Get Santech, the electrical design firm that Paul works for, under contract
   a. Get estimated pricing for completion of engineering
      - Get office consultation pricing - hourly rates
      - Field consolation pricing - hourly rates
        Initial Cost Estimate – was between 7000.00 – 9000.00 but that might have changed
   b. Identify Deliverables –
      - Soft/Hard copies of plans and specs.
      - County design approval.
   c. Get Deliverable Dates –
   d. Provide a Bid List of possible sub-contractors. 5 if possible, 3 minimum.
2. Draft new site guidelines for:
   a. Pad connection regulations based on site engineering and county permits.
   b. Site opening and closing procedures.

5. Old Business:

a.	Security Gate/Quotes/Updates – still waiting for vendors to respond	Chasin
b.	Google Workspaces for Non-Profits – Steve Myers is working on this	Myers
c.	Other old business – None	Decker

6. New Business:

a.	We need to find a new JSF chairperson to replace Dan and Sandy Kiser	Decker
b.	Other new business – None	Decker

7. Adjournment: The meeting was adjourned at 8:17pm.

Celestron 9.25” Carbon OTA/Losmandy G-11 Gemini

SDAA pre-sale price of **$1,825** for Contributing Members. ($725 tube, $1,200 mount, <$100> combo discount)
Cloudy Nights & Astromart pricing will be **$2,265**.
We are trying to sell as a unit but will part out if no takers after 14 days. Express interest early!

We have a Celestron 9.25 OTA on a Losmandy G-11 which we are delighted to offer to the membership. The package deal provides for a serious imaging or visual platform at a significantly discounted price.

The Celestron 9.25” carbon fiber SCT tubes, made in America, are considered the sweet spot for this design type. This represents a 33% light gathering increase over the 8” which results in an exceptional upgrade. Also a *f*2.3 primary versus the traditional SCT *f*2.0. Many consider this an image sharpening design. This OTA comes with a Losmandy dovetail as well as a Vixen style plate. The Feathertouch focuser is an extraordinary upgrade. A Bahtinov Mask is included. The tube is not Fastar compatible. Serial number is 952252. Optics look great. No visual back included with this OTA.

The Losmandy G-11 mount is the entry level of serious imaging platforms and is more than capable of handling this OTA and accompanying image train. The controller is a Gemini Level 1.3 upgradable to Level 1.4 – not a Gemini 2. The Gemini, while a bit cludgy, offers a complete set of controls. Current software can bridge the input shortcomings. The mount/tripod is beautifully machined and incredibly sturdy. Accessories include tripod leg pads and an out dated polar scope that can still be utilized but with less precision – again software will compensate. The mount’s serial number is HGM065565. Easily upgradeable to the Gemini 2 system.

We are selling “as-is.” Bottom line, you can have this very popular 9.25 tube and/or mount at a very attractive price.

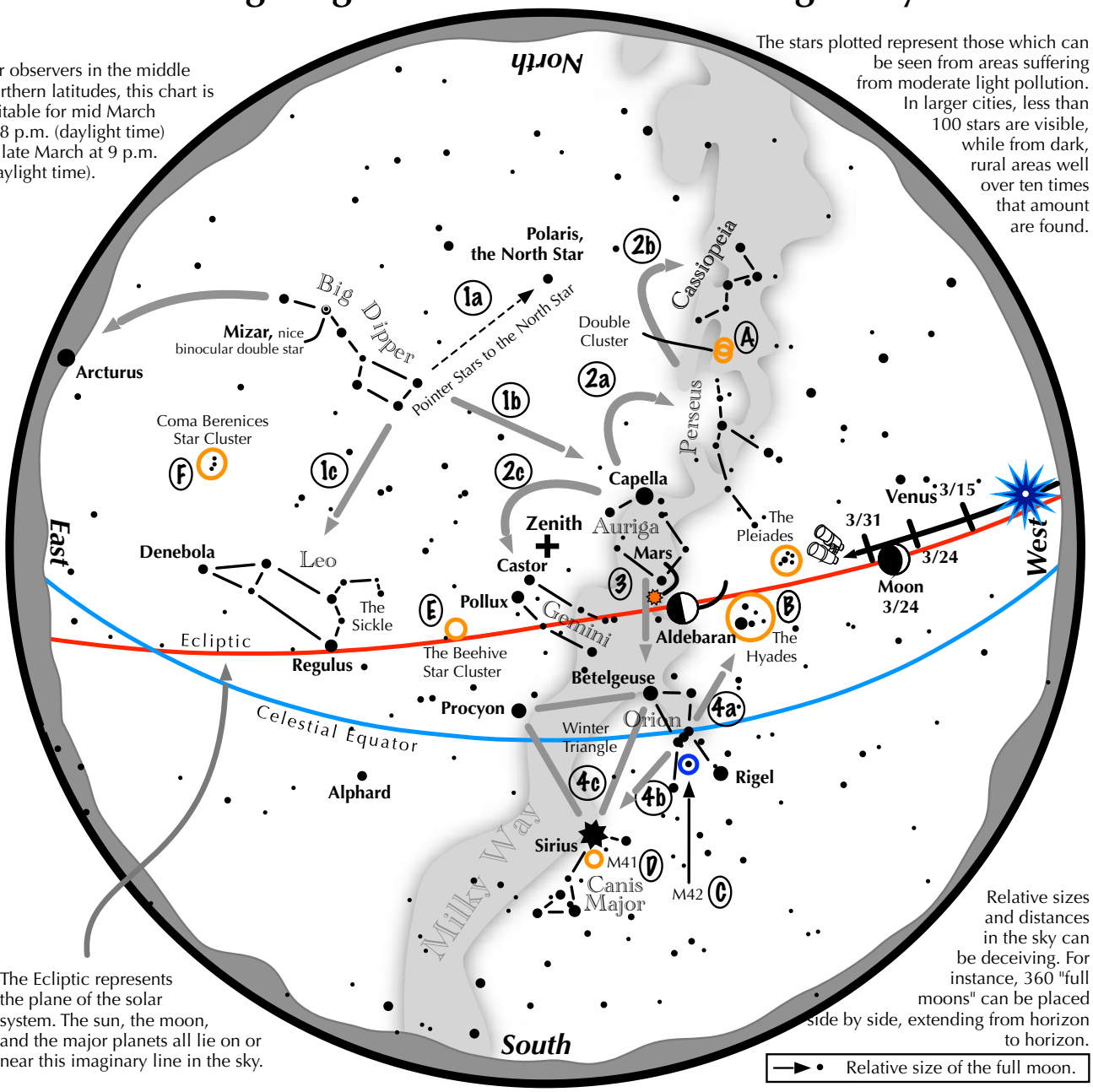
Dave Decker *for* SDAA, (619) 972-1003

San Diego Astronomy Association

Navigating the mid to late March Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid March at 8 p.m. (daylight time) or late March at 9 p.m. (daylight time).

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 March 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. Its top bowl stars point west to Capella in Auriga, nearly overhead. Leo reclines below the Dipper's bowl.
2. From Capella jump northwestward along the Milky Way to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in 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 northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius. It is a member of the Winter Triangle.

Binocular Highlights

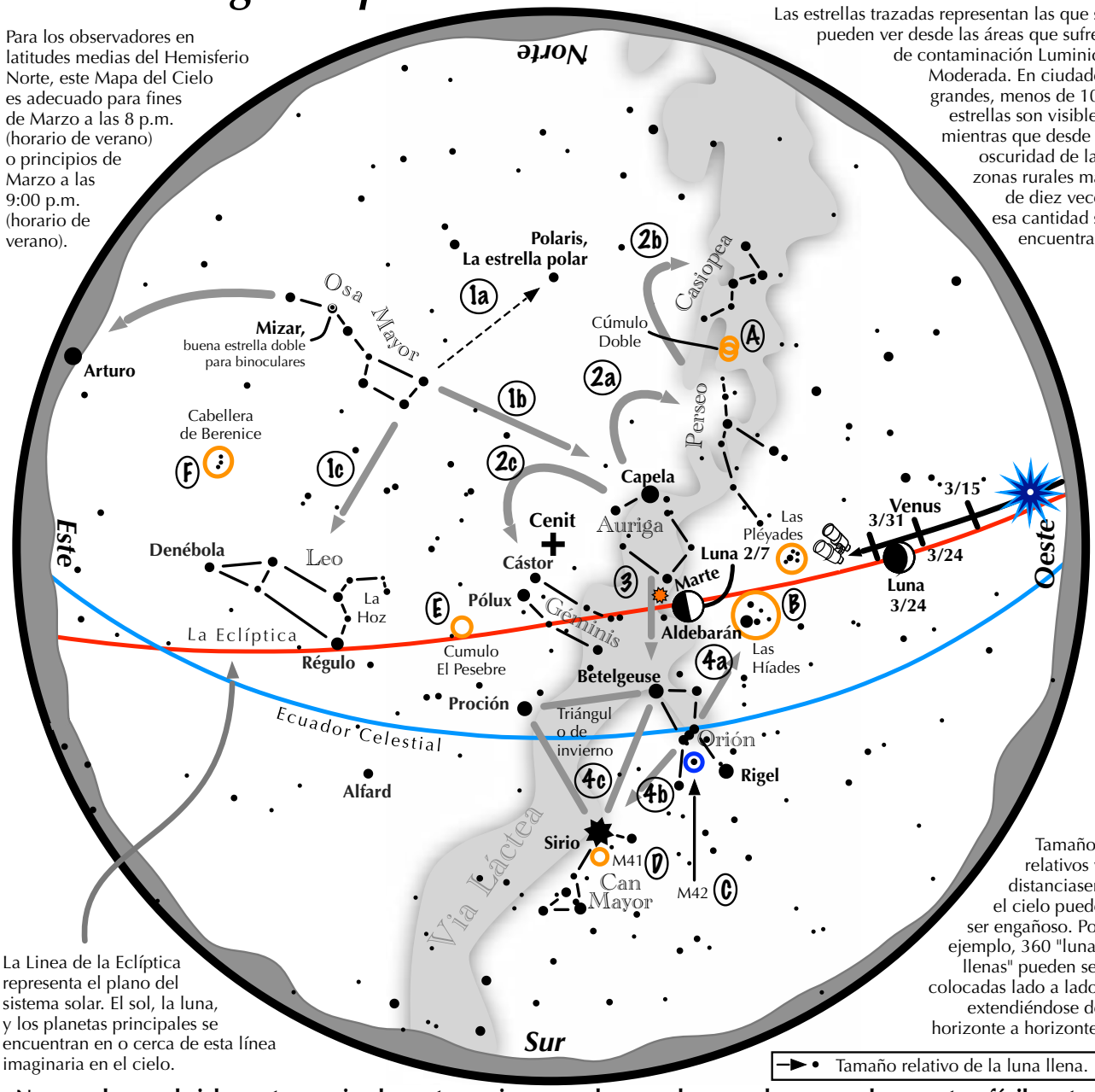
A: Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** M42 in Orion is a star forming nebula. **D:** Look south of Sirius for the star cluster M41. **E:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **F:** Look high in the east for the loose star cluster of Coma Berenices.

San Diego Astronomy Association

Navegando por el cielo nocturno de Marzo

Para los observadores en latitudes medias del Hemisferio Norte, este Mapa del Cielo es adecuado para fines de Marzo a las 8 p.m. (horario de verano) o principios de Marzo a las 9:00 p.m. (horario de verano).

Las estrellas trazadas representan las que se pueden ver desde las áreas que sufren de contaminación Luminica Moderada. En ciudades grandes, menos de 100 estrellas son visibles, mientras que desde la oscuridad de las zonas rurales más de diez veces esa cantidad se encuentran.



La Linea de la Eclíptica representa el plano del sistema solar. El sol, la luna, y los planetas principales se encuentran en o cerca de esta línea imaginaria en el cielo.

Tamaños relativos y distanciasen el cielo puede ser engañoso. Por ejemplo, 360 "lunas llenas" pueden ser colocadas lado a lado, extendiéndose de horizonte a horizonte.

Tamaño relativo de la luna llena.

Navegando por el cielo nocturno: simplemente comience con lo que sabe o con lo que puede encontrar fácilmente.

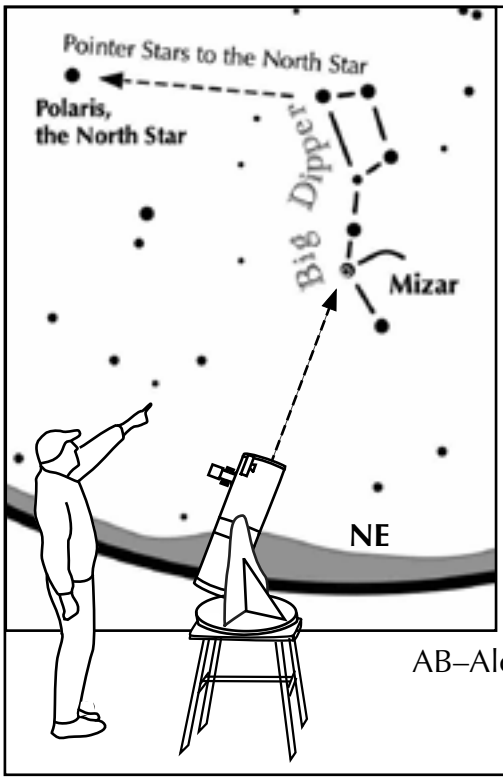
1. Sobre el horizonte noreste se alza la Osa Mayor. Dibuja una línea desde sus dos estrellas finales hasta la estrella polar. Las estrellas superiores del tazón apuntan al oeste a Capela, casi por encima. Leo yace debajo del tazón de la Osa Mayor.
2. Desde Capela, salte hacia el noroeste a lo largo de la Vía Láctea hacia Perseo, luego hacia la "W" de Casiopea. Siguiente salto hacia el sureste desde Capela a las estrellas gemelas de Cástor y Pólux en Géminis.
3. Directamente al sur de Capela se encuentra la constelación de Orión con sus tres estellas del Cinturón de Orión, su brillante estrella roja Betelgeuse y su brillante estrella azul-blanca Rigel.
4. Usa las tres estrellas del Cinturón de Orión para apuntar al noroeste hacia la estrella roja Aldebarán y el cúmulo estelar Hiades, y luego hacia el cúmulo estelar de las Pléyades. Viaja hacia el sudeste desde las estrellas del cinturón hasta la estrella más brillante en el cielo nocturno, Sirio. Es un miembro del Triángulo de invierno.

Puntos destacados con binoculares

A: Entre la "W" de Casiopea y Perseo se encuentra el Doble Cúmulo. **B:** Examina las estrellas de las Pléyades y las Híades. **C:** M42 en Orión es una nebulosa formadora de estrellas. **D:** Mire al sur de Sirio para el cúmulo estelar M41. **E:** M44, un cúmulo de estrellas apenas perceptible a simple vista, se encuentra al sureste de Pólux. **F:** Mira alto en el este para ver el cúmulo de estrellas perdidas de Cabellera de Berenice.

Liga Astronómica

 Traducción al español por Dr. Salvador Aguirre



Other Suns: Mizar

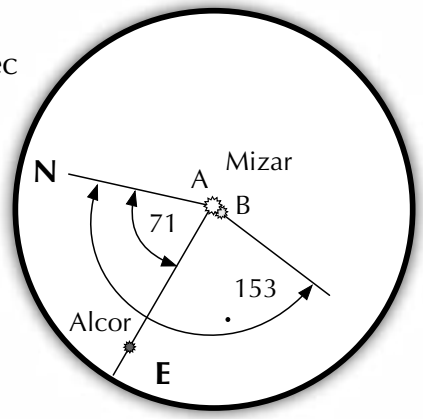
How to find Mizar on a March evening

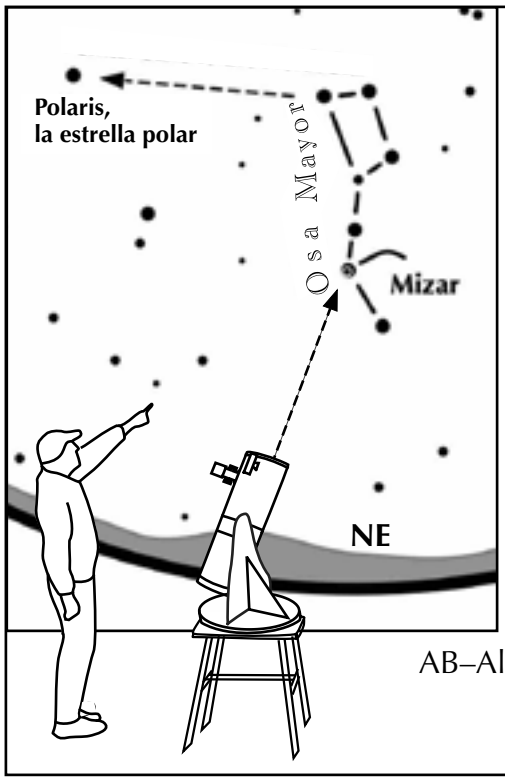
Look northeast toward the Big Dipper. The second star from the end of the Dipper's handle is Mizar. The 4th magnitude Alcor is immediately next to it.

Suggested magnification: >40x
Suggested aperture: >3 inches

Mizar
A-B separation: 14 sec
A magnitude: 2.2
B magnitude: 3.9
Position Angle: 153 º
A color: white
B color: pale green?

AB–Alcor separation: 11 min
Alcor: 4.0
PA: 71º





Otros Soles: Mizar

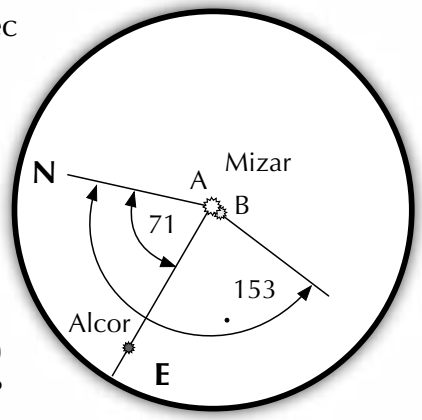
Cómo encontrar a Mizar en una tarde de marte

Mire al noreste hacia la Osa Mayor. La segunda estrella desde el final del mango del Dipper es Mizar. Inmediatamente al lado está el Alcor de 4ª magnitud.

Ampliación sugerida: >40x
Apertura sugerida: >75 mm

Mizar
A-B separación: 14 sec
A magnitud: 2.2
B magnitud: 3.9
Ángulo de posición: 153º
A color: blanca
B color: verde pálido

AB–Alcor separación: 11 min
Alcor magnitud: 4.0
PA: 71º



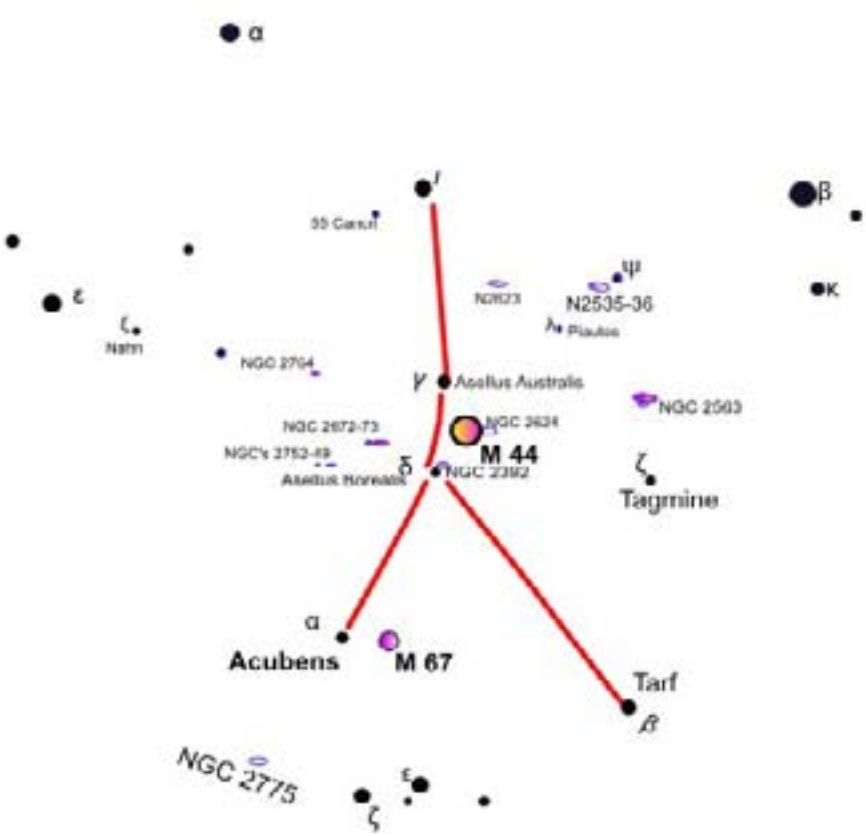
Another Look

New Moon on March 21, Full Moon on March 7
Named the Worm Moon by southern Native American tribes and the Sap Moon by northern tribes.
Pueblo tribes called it the “Moon when the leaves break forth”
Importantly if the full moon occurs before the spring equinox, it is called the Lenten moon
Other names include chaste moon, death moon, crust moon, crow moon and warming moon
First point of Aries, i,e, Vernal Equinox is March 20, 2023 at 1424 hrs
Daylight saving begins March 12, 2023

> *Raged with storms, wave and shingle were shackled in ice until another year appeared in the yard as it does to this day, the seasons constant, the wonder of light coming over us. Then winter was gone, spring comes, earth's lap grew lovely, longing woke in the cooped-up exile for a voyage home— Beowulf*

Cancer is part of that blank slate the ancients saw when they looked up between the twins, the bear and the lion. In China Cancer and M44 were known, as the "Exhalation of Piled-up Corpses," the source of mischief and blindness. The Hindus called it Flower. The Arabs stretched Leo out as far as Castor and Pollux and called Cancer the muzzle of the Lion.
A blank canvas ready to be brushed with their imagination, Cancer was know well before the Greeks and Romans. In the land of the two rivers, the Babylonians, Assyrians and before them the Chaldaeans identified the area as a Tortoise and also a Crab. As early as 4000BC and perhaps even earlier, the Egyptians placed a Scarab in the sky, an emblem of immortality and from the Chaldaeans to the Greeks is was a gateway through which souls descended to rest in Man and Woman. The Crab eventually replaced the Beetle. From long ago this portion of the sky was significant because the Sun’s apparent motion begins its retrograde and its oblique move downward.

"The nebula called Praesepe, which is not one star, only, but a mass of more than forty small stars. I have noticed thirty stars besides the Aselli." Galileo



So, what are the Aselli? The Greeks placed two donkeys, one above and one below the little mist or cloud we now know as the more of less recent Latin name Praesepe. These two stars are Asellus Borealius and Asellus Australius, Delta δ and Gamma γ Cancri. We now identify over one hundred stars brighter than 6.5 and only

one, Tarf the end, Beta β Cancri as bright as 3rd magnitude. Cancer contains 10 named stars. Acubens from the arabic claws, Asellus Australius who holds the record for the longest name, "Arkushanangarushashutu," derived from ancient Babylonian language, which translates to "the southeast star in the Crab." Next Asellus Borealius, Copernicus named after the astronomer Nicolaus Copernicus , Meleph the stall, Nahn the nose (Persian), Piautos bright fire (Chinese), Tarf the end, and Tegmine-zeta the cover. Gakyid and Copernicus are recent names, Copernicus obvious and Gakyid from the nation of Bhutan meaning Happiness. Of interest Bhutan's official name is Druk Yul, Land of the Thunder Dragon.
The most ancient scientific observation of Jupiter that is known to us was noted by Ptolemy as having occurred eighty-three years after the death of Alexander the Great, when Jupiter happened to pass over the Praesepe. This was in 240 B.C.

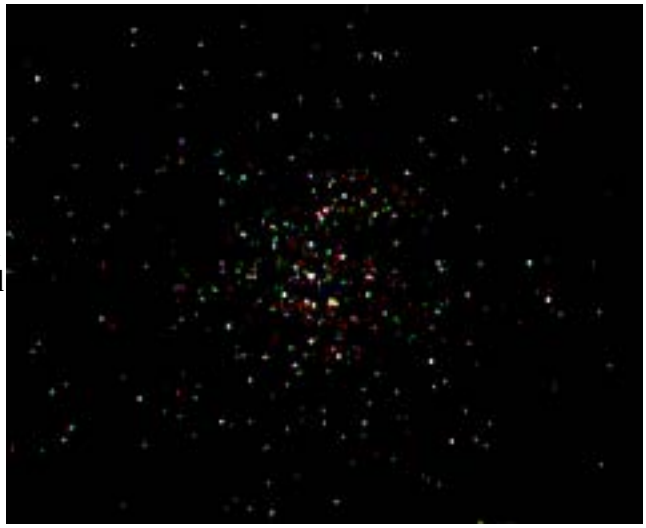
As early as several century's BC, the invisibility of M44 has been considered an omen of coming rain. I will let the poets speak for themselves of the one thing they ascribed to Cancer, the weather.

From Aratos, a third century BC Greek poet who wrote the Phenomena and the Prognositica:

And watch the Manger like a little mist.
Far north, in Cancer's territory, it floats,
Its confines are two faintly glimmering stars,
One on the north, the other on the south,
These are two asses that the Manger parts,
Which suddenly, when all the sky is clear,
Sometimes quite vanishes, and the two stars
Seem closer to have moved their sundered orbs.
No feeble tempest then will soak the leas.
A murky Manger with both stars
Unaltered, is a sign of rain.
If while the Northern Ass is dimmed
By vaporous shroud, he of the south gleams radiant,
Expect a south wind. Vapour and radiance
Exchanging stars, harbinger Boreas.

Pliny wrote: "If Praesepe is not visible in a clear sky it is a presage of a violent storm."

Plenty has been said already about M44. Ptolemy called it the nebulous mass in the breast of Cancer and its presage to storms. Scientifically its not that old but oddly enough 60% of its stars are red dwarfs. It is beautiful to look at.
https://ocastronomers.org/wp-content/uploads/2019/01/m044.jpg



The other open cluster, M67, is a little further down near Acubens α. M44 is half a billions years old and M67 is 5 billion years old. M44 has a thousand stars, M67 one hundred. Most of its stars are main sequence like the sun but has a few red giants. M67 is also beautiful to look at.

Caldwell 48, NGC 2775 is a large, 10th magnitude galaxy low in the constellation near the head of Hydra. It is rather odd looking. You will see a bright nucleus and, if you have the resolution, tightly knit spiral arms.

Messier 67, image: Sloan Digital Sky Survey

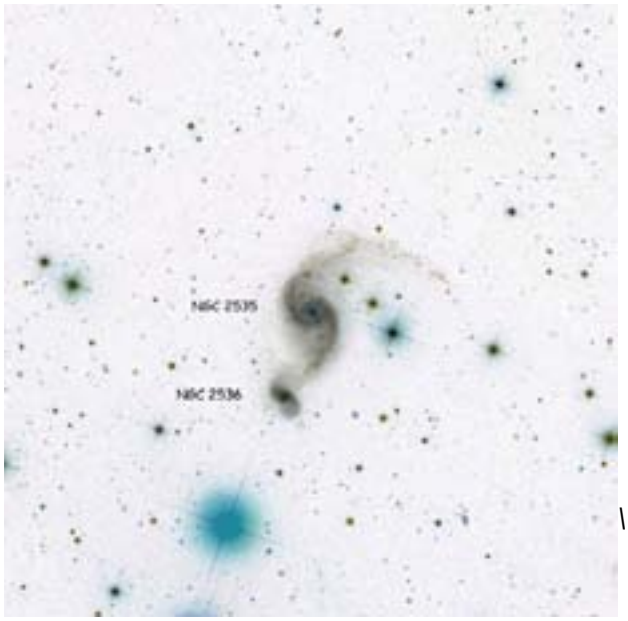
Tegmine – ζ Cancri (Zeta Cancri) is the only star in Cancer that Camille Flammarion chose to include in his book "Popular Astronomy" first printed in 1888. As Flammarion writes:

> A triple star more easy to observe is ζ of Cancer, composed of three orbs of fifth magnitude, at a distance of 1″ and 5″; the first two revolve round their common center of gravity in fifty-nine years, the third takes over three hundred years.
> *Camille Flammarion "Popular Astronomy" Observatory of Juvisy, November, 1903.*

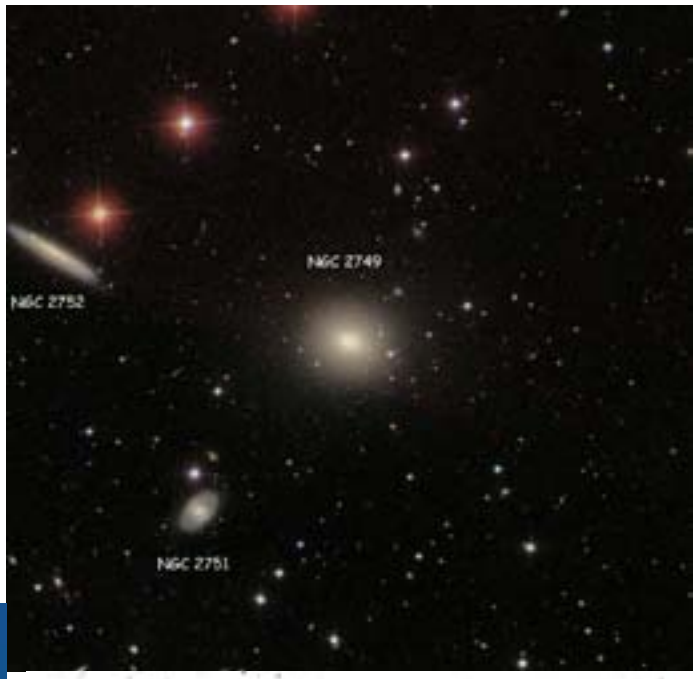
Not surprisingly, there has been new discoveries in the last few hundred years. A fourth star, a red dwarf, of 10th magnitude is in orbit with C, separated by only 0.3".

Located near the southern end of Cancer and just below M67 is Sharpless 2-290, also known as Abell 31. This is a large faint planetary that is a challenge to all. I estimate its size as 15' and can't figure out a magnitude because it can't be seen unfiltered. The astrophotographers are using OIII and Hα filters. ***http://annesastronomynews.com/photo-gallery-ii/nebulae-clouds/abell-31-by-adam-block/***

There are varying estimates of magnitude for the double galaxies NGC 2535 and NGC 2536, but the NGC gives magnitude of 12 and 14. The object is an extended pair of interacting galaxies, 2 to 3 arcmins across so likely visible to some extent in our backyard scopes.

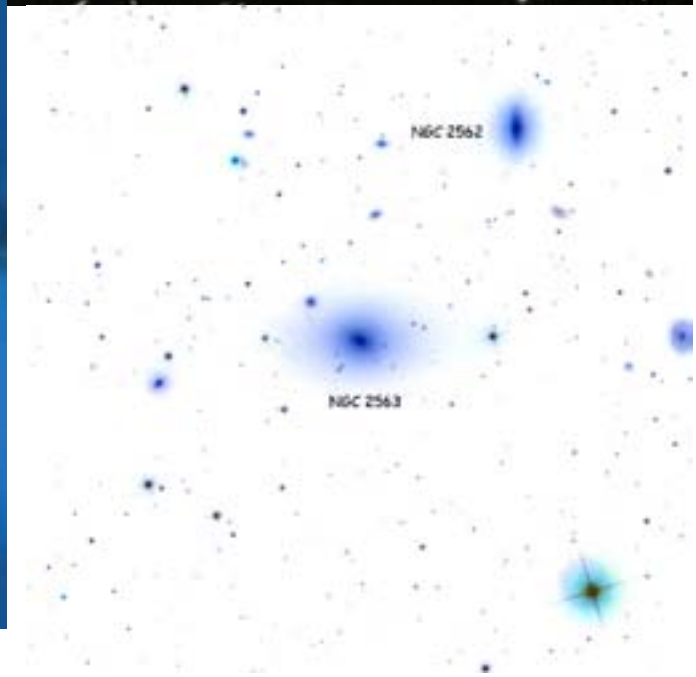


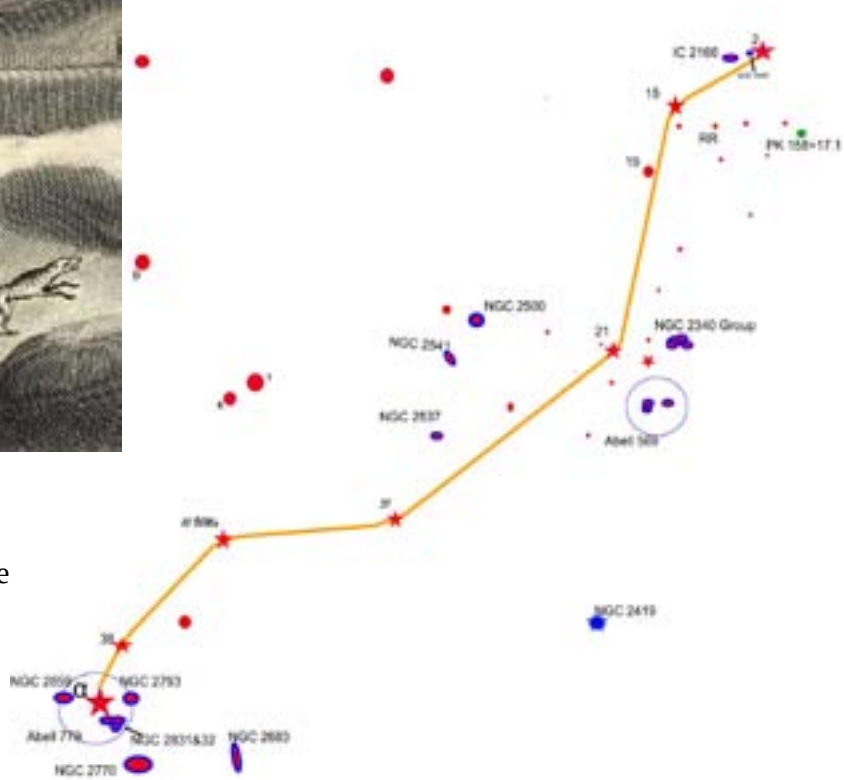
NGC 2749, 2751 and 2752 are three close by galaxies of 11, 13 and 14th magnitude and three different visual classifications: Elliptical, Edge on spiral and Tilted spiral. These are real faint and fuzzies. ***Galaxy Images copyed from the New General Catalog.***



If your taste for faint galaxies hasn't bee sated yet, slip over to the NGC 2562 and 2563 group. We have two 12th magnitude galaxies presenting different aspects and possibly visible in a single field.

https://www.wallhapp.com/urano/globe-celeste-de-coronelli-1683





"High in the evening sky in late March lies one of the great vacant spaces of the celestial vault. Between the cluster-studded sparkling of Auriga and the hordes of galaxies in Ursa Major is a void that was ignored by celestial cartographers until the late 17th century. Then Polish astronomer and instrument maker Johannes Hevelius, unable to resist the temptation of a blank space, filled the area with his constellation Lynx"

Scott Houston

So, in 1690 Hevelius added the Giraffe, the Unicorn, the Little Lion, the Little Triangle, Herschel's Telescope and the Lynx. The drawing above is a portion if the frontspiece of Hevelius's atlas "*Firmamentum Sobiescianum* " printed in 1687. It shows Lynx, Canis Venatici, Vulpecula, Leo Minor and Lacerta. In the top left is Cerebus, since forgotton as is Herschel's Telescope.

Although you needed the eyes of a Lynx to observe it, Webb mentions that Lynx is noted for the number and beauty of its multiple stars.

2 Lyncis is the furthest northern star in Lynx that you can see visually at 4th magnitude. Its a fairly interesting star, not only because it's the jumping off point for three deep sky objects but also because it's a variable spectroscopic double. They think maybe the variable part comes from the unseen companion crossing between #2 and us. 3.5 degrees due south of 2 is a huge planetary that was only recently found off the Palomar survey plates. It's PK 158+17.1 also know as PuWe 1, (Purgathofer-Weinberger). Although it's on the Uranometria charts I never noticed it before I started studying Lynx. I never spent much time in Lynx before, with Auriga, Gemini and all the other fancy constellations around, now if I can, I'll try to rectify that mistake.

Urania's Mirror

PuWe 1 is a large, 20 arcmin, faint 15th magnitude, per Simbad, planetary recently, 1980 or so, discovered off the Palomar plates. The main redish nebula is about 20' and I picked this particular image from Astroanarchy because it shows the expanded halo around the object taking it up to full moon size. I also like this image because it compares PuWE 1 to the Dumbbell, M27. This image was done in Hα and OIII, so you will need a big mirror and quality filters.

IC 2166 and UGC 3446 are the other galaxies up by 2 Lyncis. Both are smallish, around the one to three arcmin size and findable at 12th magnitude. Straight down from there is the NGC 2340 group and Abell 569. They are about 13th magnitude and one to three arcmin size, but a nice test for your eye. ***https://astroanarchy.blogspot.com/2011/03/puwe1-planetary-nebula-project.html***

A big mirror is also appropriate for NGC 2419, Caldwell 25, aka "The Intergalactic Wanderer", so called because it is the furthest visible visually globular cluster to our Milky Way. N2419 is 8th magnitude and is a rather compact 2 arcmin. Burnham lists N2419 as 11.5 magnitude and describes it as very rich and extremely condensed. A 12 arcmin field of view will show a bright star next to the cluster while a 6 arcmin field will blow it up.

https://cseligman.com/text/atlas/ngc24.htm#2419

The awesome Schmidt camera at Palomar has found more intergalactic globulars, too faint for us to see. Still, you can find globulars around M32 as described a couple of months ago to sate your globular sachet. ***http://simbad.u-strasbg.fr/simbad/sim-id?Ident=NGC++2830***

Down at the bottom of Lynx is a neat little asterism of galaxies that use alpha α Lyncis as a finder. These three galaxies NGC 2859, NGC 2793 and NGC 2832 which is a member of Abell 779. They are all within a degree of Alpha but small. N2832 is 13th magnitude and the prominent member of the group. You should be able to glimpse its companion 14th magnitude 2831 and then the lectilinear NGC 2830. NGC 2859 is the brightest member of the three, 12th magnitude and actually in Leo Minor. NGC 2793 is also 12th magnitude and round.

Also very close to Alpha is NGC 2683. A lecticular 9th magnitude spindle. The NGC catalog has the dimension at about 9x3 arcmin. Copeland called NGC 2683 "the forerunner of the galactic host of the spring and early summer".

There are three galaxies strung like pearls along the west side of Lynx, between it and Kappa κ and Iota ι Ursa Majoris, the front paw of the bear. This seems appropriate for the first galaxy, NGC 2537, the Bear Paw galaxy. Its 12th magnitude and small at 2x2 arcmin. An interesting object. Four degrees north

is NGC 2541, also 12 magnitude. It may appear knotty in your eyepiece at 6x3 arcmin. Lastly is a 3x3 arcmin face on barred? knotty spiral also at 12th magnitude.
While there drop down ten degrees to between 10 Ursa Majoris and 38 Lyncis. NGC 2782 is a 12th magnitude, 3x3 arcmin peculiar, merged galaxy with an active nucleus. The nucleus will be starlike and bright.vBarnham lists 12 galaxies in Lynx 12th magnitude and brighter and another three of 13th magnitude. The bigger star atlases show dozens more. A healthy hunting ground for you supernova specialists out there and a fitting precursor to the realm of galaxies in the coming months.
Dark Skys
Dave Phelps

The great tradition of Dark Sky Observing continues with the 43rd Annual TEXAS STAR PARTY, May 14 to 21, 2023 near Fort Davis, Texas!

IMPORTANT DATES TO KNOW
• Friday, Feb 17th – close regular registrations.
• Friday, Feb 17th through Monday, Feb 20th – run the random lottery and start housing assignments
• Monday, Feb 20th through Sunday, March 5th – do housing assignments (this gives us two weeks)
• Monday, March 6th – confirmation emails go out to regular registrants
• Wednesday, March 8th – late registration open and late housing assignments made (whatever is left)

Late Registration will close April 28, 2023.

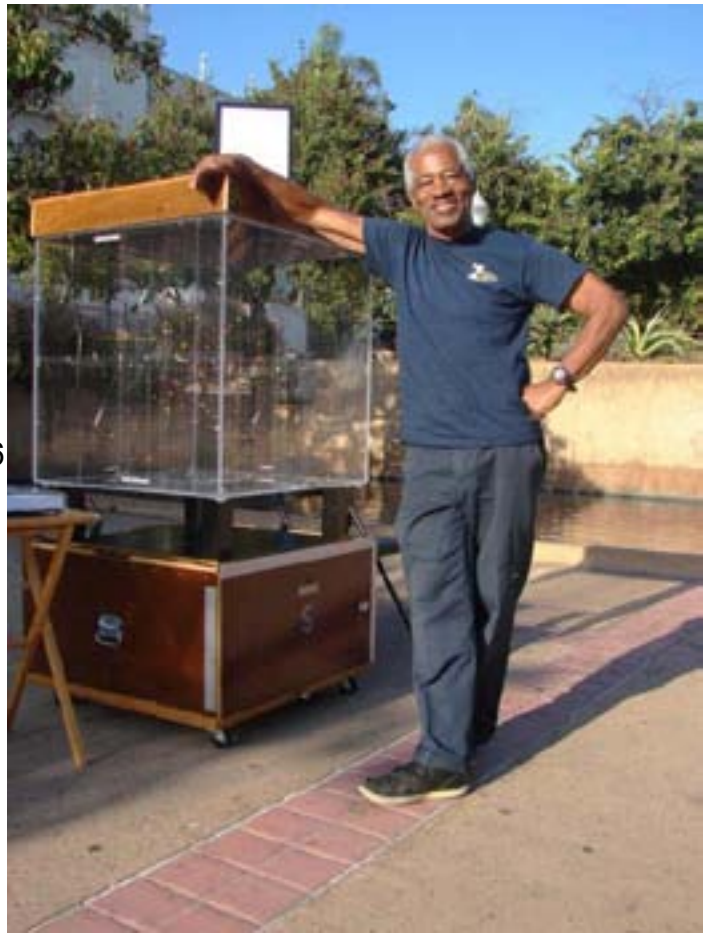
Last day to cancel and receive a refund is April 28, 2023 at 11:59 pm CDT. Your email must be time and date stamped at or prior to 11:59 pm (23:59 hours) Central Daylight Saving Time to receive a refund. Special Conditions apply to refunds

The Texas Star Party is accepting registrations for TSP 2023. Please go to https://texasstarparty.org/register/ and log in to your TSP account to begin the process.
Go to our website to review our "Registration webpage" https://texasstarparty.org/registration/ for additional information regarding "Timelines, important dates, cancelling and refunds.

If you have any questions, please email us at tsprooms@texasstarparty.org.

Meet the Members: Mitchell Walker

We have many fantastic folks contributing to the efforts of the SDAA. Here we have Mitch, a familiar face at Balboa Park, TDS, and other outreach events. And, for several years he has setup his “Stellarium Project” faithfully at Stars in the Park and recently at our annual banquet. Below, Mitch tells a story, about modeling space in a “to scale”, 100 light year cube around us. Hopefully, you have seen this wonderful museum piece, most recently displayed at the Handlery Hotel last month. In his words;



Welcome to the *stars in the hood* outreach adventure. After a long, continuing interest in astronomy and developing a greater understanding of the cosmic puzzle, I became inspired to build a 15” inch square, 3D star cube representing Space in the vicinity of our solar system. It was completed on April 7, 2005, after reading an article on the star Zeta Reticuli from the December 1974, Astronomy Magazine. A 50 Light Year radius distance from our Sun was selected to include Zeta Reticuli at 39.16 Light Years away (# 066 in the 30” inch cube).

Part of the learning curve toward building the 3D star map was the understanding of Right Ascension, Declination and Light Year distances, using the Cartesian X, Y, and Z coordinate system developed by Pierre de Fermat. The dream in building the 30” inch square 3D star cube was conceived on March 22, 1983. Construction began on Aug.14, 2018 and was completed April 25, 2019. An upgrade was added on January 13, 2023, now with a total of 166 neighborhood stars with a 100 Light Year diameter around the Sun or Sol. The galactic scale is 3” equal 10 Light Years which makes the Milky Way Galaxy approximately ½ mile in diameter, representing an approximate size of 100, 000 Light Years across. The prelude of the 30”, 3D star cube was the 15” inch version having 100 stars at a scale of 1 ½ inch to 10 Light Years.

The interactive 3D Stellarium Epoch 2000.0 3D star cube gives the viewer a visual understanding on the vastness of our Sun and Stellar neighborhood, plus a basic start in understanding Astronomy…Enjoy that journey when taken.

Mitchell A. Walker

The Society of Amateur Radio Astronomers ("SARA") Western Conference

This year, the Western Conference is at Bishop, California in the Owens Valley north of Victorville, practically in our backyard on Friday and Saturday, March 17, 18! Caltech has a large radio telescope in the Owens Valley (http://www.ovro.caltech.edu/). The Conference will feature presentations by SARA members and professional radio astronomers on radio astronomy topics. There will be plenty of good information for beginners and experts! There will also be an intimate tour of Cal Tech's 40 m telescope as well as plenty of opportunity to mingle with and learn from other attendees! All ages including high school students are welcome. More information about the Western Conference can be found at: https://www.radio-astronomy.org/node/380.

Registration for in-person attendance is $55 and the conference can also be watched online. The fee for online registration is $15. The only catch is that you must be a SARA member to register. The annual fee to become a SARA member is $20. Payment for both the annual dues and the Western Conference can be made through PayPal (www.paypal.com) by sending payment to treas@radio-astronomy.org. If you don't want to use PayPal, a check can be sent to SARA Treasurer (c/o Brian O'Rourke), 337 Meadow Ridge Road, Troy, VA 22974-3256. Please include in the comments that the payment is for the 2023 Western Regional Conference and 2023 Annual Dues. If anyone has any questions about the Western Conference or would like to coordinate travel, they can contact Curt Kinghorn at CurtKinghorn@gmail.com or at 916-208-8870.

An Optical Measurement of the Deflection of Light by Jupiter's Gravity

Donald G. Bruns V4 January 31, 2023

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Abstract

General Relativity predicts that starlight will be deflected by 0.016 arcsec if its light passes close to the planet's limb. Astronomers measured this at radio frequencies, but no one has accomplished this in the visible spectral region. A fortuitous alignment of three bright stars with Jupiter in October 2023 should make this measurement possible using only small telescopes placed almost anywhere in the Western Hemisphere. The data collection will require continuously recording images over several hours over two nights. The data analysis will extract the star positions from thousands of images, followed by averaging the values in 30 minute intervals to reduce the measurement noise. A test in November 2021 resulted in the required precision. Interested astronomers are invited to contribute data to this project. If successful, this measurement will fulfill one of Einstein's wishes.

Introduction

Stellar deflections due to General Relativity have been measured near the Sun since 1919, where the deflection coefficient is 1.75 arcsec for stars located near its limb [Refs 1, 2, 3]. Einstein suggested this in 1916, but astronomers were understandably frustrated because observing during a total eclipse was necessary. Those events are not very common or convenient, and the observations had to be completed during the few minutes of totality. Einstein also suggested that these measurements could be done during the daytime without an eclipse, but that has proven unsuccessful [Refs 4, 5, 6].

Einstein's third suggestion was to use Jupiter as the gravitational source. Deflections there would be about 100 times smaller than those near the Sun, so technology was not good enough during his lifetime. The Hubble telescope attempted to measure the deflection of a star near Jupiter in 1995, but no results were obtained [Ref 7]. While the Gaia analysis included Jovian deflections in calculating the positions of stars for its catalog [Ref 8], a direct optical measurement has never been completed.

One convenience of using Jupiter to measure stellar deflections is that an observer can use a telescope almost anywhere in the world, as long as a bright star passes within 100 arcsec of Jupiter while at high elevation in a clear sky. The Jovian passage takes several hours, so timing is not critical and the measurement noise can be reduced by analyzing thousands of images. It is also essential that the target star be accompanied by two bright reference stars so that an accurate plate scale can be calculated. Because every instrument slowly changes with temperature, the best possible reference stars would be in a line, minimizing changes in the relative plate scale.

By coincidence, such a conjunction does appear the night of October 27-28, 2023. Figure 1 shows the target star and the two reference stars near Jupiter. The closest approach of SAO 93016 is at 7:15 UT, when it will be only 25 arcsec from Jupiter's limb. Jupiter's gravity should generate an apparent outward deflection of 0.0085 arcsec. This close conjunction last occurred in 1928 and does not repeat until 2106, so this opportunity needs to be measured!

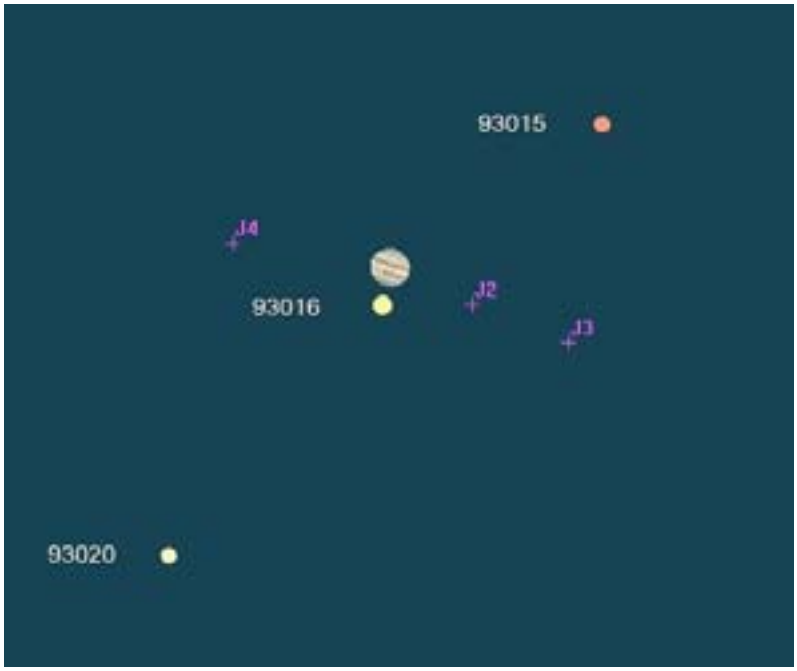

Figure 1. SAO 93016 (magnitude 7.1) should show a 0.0085 arcsec gravitational deflection as Jupiter passes nearby in October 2023. SAO 93015 (magnitude 7.6) and SAO 93020 (magnitude 8.3) provide good references to calibrate the plate scale. The slow motion of Jupiter with respect to the stars allows several hours to acquire images. [Image from Guide 9.]

The view from Jupiter in Figure 2 shows Earth at the time shown in Figure 1. Jupiter shines high near the meridian in much of the US, but southern sites with good seeing will provide better measurements.

Figure 2. Earth's Western Hemisphere is perfectly placed to view SAO 93016 as Jupiter makes its closest approach. Image collection over several hours reduces the measurement noise. [Image from Guide 9.]

Data Collection

Amateur telescopes, cameras, and mounts are perfectly suited to capture the images needed for this project. The instrument requirements are summarized here.

In moderate (1 - 2 arcsec) atmospheric seeing, the best star position measurements result from using a plate scale near 0.5 arcsec/pixel. A Luminance filter acceptably reduces atmospheric chromatic aberrations since the targets are at high altitude. The bright targets means that 100 mm apertures can operate using 1 sec exposures. For 2.4 micron CMOS pixels, the telescope should have a focal length near 1 meter, just right for a 127 mm F/8 refractor. For 3.8 micron CMOS pixels, the ideal telescope focal length is 1.6 meters. A 200 mm F/8 Ritchey-Chretien telescope design also generates minimum distortions, providing the best calibrations. Since the imaging takes place all night long, a carbon-fiber design helps minimize focal shifts. Other telescope and camera combinations might work well, but should be tested as described in the **Results** section. For the common ZWO1600 CMOS camera, if the telescope focal length is less than 4000 mm, the stars will fit into the frame. For long focal lengths, binning the pixels might be convenient.

The imaging camera should be a CMOS design, so that a 1 frame-per-second (FPS) rate can be maintained. Only a small sub-frame might need to be saved, but this still requires Gigabytes of storage space. Since 13 arcminutes separates the reference stars, the CMOS sensor needs to be at least 1600 pixels wide. Most amateur units meet that requirement. A cooled camera is not essential, since the exposures are so short.

An alternate technique is to use a narrow-band (20 nm) methane filter (890 nm) to reduce the scatter from Jupiter. This also reduces the signal from the target stars, so 3 second long exposures might be needed with small apertures. This technique is still being evaluated, but a dual-telescope mount has been prepared. The RC8 telescope would be used with the methane filter while the refractor would use the Luminance filter.

Figure 3. A Paramount MyT has a capacity of 50 pounds, enough to hold both telescopes mounted on an aluminum plate. One telescope mount includes an adjustment in RA while the other telescope can be adjusted in DEC. This allows boresighting the telescopes. A small telescope mounted between the two can be used as a guide scope to keep Jupiter centered to reduce small optical distortion corrections.

Since the imaging might last all night long, the ideal mount would be a fork style. A German equatorial mount requires pausing for a few minutes while the observer flips the mount across the meridian. Good tracking keeps the stars nearly in the same location on the sensor, avoiding small optical distortion corrections.

Data Analysis

Since the observations contain so many images, writing a program to automatically find the star positions is needed. There are two methods; curve fitting or center-of-mass (CoM). Because the stars are so bright, their signal-to-noise ratios exceed 100. A CoM proof-of-concept Python program was written and tested with good results, but curve fitting is still being evaluated.

The bright scatter from Jupiter needs to be subtracted, but since the target star does not get too close to Jupiter's limb, the scatter should be easy to handle. This is being evaluated with simulated stars on archived Jupiter images. A secondary spider might cause some additional scatter, but this would be absent with a refractor or a methane filter. The use of methane filter totally eliminates Jupiter's scatter.

Results

The target stars are visible months before and months after October, providing opportunities to test data collection and analysis. With Jupiter far away, the deflection of the target star in the final analysis should be zero, with an uncertainty much smaller than 0.0085 arcsec. One such test was completed in November 2021. While this test used short exposures, longer ones should work just as well.

Using a Ritchey-Chretien telescope and a CMOS camera with 3.8 micron pixels, a series of 216,000 images were taken at 20 FPS for 3 hours. An example image is shown in Figure 4. A Python program using CoM calculations processed the images. The plate scale determined by the outer two stars averaged 0.489 arcsec/pixel. The plate scale varied slowly because the telescope temperature change affected its focal length.

Figure 4. The CMOS camera was rotated 45º to allow saving a smaller image. Here the exposure was 0.05 sec using an F/8 200 mm aperture telescope resulting in a plate scale of 0.489 arcsec/pixel. The approximate SNR for the three stars were 200, 500, and 200.

The plate scale thus determined for each image was multiplied by the measured target star separations in the same image. Those numbers were averaged over 30 minute periods (36,000 images). They were fit to a quadratic curve and the standard deviation of those values was found to be 0.0025 arcsec. This is small enough compared to the expected deflection that the final results from 2023 should be definitive. Based on 1.5 arcsecond seeing, 30 minute averaging should reduce the position errors down to 0.003 arcsec, in good agreement with this test run [Ref 9].

Conclusions

In October 2023, the optical deflection of a star near Jupiter can finally be measured. Small telescopes and inexpensive CMOS cameras can be used anywhere the conjunction is visible, and amateur astronomers are encouraged to test their equipment, using the same target stars, starting in the summer of 2023. Larger telescopes in fixed observatories could also be used, if their focal lengths are less than about 4 m. A beta version of the analysis program will be publically available. When the results from other amateurs or groups are combined, the final results should be even better. Please contact the author with your interest in joining this historic experiment.

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Have a great new piece of gear? Read an astronomy-related book that you think others should know about? How about a photograph of an SDAA Member in action? Or are you simply tired of seeing these Boxes in the Newsletter rather than something, well, interesting?

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This article is distributed by NASA's Night Sky Network (NSN). The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Spot the Morning and Evening Star: Observe Venus

David Prosper

Venus is usually the brightest planet in our skies, and is called "Earth's Twin" due to its similar size to Earth and its rocky composition. However, Venus is a nightmare version of our planet, featuring a thick, crushing atmosphere of acidic clouds, greenhouse gasses, howling winds, and intense heat at its surface.

This rocky inner world's orbit brings it closer to Earth than any of the other planets, and is the second closest to the Sun after Mercury. Like Mercury, Venus orbits between our planet and the Sun, so Earth-based observers can observe Venus in the morning before sunrise, or in the evening after sunset – but never high in the sky in the middle of the evening, unlike the outer planets. Since Venus is so striking in its twilight appearances, the planet features heavily in sky mythologies worldwide. Venus's bright morning and evening appearances are the origin for its dual nicknames: the Morning Star, and the Evening Star. Some ancient astronomers never made the connection, and assumed the Evening Star and Morning Star were two unrelated objects! Observers can even spot Venus during the daytime, if the sky is very clear and the planet is bright enough. Venus also has phases, similar to the Moon and Mercury. Galileo's observations of Venus's phases helped turn the astronomy world upside down in the early 1600s, and you can see them yourself using a telescope or even a surprisingly low-power pair of binoculars. **Warning**: Please be very careful when observing Venus with a telescope in the early morning or daytime. Never allow the Sun to enter your instrument's field of view, as you could be permanently blinded.

Venus's other moniker of "Earth's Twin" is a bit misleading. In terms of their surface temperatures and atmospheres, Venus and Earth are extremely different! The surface of Venus is warmer than that of Mercury, despite Mercury being many millions of miles closer to the Sun. While Mercury is still a scorching 800 degrees Fahrenheit (427 degrees Celsius), Venus is even hotter: 900 degrees Fahrenheit (482 degrees Celsius). The vast amount of carbon dioxide in the thick Venusian atmosphere acts as an insulating blanket that retains much of the Sun's heat, creating the runaway greenhouse effect that dominates its present-day climate. The Venusian surface is a crushing 90 Earth atmospheres on top of its absurd temperatures. These extreme conditions mean that the mission life of any past Venusian robotic landers were measured in **hours** at best – and usually minutes! However, conditions in Venus's upper atmosphere may be much more hospitable, with temperatures and pressures at 30 miles (50 km) above the surface that are much more Earth-like in temperature and pressure. Studies of the Venusian atmosphere, including seasonal appearances of dark streaks and faint signals of suggestive chemistry, intrigue researchers with the possibility that some sort of life may persist in its clouds. But far more evidence is needed to confirm such a claim, since non-biological factors like volcanism and other processes could also be the source for these signals.

Venus's thick sulfuric acid clouds block direct visual observations of its surface from optical telescopes on Earth. Multiwavelength observations from space probes show evidence of active volcanoes and possibly some sort of plate tectonics, but followup missions will be needed to confirm the presence of active volcanism, plate tectonics, and any possible signs of life. In order to do so, NASA is sending two new missions to Venus by the end of this decade: the orbiter **VERITAS**, which will map the surface in high detail and study the chemistry of its rocks and volcanoes, and **DAVINCI+**, which will study its atmosphere and possible tectonic surface features via a "descent sphere" that will plunge into Venus's clouds. Follow their development and discover more about Venus at solarsystem.nasa.gov/venus, and of course, continue your exploration of the universe at nasa.gov.

Venus and Jupiter continue to move closer together in the evening sky this month. Jupiter will continue its descent towards the horizon while Venus will continue to climb and will be visible in the evenings though mid-summer of 2023. It's a great year for Venus fans!

Image created with assistance from Stellarium

The top layers of Venus's cloud pop in this contrast-enhanced image, reprocessed with modern techniques from Mariner 10 data.

Credit: NASA/JPL-Caltech

Source: https://solarsystem.nasa.gov/resources/2524/newly-processed-views-of-venus-from-mariner-10/

San Diego Astronomy Association

2023 TDS Star Party Schedule

Date	Type	Sunset	Astro. Twi.	Moonrise(set)	Illum.†	Notes	Hosts
3/18/2023	Member	6:58 PM	8:20 PM	5:55 AM	12.6%		Steven Myers
3/25/2023	Public	7:03 PM	8:26 PM	(11:40 PM)	20.9%		Ed Rumsey & Joe Fox
4/15/2023	Member	7:18 PM	8:44 PM	4:29 AM	24.8%	Mercury at greatest eastern elongation. (4/11)	Jerry Hilburn
4/22/2023	Public	7:23 PM	8:51 PM	(10:27 PM)	8.6%	Lyrids peak night Apr 22-23 (ZHR 18)	Paul Krizak
5/13/2023	Public	7:39 PM	9:13 PM	3:03 AM	38.5%		
5/20/2023	Member	7:43 PM	9:20 PM	(9:14 PM)	1.6%	Mercury at greatest western elongation. (5/29)	Jerry Hilburn
6/10/2023	Public	7:56 PM	9:37 PM	1:36 AM	52.8%	Venus at greatest eastern elongation. (6/4)	
6/17/2023	Member	7:58 PM	9:40 PM	8:03 PM	0.3%		
7/8/2023	Public	7:59 PM	9:39 PM	12:07 AM	67.3%		Per Martin
7/15/2023	Member	7:57 PM	9:35 PM	4:36 AM	3.9%		
8/12/2023	Public	7:36 pm	9:06 PM	3:26 AM	12.2%	Perseids peak night of Aug 12-13 (ZHR 100)	Ed Rumsey
8/19/2023	Member	7:29 PM	8:57 PM	(9:23 PM)	10.9%	Saturn at Opposition. (8/27)	
9/9/2023	Public	7:02 PM	8:26 PM	2:17 AM	24.5%		
9/16/2023	Member	6:53 PM	8:16 PM	(7:52 PM)	3.0%	Neptune at Opposition. (9/19)	
10/7/2023	Public	6:25 PM	7:47 PM	1:07 AM	40.2%	Draconids Meteor Shower. (10/7)	
10/14/2023	Member	6:16 PM	7:38 PM	(6:22 PM)	0.0%	Annular Solar Eclipse. (partial here)	
11/4/2023	Public	5:55 PM	7:18 PM	11:54 PM	57.8%	Taurids peak night Nov 4-5. (ZHR 5)	
11/11/2023	Member	4:49 PM	6:14 PM	5:34 AM	2.8%	Uranus at Opposition - Nov 13	
12/9/2023	Member	4:42 PM	6:10 PM	4:22 AM	12.0%	Mercury at greatest eastern elongation. (12/4)	
12/16/2023	Public	4:44 PM	6:12 PM	(8:54 PM)	20.1%	Geminids peak night Dec 13-14 (ZHR 150)	

† Illumination at meridian crossing.

†† Published *zenithal hourly rate(s)* ZHR vary widely between sources.

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MEMBERSHIP INFORMATION

Send dues and renewals to P.O. Box 23215, San Diego, CA 92193-3215 or renew on-line. The notice that your membership in SDAA will expire is sent by email. Dues are $60 for Contributing Memberships; $40 for Basic Membership; $70 for Private Pads; $5 for each Family membership.