

# LONGMONT ASTRONOMICAL SOCIETY

MAY 2024



**DIAMOND RING BY MARTIN BUTLEY**

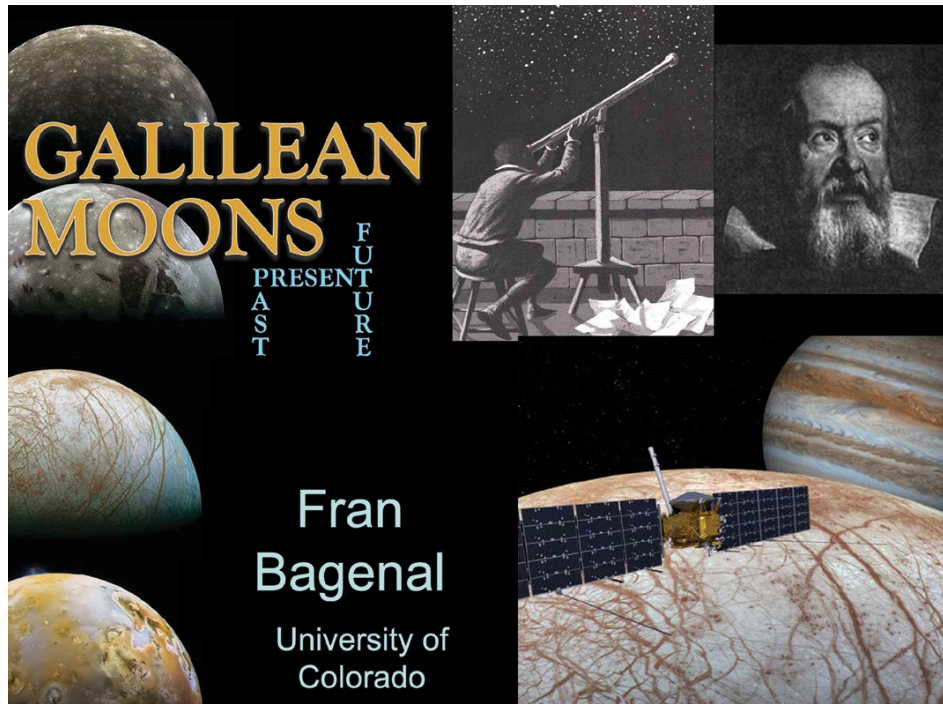
**VOLUME 40, No 5, 2024**  
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## Next LAS Meeting May 16 at 7 pm Galilean Moons: Past, Present and Future by Dr. Fran Bagenal

As Juno's orbit has evolved over 8 years, the spacecraft has also made flybys of the Galilean moons Ganymede, Europa and Callisto. This provides an opportunity to review the history of the Galilean moons, discuss previous observations made by Voyager, Galileo, Cassini and New Horizons missions to provide the context for recent Juno flybys. Looking to the future, ESA's JUICE and NASA's Europa Clipper missions will be probing deeper into these very different worlds.

### Biography

Dr. Fran Bagenal is a senior research scientist and professor at the University of Colorado, Boulder and is co-investigator and team leader of the plasma investigations on NASA's New Horizons mission to Pluto and the Juno mission to Jupiter. Her main area of expertise is the study of charged particles trapped in planetary magnetic fields and the interaction of plasmas with the atmospheres of planetary objects, particularly in the outer solar system. She edited the monograph *Jupiter: Planet, Satellites and Magnetosphere* (Cambridge University Press, 2004).



Born and raised in the UK, Dr. Bagenal received her bachelor degree in Physics and Geophysics from the University of Lancaster, England, and her doctorate degree in Earth and Planetary Sciences from MIT (Cambridge, Mass) in 1981. She spent five years as a postdoctoral researcher at Imperial College, London, before returning to the United States for research and faculty positions in Boulder, Colorado. She has participated in several of NASA's planetary exploration missions, including Voyager 1 and 2, Galileo, Deep Space 1, New Horizons and Juno.

[https://las.colorado.edu/home/mop/home/people/fran\\_bagenal/](https://las.colorado.edu/home/mop/home/people/fran_bagenal/)

The meeting will be at the First Evangelical Lutheran Church, 803 Third Avenue, Longmont, CO 80501. If you cannot attend the in-person meeting, it will be available on Zoom. Fran will present in person.

### About LAS

The Longmont Astronomical Society Newsletter ISSN 2641-8886 (web) and ISSN 2641-8908 (print) is published monthly by the Longmont Astronomical Society, P. O. Box 806, Longmont, Colorado. Newsletter Editor is Vern Raben. Our website URL is <https://www.longmontastro.org> and the webmaster is Sarah Davis. The Longmont Astronomical Society is a 501 c(3), non-profit corporation which was established in 1987.



The Longmont Astronomical Society is affiliated with the Astronomical League (<https://www.astroleague.org>). The Astronomical League is an umbrella organization of amateur astronomy societies in the United States.



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## LAS 2024 Execs

Vern Raben, President  
 Hunter Morrison, Vice President  
 Eileen Hall-McKim, Secretary  
 Bruce Lamoreaux, Treasurer

## LAS 2024 Board Members

David Elmore, Gary Garzone,  
 Mike Hotka, Brian Kimball, and Tally O'Donnell

## Appointed Positions 2024

Sarah Detty, Webmaster  
 Bruce Lamoreaux, Library Telescope Coordinator  
 Bill Tschumy, Public Outreach Coordinator

Vern Raben, Newsletter Editor  
 Eileen Hall-McKim, Newsletter Archives

## Planets in May

### Mercury

Not visible this month.

### Venus

Not visible this month.

### Mars

Mars is quite low in the east before sunrise. It is magnitude +1.1 magnitude in brightness; the disk increases from 4.7 arc sec across to 5.0 this month. Closest approach to earth is less than a year from now on Jan. 12, 2025 at 6:38 am MST when it will be 14.6 arc sec across. Opposition is Jan 15 at 7:32 pm.

### Jupiter

Not visible this month.

### Saturn

Saturn is visible in the morning sky in the SE. It is about magnitude +1.2 in brightness and the disk is 17 arc sec across.

### Uranus

Not visible this month.

### Neptune

Neptune is visible in the ESE in constellation Pisces before sunrise. It is magnitude 7.9 magnitude in brightness and the disk is 2.2 arc sec across.

## Lunar Phases in May

- New Moon: May 7 at 9:23 pm
- First quarter: May 15 at 5:49 am
- Full Moon: May 23 at 7:54 am
- Third quarter: May 30 at 6:39 am

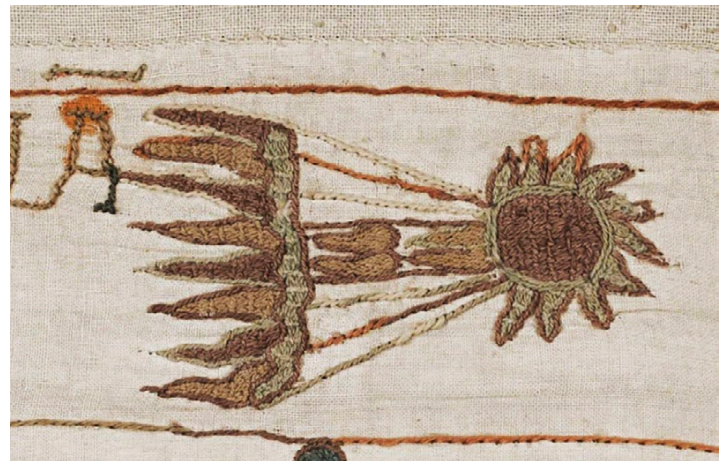
## Showpiece Objects in May

Some early evening objects for mid May:

- M 5 globular cluster in Serpens, mag 5.7
- M 3 globular cluster in Canes Venatici, mag 7.7
- M 81 “Bodes” spiral galaxy in Ursa Major, mag. 7.8
- M 101 “Pinwheel” spiral galaxy in Ursa Major, mag 8.4
- M 51 “Whirlpool” spiral galaxy in Ursa Major, mag 8.7
- M 82 “Cigar” irregular galaxy in Ursa Major, mag 9.0
- NGC 5053 globular cluster in Coma Berenices, mag 9.0
- M 106 spiral galaxy in Canes Venatici, mag 9.1
- M 104 “Sombrero” galaxy in Virgo, mag 9.1
- M 63 Sunflower galaxy in Canes Venatici, mag 9.2
- M 64 Black Eye galaxy in Coma Berenices, mag 9.3

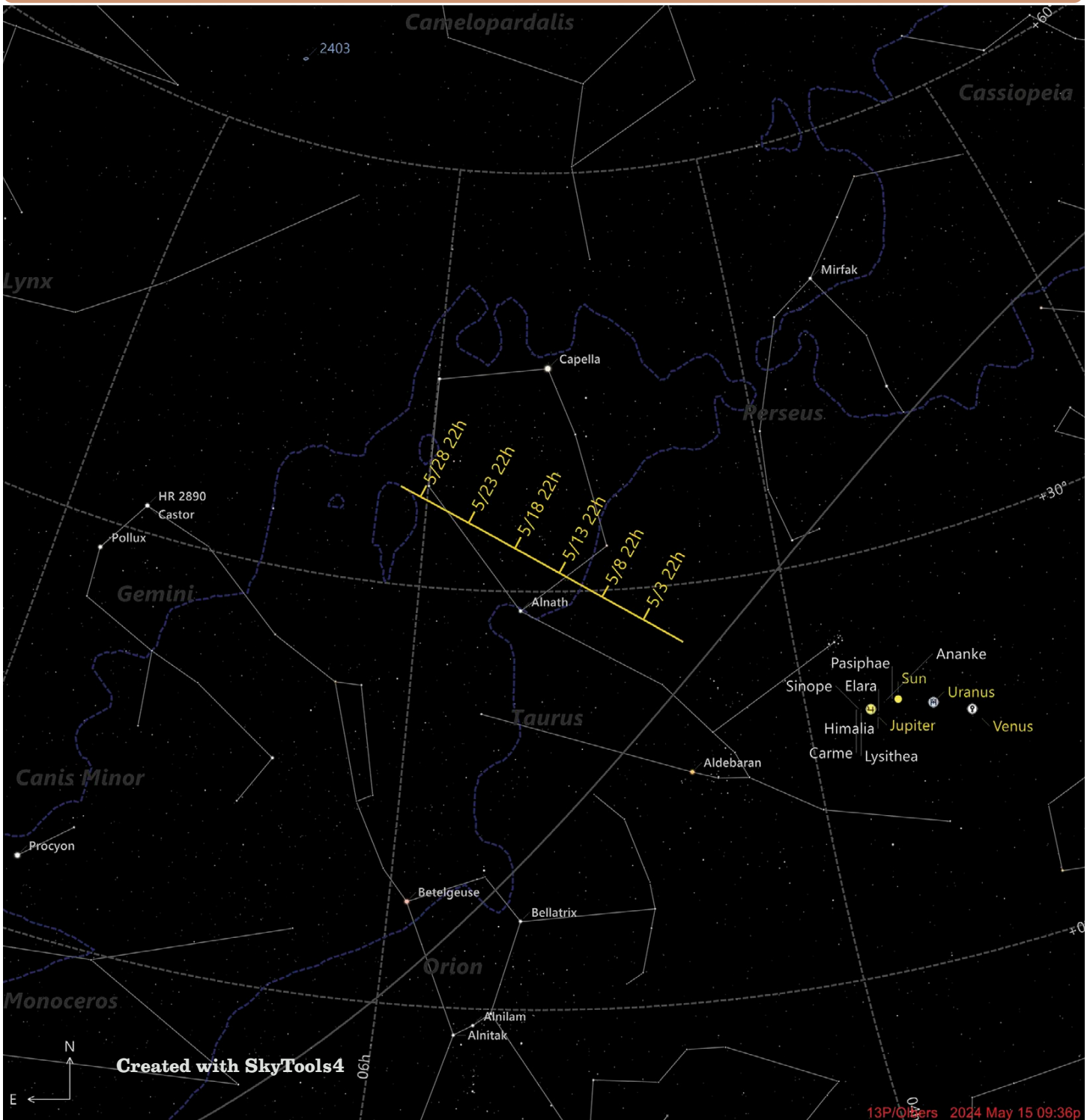
## Meteor Showers in May

Eta-Aquarids peak on May 5. Circumstances are good as the moon is only a couple days from being new. Typically about 10-30 per hour may be seen. Possibility they may be much stronger this year due to interactions with its particles with planet Jupiter. Eta Aquarids are caused by debris from Halley’s comet, 1P/Halley. Halley’s comet is depicted in scene 32 of the Bayeux Tapestry completed in 1077.



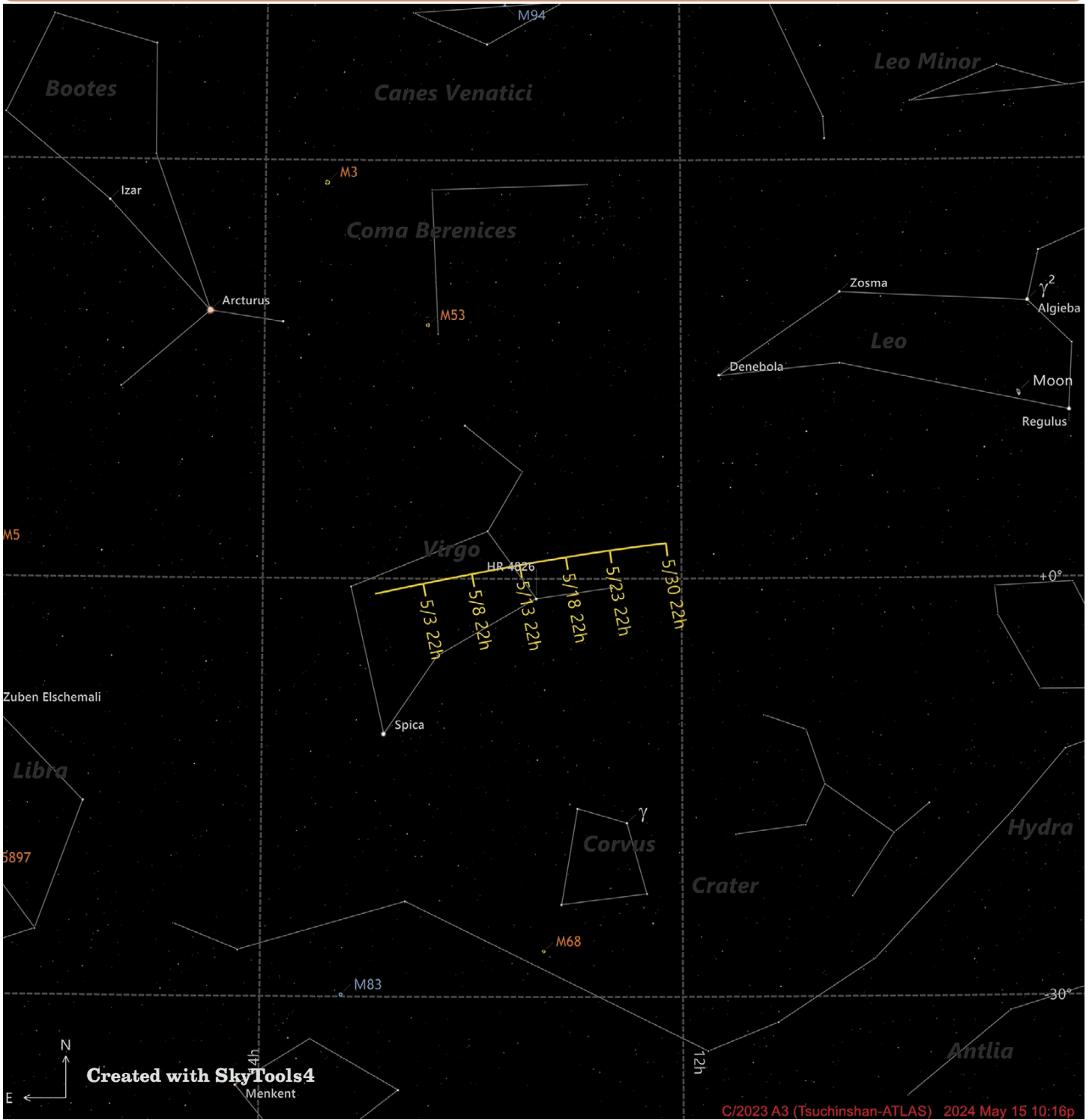
- NGC 4631 “Whale” galaxy in Canes Venatici, mag 9.5
- M 97 “Owl” nebula in Ursa Major, mag. 9.7
- NGC 4490, Cocoon galaxy in Canes Venatici, mag. 9.8
- M 86 “Makarian’s chain of galaxies” in Virgo, mag 9.8
- NGC 2683 spiral galaxy in Lynx, mag 10
- NGC 3115, “Spindle” galaxy in Sextans, mag 10.0
- NGC 4565, Needle galaxy in Coma Berenices, mag 10.1
- M 96 spiral galaxy in Leo, mag 10.1
- M 88 spiral galaxy in Coma Berenices, mag 10.2
- NGC 4244 “Silver Needle” galaxy in Canes Venatici, mag 10.4

# Comet 13P/Olbers in May



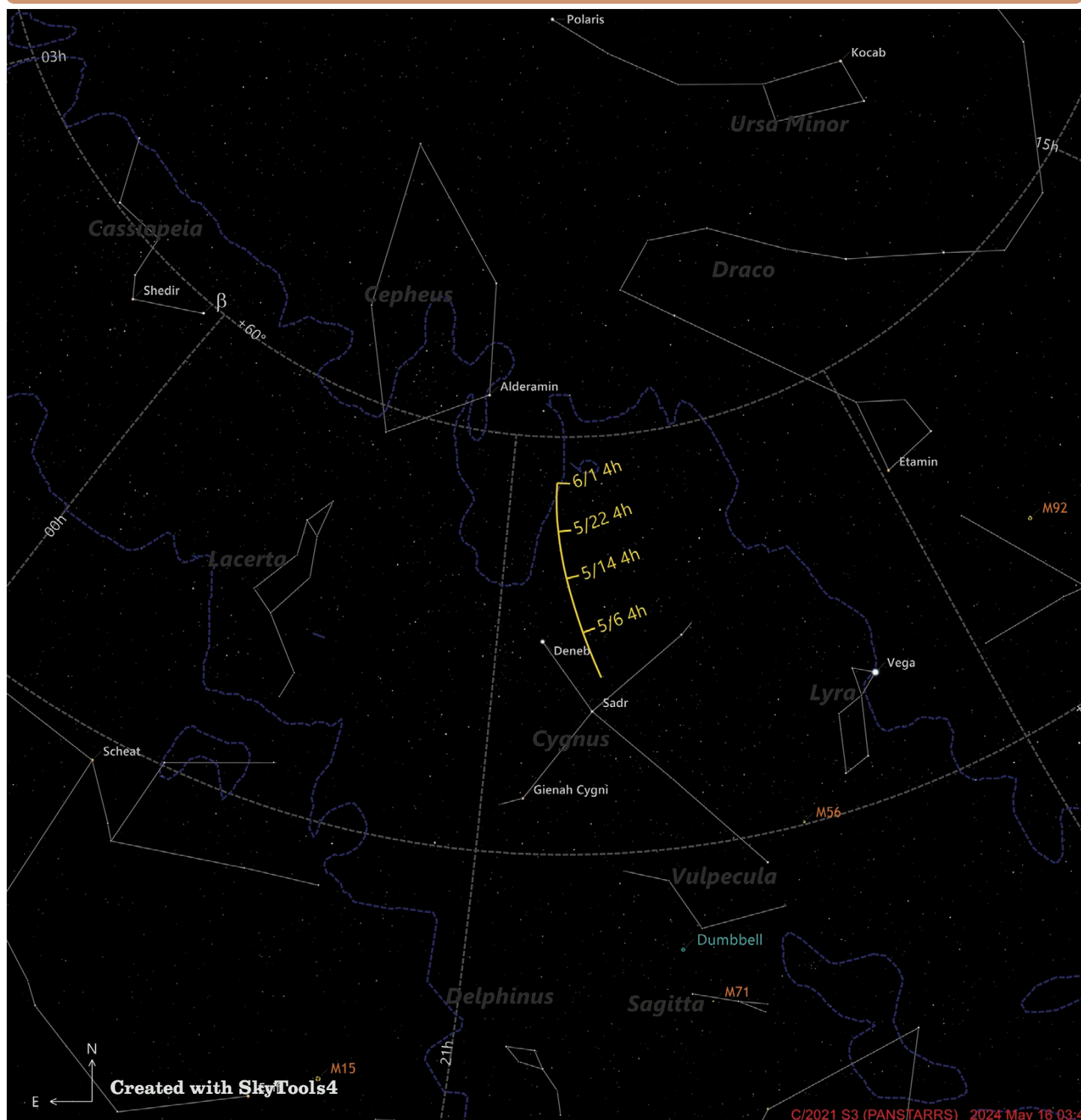
Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
May 1	9:22 pm	04h43m01.3s	+27°00'13"	Taurus	8.4	2.5
May 8	9:29 pm	05h00m56.5s	+29°33'59"	Auriga	7.8	2.5
May 13	9:33 pm	05h14m57.1s	+31°21'49"	Auriga	7.4	2.5
May 19	9:39 pm	05h33m14.3s	+33°27'39"	Auriga	7.0	2.6
May 25	9:46 pm	05h53m18.1s	+35°27'43"	Auriga	6.6	2.6
May 31	9:51 pm	06h15m18.7s	+37°19'25"	Auriga	6.2	2.6

# C/2023 A3 (Tsuchinshan-ATLAS) in May



Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
May 1	11:39 pm	13h20m39.5s	-00°47'14"	Virgo	10.2	1.5
May 8	10:52 pm	13h01m17.3s	+00°11'44"	Virgo	10.0	1.6
May 13	10:22 pm	12h47m38.1s	+00°50'01"	Virgo	9.9	1.6
May 19	10:04 pm	12h31m50.6s	+01°30'11"	Virgo	9.7	1.6
May 25	10:11 pm	12h17m02.4s	+02°02'58"	Virgo	9.6	1.6
May 31	10:13 pm	12h03m32.1s	+02°27'38"	Virgo	9.5	1.5

# Comet C/2021 S3 (PanSTARRS) in May

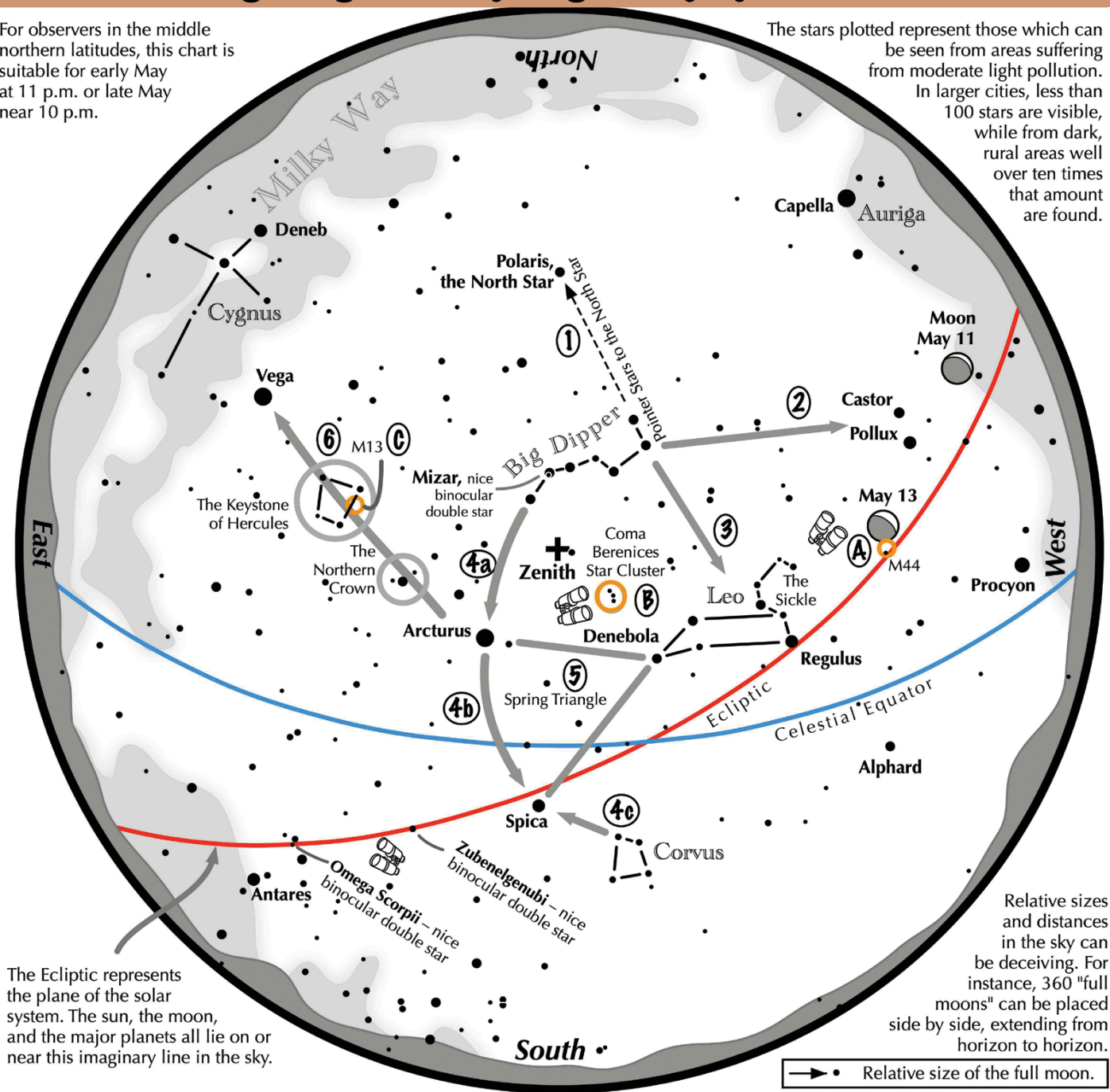


Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
May 1	4:10 am	20h21m28.2s	+43°52'02"	Cygnus	11.0	1.8
May 8	4:00 am	20h28m31.4s	+47°32'32"	Cygnus	11.1	1.7
May 13	3:51 am	20h32m21.3s	+49°54'38"	Cygnus	11.2	1.7
May 19	3:53 am	20h35m33.3s	+52°29'02"	Cygnus	11.4	1.6
May 25	3:34 am	20h37m09.1s	+54°45'55"	Cygnus	11.5	1.6
May 31	3:22 am	20h37m05.1s	+56°46'12"	Cygnus	11.6	1.5

# Navigating the May Night Sky by John Goss

For observers in the middle northern latitudes, this chart is suitable for early May at 11 p.m. or late May near 10 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 May night sky: Simply start with what you know or with what you can easily find.

- 1 Extend a line northward from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
- 3 Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
- 4 Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.  
Confirm Spica by noting that two moderately bright stars just to its southwest form a straight line with it.
- 5 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 6 Draw a line from Arcturus to Vega. One-third of the way sits "The Northern Crown." Two-thirds of the way hides the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.

### Binocular Highlights

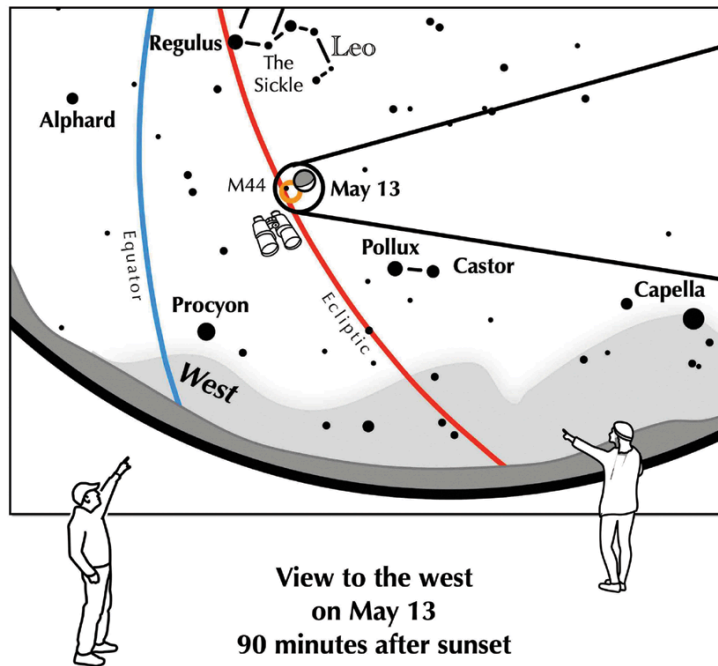
**A:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **B:** Look near the zenith for the loose star cluster of Coma Berenices. **C:** M13, a round glow from a cluster of over 500,000 stars.



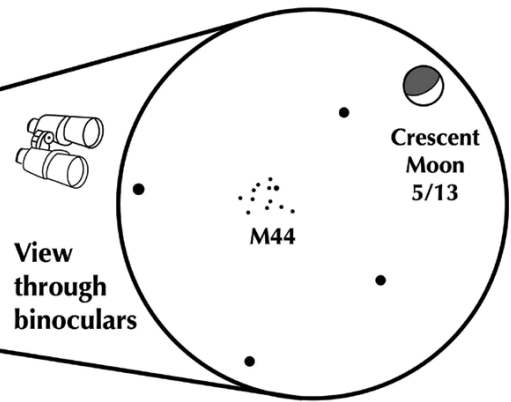
Astronomical League [www.astroleague.org/outreach](http://www.astroleague.org/outreach); duplication is allowed and encouraged for all free distribution.



## In the early evening on May 13, try this challenge:



**View to the west  
on May 13  
90 minutes after sunset**



### Crescent moon meets the Beehive

On the evening of May 13, the crescent moon floats right of M44, the Beehive star cluster. Look in the west 90 minutes after sunset.

Be sure to use binoculars to spot the many stellar bees of M44. The cluster has over 1000 stars, but only two dozen will be picked out with binoculars.



Even though they lie near each other in binoculars, they are nowhere near each other in three-dimensional space. M44 is 150 million times farther than the moon!

It has taken the light from M44's stars over 600 years to reach your eyes!



# Binoculars and Double Stars

*A rewarding and challenging activity*

<https://www.astroleague.org/binocular-double-star-observing-program/>



## Effective Binocular Observing ...

- Binoculars must be precisely focused.
- Binoculars must be held steady. Mounted on a tripod is best.
- Adequate dark adaption is needed. Wait at least 15 minutes in the dark before meaningful observing begins. 30 minutes is better.
- Glare from a bright primary interferes with spotting a dim secondary. The greater the magnitude difference, the greater the difficulty splitting them.
- Steady atmospheric seeing is desired.
- Best observed when the double star has an altitude higher than 30°.

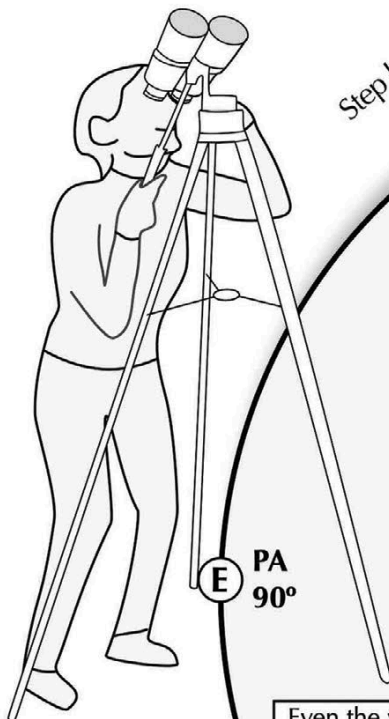
## In Your Observing Notes:

- ☆☆ Brightnesses of the components.
- ☆☆ Separation of the components.
- ☆☆ Position Angle (PA).
- ☆☆ Colors of the components.
- ☆☆ Neighboring stars in the field?
- ☆☆ Seeing conditions.
- ☆☆ Atmospheric transparency.
- ☆☆ Altitude.

## Rule of Thumb ...

### Minimum true separation with 10 x 50 binoculars:

- ✧ 24 arc seconds for two stars of 4th magnitude. This equals 4 minutes apparent separation.
- ✧ For comparison, the full moon has a true diameter of 1800 arc seconds (=30 minutes).
- ✧ **True separation** is the angular space between stars as it appears to the unaided eye. **Apparent separation** is how it appears in binoculars.



Step back 1.5 m (4.75 ft) from this 150 mm (6 inch) printed field, and the 6° field will match 6° in the sky.



## 6° true angular field – typical for binoculars

### Example Doubles

Stellar Magnitude	Example	Separation (")	PA (°)
2 ●	Alpha Capricorni	381"	290°
3 ●	Delta Cephei	41"	191°
4 ●	Σ1474 Hydrae	66"	27°
5 ●	56 Andromedae	203"	298°
6 ●	Nu Draconis	61"	311°
7 ●			
8 ●	Alpha Ursae Majoris	385"	206°



Relative diameter of the full moon.

### Separation distance

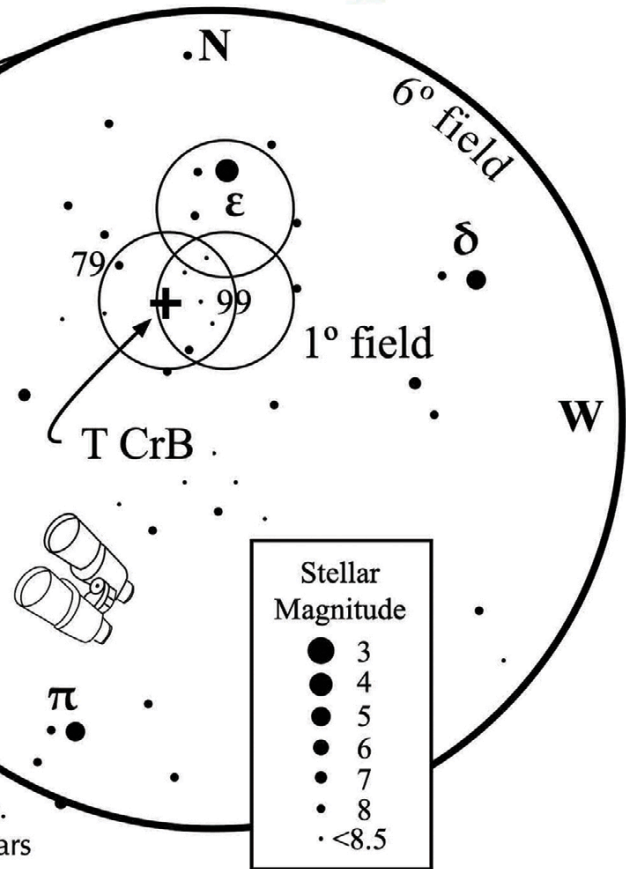
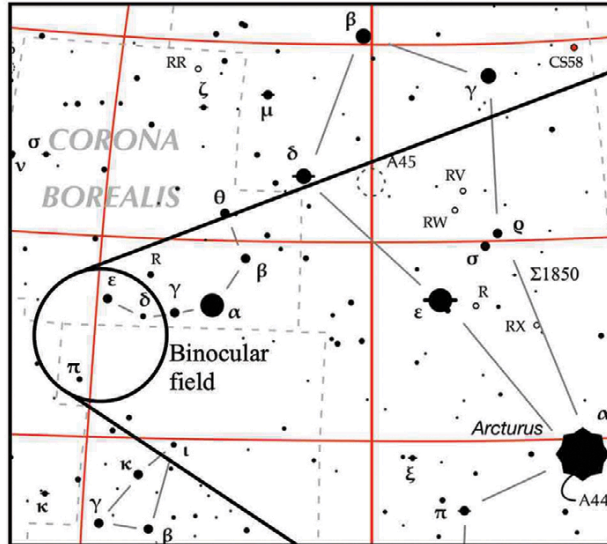
- 600" = 10'
- 300" = 5'
- 120" = 2'
- 60" = 1'
- 40" = 0.67'

Even the wider doubles appear close to each other. Two stars that have a tight separation, or a large magnitude difference, or a combination of the two are much more difficult to split, sometimes frustratingly so, but an enjoyable challenge nonetheless.

# T Coronae Borealis

*A nova waiting to happen – soon!*

also known as HIP 78322 and the "Blaze Star"



## How to find T Coronae Borealis

- A. Locate bright Arcturus and the kite shaped constellation Boötes.
- B. Corona Borealis lies directly east of Boötes.
- C. Trace the semi-circle of the stars of the crown.
- D. Epsilon and Delta are fourth magnitude stars shining east of Alpha (Gemma), the brightest member of the crown.
- E. Place Epsilon in the northern half of the binocular (or finder) field. Fifth magnitude Pi Serpentis lies near the bottom of the field.
- F. T Coronae Borealis is about 1/4 the distance between Epsilon and Pi.
- G. Move two low power eyepiece fields south of Epsilon.
- H. Then move 1/2 low power eyepiece field east.
- I. This is the vicinity of 10th magnitude T CrB.

- The star normally is magnitude 10.3.
- Ten years before its outburst, it rises to magnitude 9.8. It did this 10 years ago.
- It then dims to about magnitude 12 one year before outburst. It did this in April 2023.

**Between now and September, T CrB is predicted to nova, quickly reaching 2nd magnitude and rivaling the brightness of Alpha CrB (Gemma).**

- Its brightness rise will take one day or less.
- It will likely remain near maximum brightness (2nd mag.) for only a few days.



# April 18 LAS Meeting Notes by Eileen Hall-McKim

## I. Introduction

The April 2024 LAS monthly meeting was held in-person and by zoom on April 18th at the Longmont Lutheran Church, 803 Third Ave. President Vern Raben began the meeting by introducing the officers and board members and self-introductions of members attending. Fourteen members attended in-person, 8 attended on-line by zoom.

The agenda for the April meeting begins with presentations by members in an “Open Forum” followed by a business meeting, reports on recent star parties and announcements of upcoming events.

## II. Presentations: Open Forum

First in our evening of presentations we have M.J. Post and Clarke Yeager with a talk and demonstration of a hand-made solar alignment device they have both assembled different versions of. When we go to a star party it can be hard to polar align with Polaris if it isn't quite dark enough when you need to set up. Clarke Yeager came up with this scheme at 'Star geezers' coffee session, Mondays at Bona Coffee, and they have been working on 'models' of this.

- M.J.'s version is a board with two irises on either end. M.J. explains “Basically what you do is get your tripod perfectly level, more or less to the north, make sure your coordinates are correct on your go-to program and the time is correct, and then you put one of these ‘contraptions’ on it while the sun is up and let the sun shine through an opening and hit a target behind. Then you align your azimuth and elevation on the scope, so that its perfectly aligned, and of course your go-to scope is tracking sidereally at the time. It is like a pinhole camera, it is real easy to set up.”



Tally then tries to simulate the sun using a flashlight. Image 6:00



- Clarke has a similar setup with a tube. He has a 3D printer, so he printed a very tiny hole on one end of the tube, and a cross-hair on other end, so can line up the sun directly on that cross-hair. “Again, making sure your mount is level, and have right time and coordinates, if all that is perfect and you tell it to go the sun, the mount thinks it went to the sun. Mechanically, it may not be there, but from the program, it thinks it's at the sun, so now all you have to do is mechanical adjustments on your mount and bring that spot into the cross-hairs.”
- “Also I use CD with hole cut in it to fit over the tube, initially you may not be pointed real close to the sun, so now you can see the shadow and mechanically adjust until shadow disappears, at that point it's going to be either on or somewhere close in viewfinder. Works real well. Ended up running an experiment with AVX MOUNT, its relatively small, easy to handle, so we took it to Texas for Total Solar Eclipse; set it up with sun on cross-hairs and let it run. After 4½ hours, you can see how close it was on the cross-hairs, so was tracking pretty well for 4½ hours”.

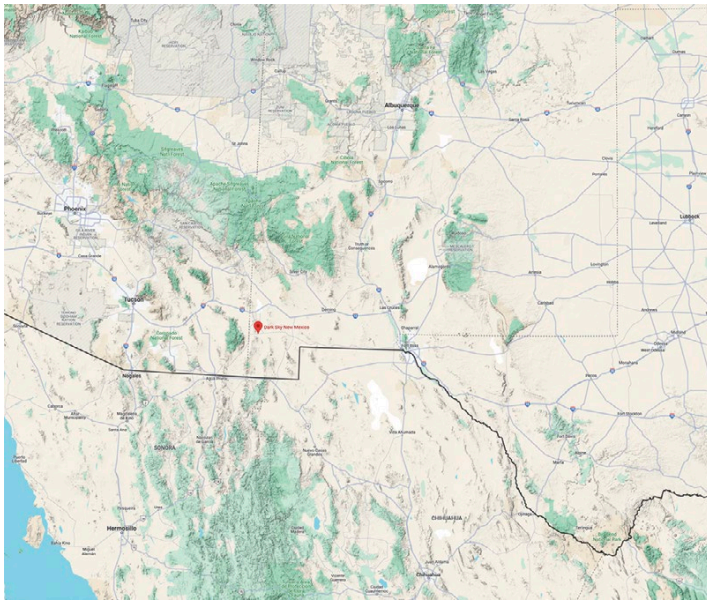
Ready to go to that star party now if you get there before sunset...nice solar polar alignment!



**M.J. Post presents: Dark Sky New Mexico Observatory Telescopes (DSNM)**

Tally O'Donnell, David Elmore and MJ Post have telescopes in New Mexico at DSNM (Map of area) Red dot is DSNM.

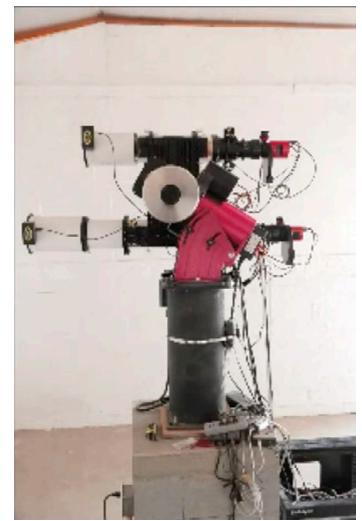
Being so close to the U.S.-Mexico Border, there is of course a lot of border control activity down there. To the east (where the pointer arrow is on the map), is Fredericksburg, Texas, where Tally and MJ traveled to for the solar eclipse event.



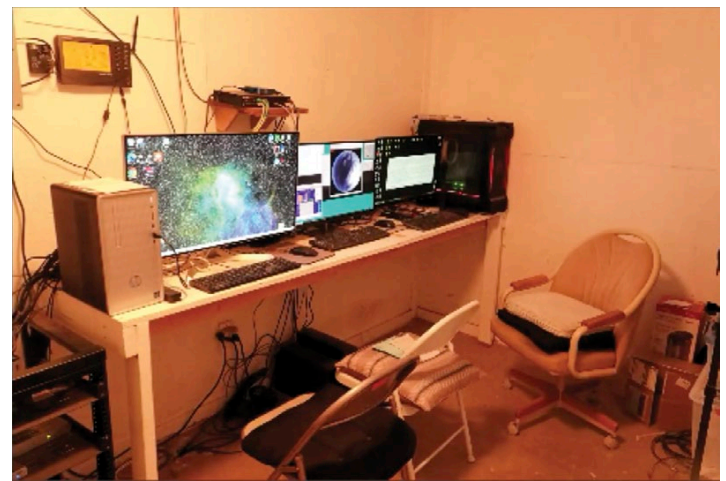
Aerial view of compound of 15 buildings with roll-off roofs. The little mountain to center left is called Rattlesnake Mountain and it is where they do rock hounding during day when they are there observing at night. It has very dark conditions.



M.J.'s setup:  
New astrophysics mount, with CDK 14 scope on top and 11" Celestron scope on bottom



Tally's set up:  
Both in same building, roof rolls off for both of us at the same time



The Warm Room where we have remote control of all three computers; the two acquisition computers and the building computer



David's setup

For about 1½ years we have been noticing strange red flashes in the sky on some nights. We only noticed this when reviewing the previous nights work on the All-Sky Camera - 180 degree fish-eye camera – we record videos all night long, saw red flashes, in slightly different places, frames are 1 minute apart; we have seen 6-7 of these.



- Military training facility in the directions where flashes appear - always to the Southeast
- Couldn't triangulate, other people had seen in same direction, we couldn't figure it out

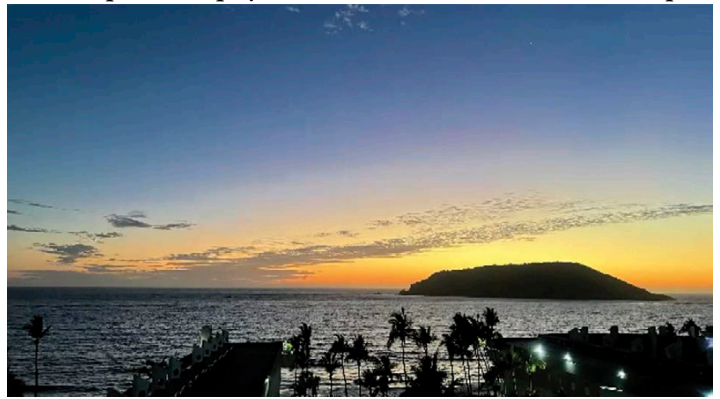
Recently, David Elmore was reading spaceweather.com and saw article from someone at McDonald Observatory who had reported seeing red blobs. Turns out, it is the de-orbit burn for launches from Cape Canaveral of the SpaceX Falcon 9 Starlink Satellite System. So, 95 minutes after a launch, the second stage comes around, and they do a de-orbit burn, so it will burn up over the Atlantic, and that is what we are seeing here

Cannot triangulate with McDonald Observatory as our line of sight goes directly over them. It's way out in the Gulf of Mexico someplace, probably before the second stage reaches the Florida Peninsula, they do this de-orbit burn.

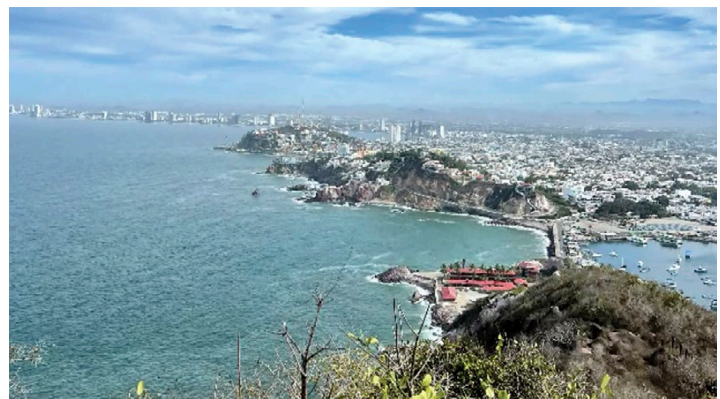
### **David Elmore presents: Eclipse in Mazatlan**

Years ago David determined where he wanted to go to see the 2024 Total Solar Eclipse and it was from Mazatlan, Mexico. After deciding and talking with his travel agent he

was presented with an eclipse tour including Fred Espenak, Mr. Eclipse, astrophysicist well-known for work on eclipse



predictions, as their resident expert, so he jumped on the opportunity and thus stayed with this location. This image from David's hotel room.



Red roofed building in foreground, Marine Science Institute in Mazatlan, who offered to host visiting astronomers on their campus. David was one of 6 groups of scientists at the Institute, and stayed at hotel up far left hand side of the beach and they ubered back and forth to the institute.



David and his son, Chris with his scope set-up. They set up a telescope that was one of the 36 identical systems

from the (CATE) Continental America Telescopic Eclipse experiment 2024 (Citizen CATE 2024)

Thirty-five of those telescopes were set up between Texas and Maine, spaced such to overlap for continuous coverage over the U.S. so we could miss one and still have continuous coverage over the continental U.S. and then could get a snapshot in advance from this system in Mazatlan .



Skies look great all week preceding; on eclipse day there was lots of cirrus. During totality we could see Venus (right) and Jupiter (left).

Even though there were cirrus, it was not very bright since it was not being illuminated by the solar disk. It was possible to see the solar corona through the cirrus.

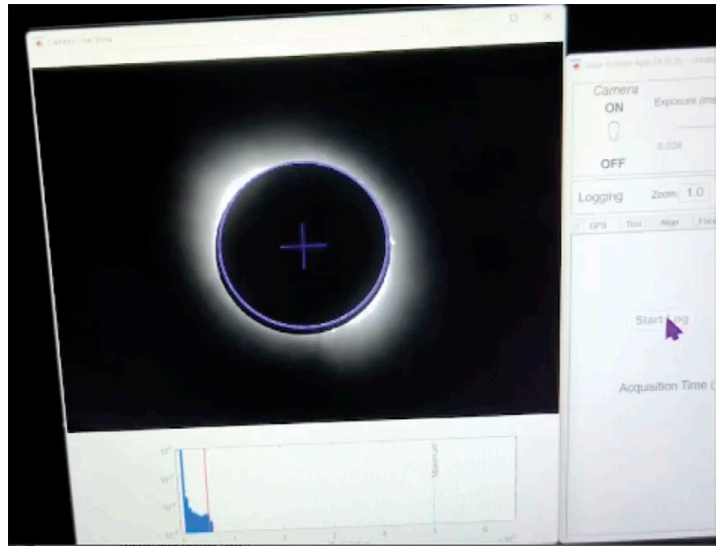
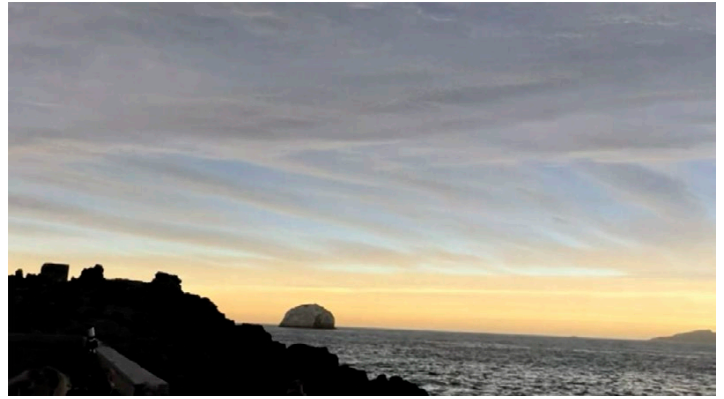
- Animation of entirety of the eclipse taken through the telescope. The telescope recorded High Dynamic Range images; it took 8 exposures in a row with exposure times varying from 130 microseconds to 400 milliseconds - a factor of 3000/1 - that created 1 High Dynamic Range images. Over the course of the eclipse the system recorded 150 of those = 1,200 total exposures = 150 HDR animated.



When totality occurred it was fun to look around, the horizon looked like sunset all around us

From a computer we could see it recording High Dynamic Range sequences, we did not need to watch, it was

automated so we could look around and enjoy the eclipse ourselves.



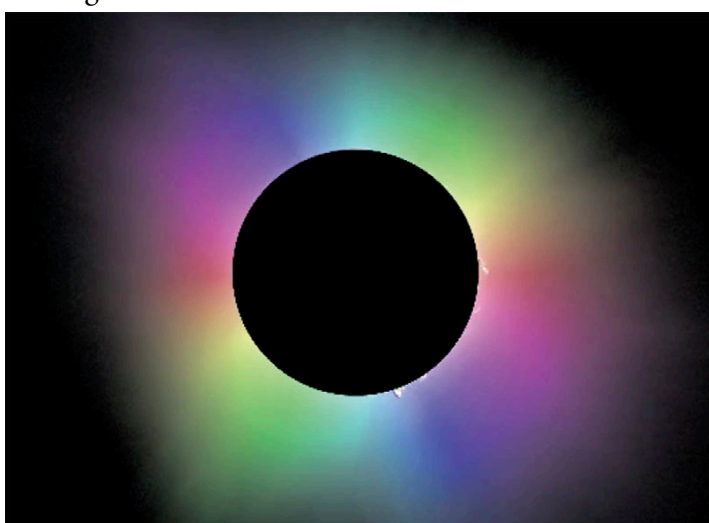
Scientifically for the CATE experiment was it worth going? Yes!!



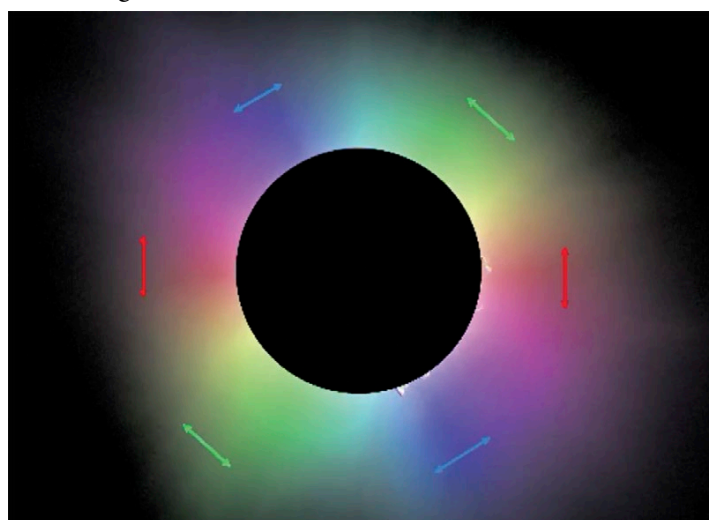
This is 150 High Dynamic Range (HDR) images registered and averaged and then edge enhanced. In fact we were able to see many things we were hoping too, even though looking through cirrus clouds. We were able to see definition in the details in the corona that is going to be very scientifically useful.

- We see coronal streamlines, arcs, areas where streamers come together, we want to look especially at those, to see if we can see changes over the course of more than an hour of animation that we'll end up with
- There are small features, one left of the sun looks like we may be able to track it as it accelerates outward in the solar wind
- There are wavelike features we want to look at in the animation

Another thing about the project was that it had a special camera on the back of the telescope that was sensitive to polarized light. We wanted to be able to detect polarization of the light from the corona which can be used to separate light that is scattered off electrons vs light that is coming from ions and dust.



This particular image encodes the angle of linear polarization of the electron corona in color. Those colors show that the light from the corona was linearly polarized tangent to the limb of the sun, as we expected, and that indicates that indeed we were detecting the polarization that we wanted to later extract the electron signal from the corona from the ion signal.



Despite clouds along the path of the total eclipse across the U.S., 31 of the 36 CATE sites collected scientifically useful data. Besides the 90 seconds of excitement during totality it proved to be scientifically valuable, and there were drinks in the hotel as well!

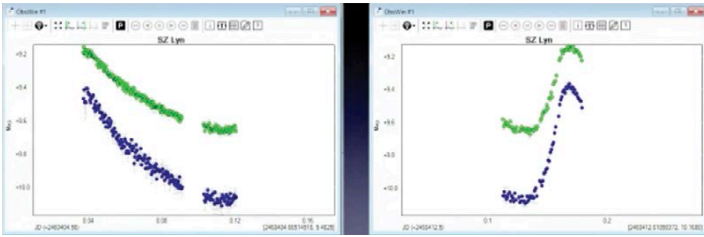
**Bill Tschumy presents:  
Variable Star – SZ Lyncis:  
A short period variable**



Bill has been doing variable star analysis lately on a short-period variable star SZ Lyncis in the constellation Lynx

- What the sky looks like (mid April) at about 8:30pm or so, SZ Lyncis upper chart, to left of meridian
- High Amplitude Delta Scuti type variable star– good range of magnitudes as it goes through its cycle, Delta Scuti prototype type of star they name it after
- Also known as a Dwarf Cepheid- kind of related but not exactly to Cepheid Variables; in same class as a Cepheids
- A pulsating variable with a magnitude range of 9.08-9.72 V- considered high range for this type of star
- Short period between peaks 0.12053492 days (2.89) hours will go through whole cycle, so is easy to record and monitor the whole cycle in short period
- Period is not constant, varies slightly, due to it being part of a binary star system; it is the companion star that causes this star to wobble, and the wobbling changes the distance to us and shifts the period a little bit
- Orbital period of 1181.1 days

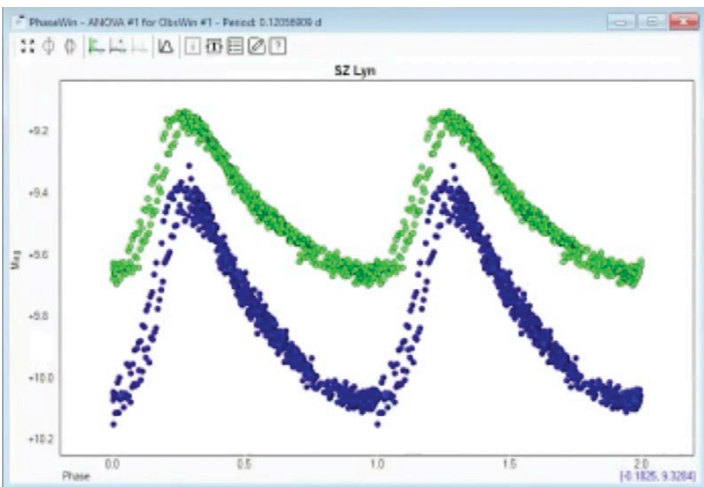




What I get on a given night

- My data - 100mm refractor in Driveway
- Recording both in: Green band- V band Blue band- B band
- So far have done 6 or 7 nights of capturing brightness of this
- Each dot is an exposure with analysis of what the magnitude is
- V Magnitude varies from 9.13 – 9.7
- After you have gathered a bunch of these, you can put into a program and it will calculate the period and try to align all the different segments together will figure out how it best aligns

Here is what you get: A phase plot



- Period in blue wavelength seems to be a little bit shifted relative to the green
- Don't know if that is normal, still researching, haven't seen in others analyzed
- Dimmer in blue than green
- At first thought there was two different chains at least in ascending branches, maybe periods of variability, but now I think I don't have enough data, likely will fill in and be thicker with more data on the ascending branch to fill that in, suspect it will look more like the descending branch
- 1212 observations
- Measured period of 0.12056909 – Published period of 0.12053492- (3 seconds different)
- So feel pretty good having such close observation results

as the published period!

### Aperture Photometry

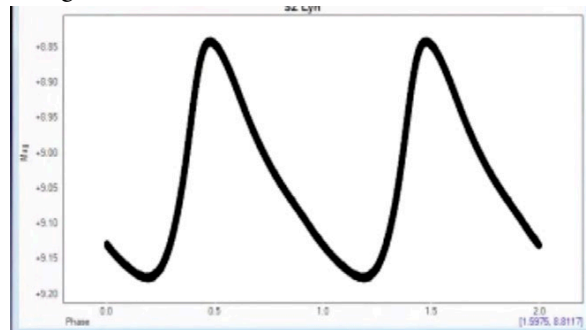
- Take variable star, put circle around variable star, software will capture total flux
- Have comparison stars, not variable, know the magnitude exactly, put aperture around these stars, ask what total flux, that will give you relative brightness, can calculate exactly what the real brightness is of the variable star
- All a matter of measuring the flux in a given region

What program to use to do the analysis

- Tycho tracker, AAVSO has online software you can use but this is easier to use
- Tycho tracker is actually designed to discover asteroids and measure their magnitude but also have feature to do variable star analysis
- Not expensive software about \$40 works well

As a comparison – downloaded data from TESS (Transiting Exoplanet Survey Satellite)

- Light curve from TESS (16,626 observations)



- Period of 0.12054002 days (published 0.12053492 days)
- Line looks smooth but zoomed segment shows quite a bit of variability Image 38:13
- Can generate an ephemeris on it. I do this so I know exactly where it is going to be on any given night or time, have only couple hours at night to work, have a scope that rolls out, monitor the same star on clear night, just having fun, works fine for what I am doing.

Question and discussion followed on: How do you do polar alignment? Discussion of use of filters in photometry, Discussion on AAVSO groups about using Smart Scopes for analysis and guidance for submitting the data so it is useful for science if interested in that, Does it matter if star image gets saturated? Is there software that can look at a sequence of images and pick out asteroids, short-term variable stars, things like that automatically for you? Discussion of types of cameras to use.

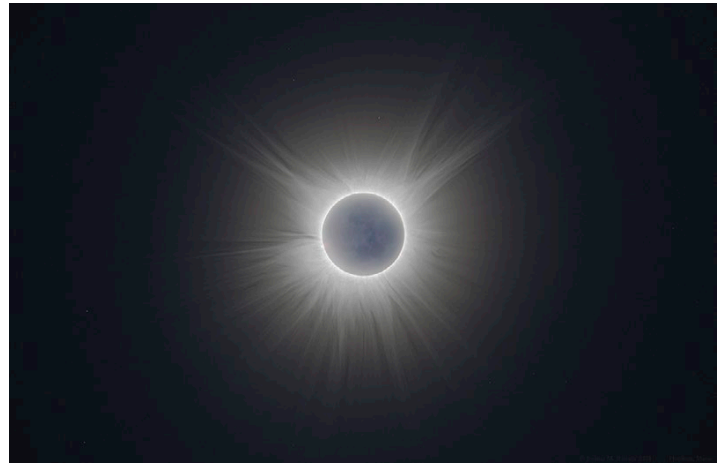
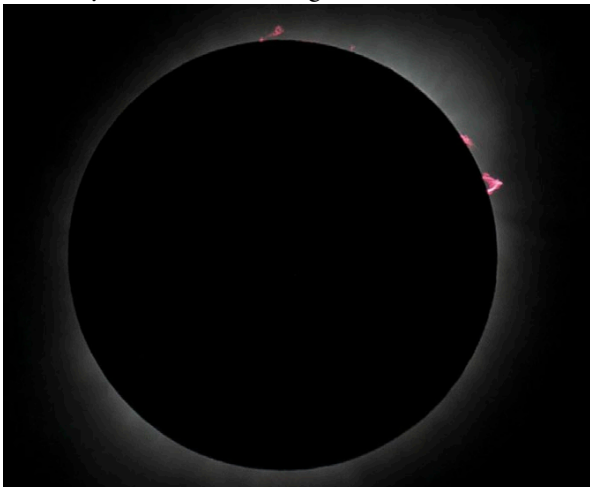
**Clarke Yeager presents:  
Solar Eclipse Trip -  
Dallas-Sulfur Springs, Texas**

Clarke traveled to Texas with Marty, Gary and Carol, first to Marty's brother in Dallas, then to an area a couple hours drive on the centerline, setting up in Sulfur Springs Walmart Parking Lot. Clarke went hoping to get good images of the corona but unfortunately it was cloudy. Even though cloudy, he ended up with a couple very interesting images anyway.



The cloud enhanced 'Diamond Ring'

Fortunately, clouds opened up for just a short period and Clarke got a very nice prominence image. In this image can actually see the arch in the prominence. What causes that is that one end of that arch is on the north pole and other end on the south pole of the solar region and the plasma has a tendency to follow the magnetic fields.



HDR of corona by Josh Balsam

Above corona image shows great detail in the structure of the corona, which is the solar wind. Most images show only show a bright ring around the moon because of the huge contrast from close to the sun and further away from the sun. This image shows the actual structure of the corona. A couple of things to note in the image is 1) the structure of the corona can be seen two to three million miles out from the sun and 2) if you look closely, you can see more than a half a dozen stars.

**Gary Garzone – Solar Eclipse from Sulfur Springs, Texas**



Gary traveled with Clarke and Marty with 8" telescope with white light made with the club years ago and a Canon Rebel 10 camera. They met a varied crowd of people from all over, had a fun trip.

### III. Business Meeting - Treasurer Report by Bruce Lamoreaux



## Longmont Astronomical Society

P.O. Box 806  
Longmont, CO 80502-0806

### LAS Treasurer's Report - Bruce Lamoreaux

4/18/2024

#### Main Checking Account (xxx-1587)

Begin Balance:	\$ 8,680.00	3/5/2024
Deposits:	\$ 150.00	Membership
Expenses:	\$ (70.00)	Bank Charges, Library Telescope Finder and Batteries
<b>Current Balance:</b>	<b>\$ 8,760.00</b>	<b>4/3/2024</b>

#### 2-Year Savings Account (xxx-1478) (matures 10/23/23)

Past Balance:	\$ 8,200.00	12/29/2023
Interest:	\$ 15.00	
<b>Balance:</b>	<b>\$ 8,215.00</b>	<b>3/29/2024</b>

#### Telescope Fund (xxx-0165)

Past Balance:	\$ 1,100.00	2/28/2024
Deposits:	\$ -	
Expenses:	\$ -	
<b>Balance</b>	<b>\$ 1,100.00</b>	<b>3/28/2024</b>

#### Petty Cash

Past Balance:	\$ 50.00
Deposits:	\$ -
Expenses:	\$ -
<b>Balance</b>	<b>\$ 50.00</b>

**Total Assets** **\$ 18,125.00** \$ 75.00 Up from March

<b>Active Membership:</b>	<b>95</b>
<b>Student Membership:</b>	<b>0</b>
<b>Total</b>	<b>95</b>

#### IV. Reports on recent LAS star parties by Eileen Hall-Mckim

##### Louisville Eclipse Viewing – Bill Tschumy, Bruce Lamoreaux, Vern Raben, Vi Raben, and Eileen McKim



Similar to many other Solar Eclipse viewing locations nationwide, we did not quite know what to expect as it was a Monday and the cloud forecasts had been ‘variable’ to say the least for Front Range Colorado and the Louisville Public Library Event. Several counties had a very bad windstorm over the weekend, and power was still out for some of Louisville/Boulder area, so many schools and some businesses were still closed on Monday. Bill, Bruce, and Vern brought scopes and a Boulder Parks and Recreation Ranger also brought his.

Turns out the day was sunny, warm and beautiful blue sky with only occasional minor passing clouds for the entire time we gathered 11:30 am - 2:00 pm with maximum partial totality reached at 12:40 pm. There were many families with kids and a large van brought residents from Balfour Senior Living, that was great to see!



Bruce had a nice interactive type set-up with his 8” dobsonian, a good size pin-hole projector, and a SeeStar smart scope linked to an iPad, tracking the eclipse for viewers in real time.



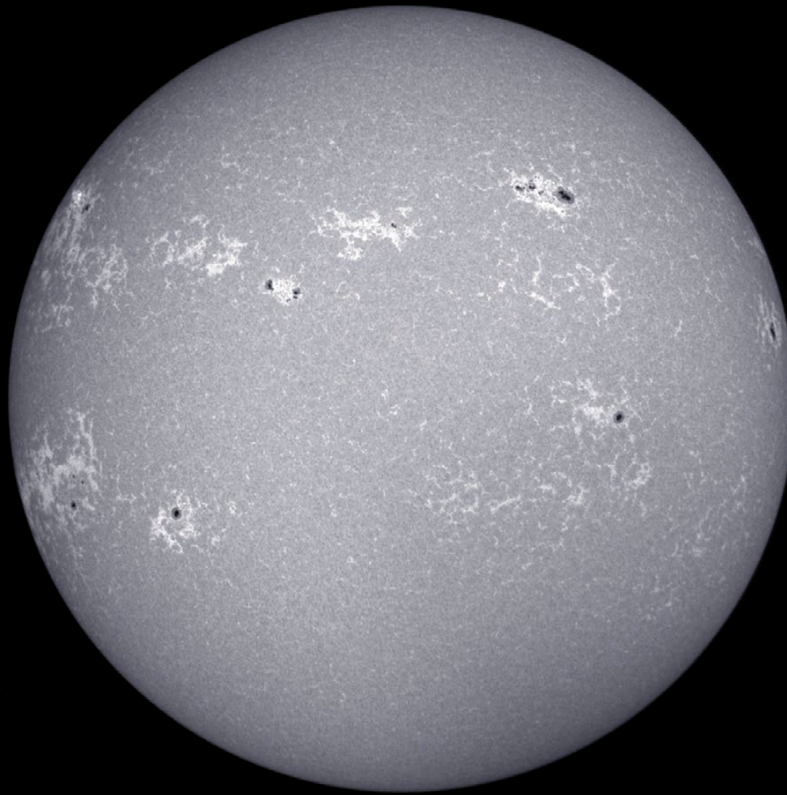
Vern and Bill had scopes of different types so it worked great for the various ages of people there to view the eclipse. We had a very large crowd with estimates of 250-300 people throughout the day on the library plaza, but it worked out well and we all had a great time!



Rabbit Mountain April 12 was a surprising success! After being perfectly clear all day, it started clouding up about 5:30 pm, as was forecast, worried we would be clouded out, but there were always large open clear sky areas so we were able to find something to see all evening. Weather was beautiful, warm, calm night. We had 7-8 scopes and a good crowd of about 30, everyone really enjoyed it.

#### V. Upcoming Events

- May 3<sup>rd</sup> Rabbit Mountain – Our next Star Party is Friday, May 3<sup>rd</sup> with public telescope viewing beginning around 8:30pm at Rabbit Mountain. Anyone who hasn't come out and is interested in coming out, come on out, its great fun! Arrive anytime around sunset or earlier if setting up a telescope. Someone at entrance will direct LAS members to where telescopes are set up. Parking at times can be somewhat limited.
- Next LAS Monthly Meeting is Thursday, May 16 at 7:00 pm at First Evangelical Lutheran Church, 803 Third Ave., Longmont, CO 80501



**Sun in Calcium K on April 15 by Brian Kimball**



**Sun in White Light on April 14 by Brian Kimball**



Partial Eclipse by John Warren



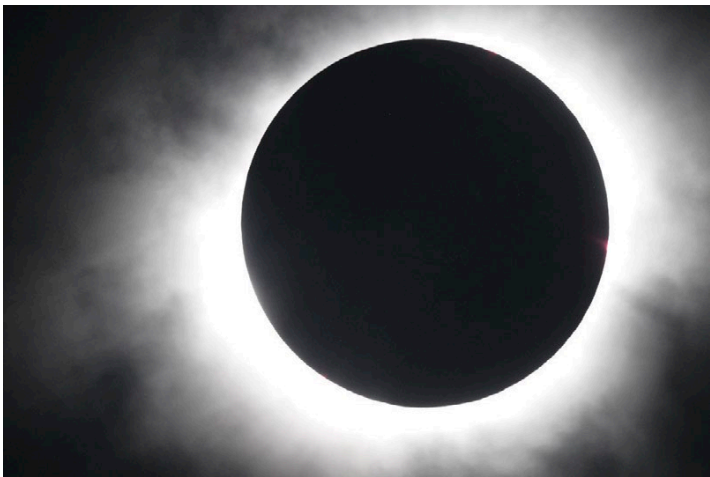
12P/Pons-Brooks on April 2 by Paul Robinson



**Comet 12P by Gary Garzone on April 3**



**Eclipse Images by Gary Garzone on April 8**





**Diamond Ring by Jim Pollock**



**Corona by Jim Pollock**





**Solar Prominences by Jim Pollock**



**Comet 12P/Pons-Brooks on April 4 by Paul Robinson**



**Sextans A, Dwarf Square Galaxy by MJ Post**



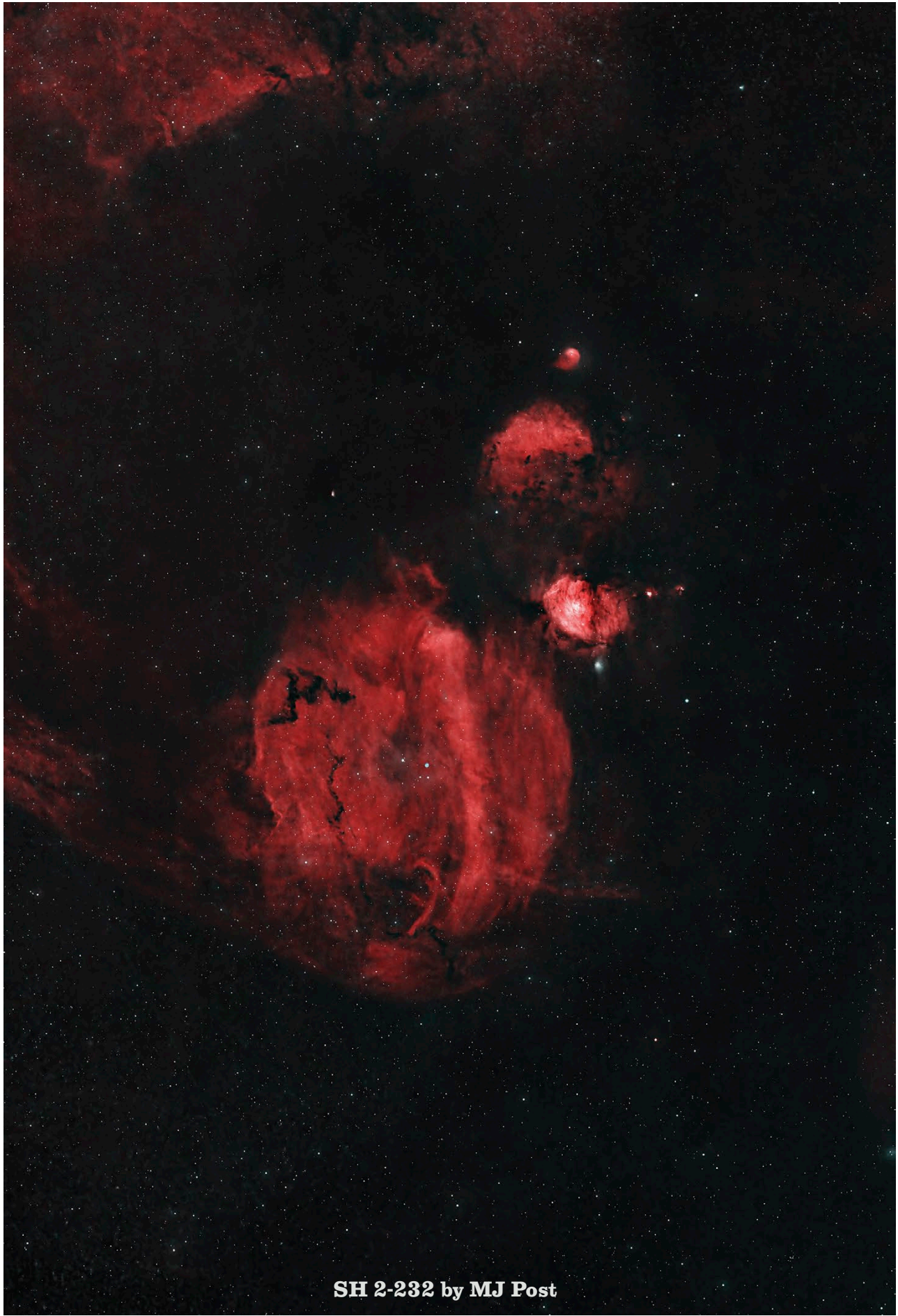
**Arp 224 by MJ Post**



**NGC 2859 by MJ Post**



**PN1 in HOO by MJ Post**



**SH 2-232 by MJ Post**

# Newsletter Archives by Eileen Hall-McKim

## 30 Years Ago May 1994

### A Different Kind of Solar Eclipse Observation by Kevin Brose

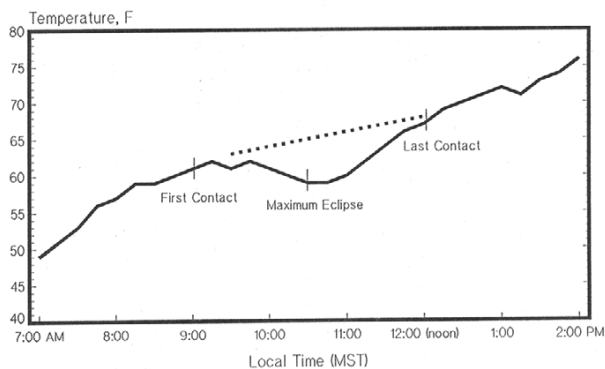
Tuesday, May 10, 1994 dawned bright and sunny – perfect weather for a solar eclipse. An eclipse that was widely touted by the media as the last great solar eclipse of this century for the U.S. Since I, like nearly everyone else, had to work that morning, I was planning to observe the eclipse in some way. Since I had no means of direct optical observation, I opted for the old pinhole projection method.

As I set out, I came across a group of people also heading outside for the same reason, outside I discovered more small groups congregating around the facility. Most were also using pinhole projection and I saw no one looking directly at it, thank goodness. I even found one group taking turns placing a cardboard box (outfitted with welder's glasses) over their heads!

I guess only an eclipse could account for “such odd behavior”. The amount of interest in the eclipse was rather surprising. If there would have been anyone there with a solar telescope, they would have been a very busy person! As the eclipse passed into maximum phase discussion ensued about the coolness of the air. How much does the air temperature deviate during a solar eclipse? At home I have a weather station that measures such parameters and is connected to my PC which is equipped to do data logging at 15 minute intervals, 24 hours a day. With this weather data readily available, I made a graphical plot of the temperatures during the eclipse. There are other parameters related to the intensity of the solar radiation (such as watts per square meter) that would show correlations with the eclipse maximum. It would be interesting to compare that data as well. One thing for certain – when 82% of the sun is obscured you will feel a little cooler!

Solar Eclipse May 1994  
Observed vs Typical Temperature

Point of Observation:  
Longmont, CO  
40d 11' 14" N  
105d 7' 13" W



## 20 Years Ago May 2004

### From the President, Bob Spohn

I'd like to express my appreciation to all of you who helped support our successful Astronomy Day celebration this month. Thank you for your hard work and taking time out of your busy spring schedules; we had another nice-looking display and a wonderful star party!

The public Star Party at Flanders Park was a hit also – I would estimate 30 – 35 non-members attended. It was a great Flanders night with good seeing and clear skies. Comet NEAT was the main attraction, and it was a perfect night for looking at a wide range of objects to show the public.

### Astronomy Day by Gary Garzone

Thanks to those who showed up and helped with LAS display at Mall, it is always appreciated by the few who always seem to show up and do all the work. We had 8 inch scope with solar filter outside for viewing and Mike Hotka brought the JPL display, Bob Spohn brought the Saturn doors and Melinda posted two classes of art work from kindergarten kids. Michelle brought big Meade 12 inch scope for nice display for public. We had lots of people looking and asking questions. Pretty good astronomy day again! LAS is the best!



*Editor's note: Interesting co-incidence: in placing this image I noticed that I'm in this photo (2nd from the left) viewing the LAS displays almost a year before I became a member. Vern*

Astronomical League Correspondent report from Bob Possell: Bob spoke about new observing program “Universe sampler”. Bob also talked about open house at Cham-

Berlaim Observatory May 31st at 7pm. Look for email announcement. Check out the observing programs on the AL web site. One of our members is completing sun spot certificate. Bob would like to encourage a lot of certificates this year.

Newsletter editor report from Philippe: Philippe presented award to Mike Hotka for offering over 10 submissions to the newsletter this year, including his great contribution to the most recent newsletter. This is “your newsletter”, we welcome submissions.

Pawnee report by Gary Garzone – Comet NEAT and M44 were very good, I wish I had something to get a picture, I think Tom T tried and Brian Kimball also got some good shots in. Started out very cloudy and rained even a little, but “sucker holes” kept me going and about 1:00 am it cleared pretty nice for views until 3:00 am when I started to fade fast. We got tea pot views of all the summer stuff by early morning. Small group of optimistic dark sky marines showed up and it did turn out to be worth the trip. It was not one of our better viewing nights, but any view is good.



**Comet Neat by Brian Kimball in May 2004.**

### **10 Years Ago May 2014**

From the President, Vern Raben  
The meeting this month will be at the Fiske Planetarium, 2414 Regent Drive, which is on the CU Campus in Boulder, CO. Tito Salas will give us a demonstration of the new digital 8K full dome projection system. This should be an amazing show. The dome is illuminated by six projectors each of which are 4K by 2K pixel resolution. The stars, galaxies, and planets are rendered at 8K resolution in real-time using four render computers per projector. A total

of 26 computers, 24 for rendering, a master computer, and one for audio. Each render computer has 8 cores, an NVIDIA K5000 GPU, and 16 GB of memory.

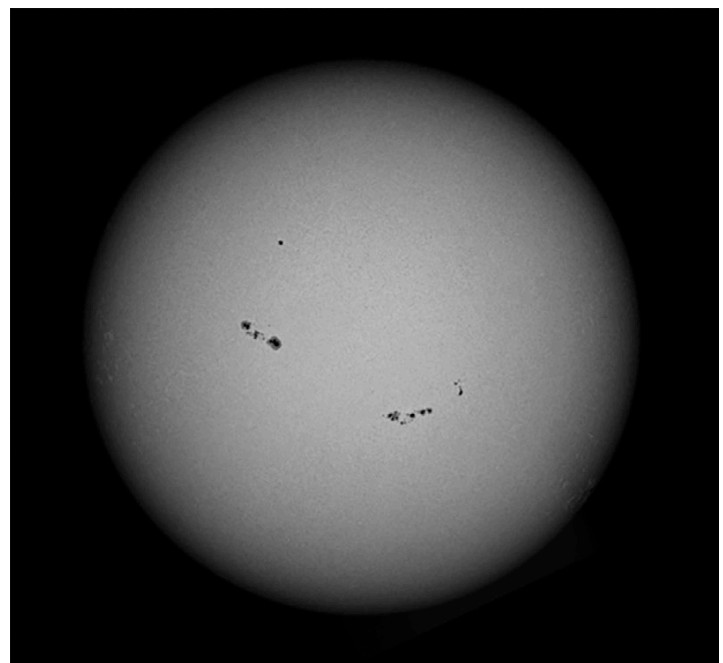


**Credit: Fiske Planetarium**

In the lobby of the planetarium is a “Science on a Sphere”. This is a display system that uses computers and video projectors to display planetary data onto a six foot diameter sphere – giving the appearance of a giant globe hanging in space.

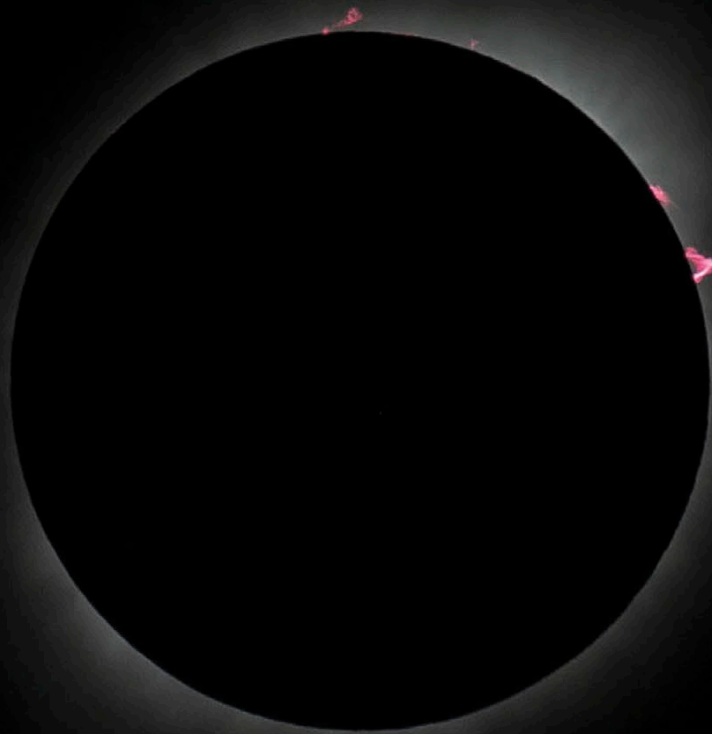
Comet C2014/E2 (Jacques). Discovered in March of this year, the comet is about magnitude 7.5 in brightness now and so should be visible in binoculars. Best time to view it would in the evening near end of twilight in the WSW.

**DARK SKY** At the beginning of the month astronomical darkness ends at 5:24am MDT and begins at 9:42 pm MDT. At the end of this month astronomical dawn ends at 3:43 am MDT and astronomical darkness begins at 10:24pm MDT.



**Sun in White Light on May 1, 2004 by Brian Kimball**

**LONGMONT ASTRONOMICAL SOCIETY**  
**P. O. Box 806**  
**LONGMONT, CO 80506**



**TOTALITY**  
**BY CLARKE YEAGER**