



# The W.A.S.P.



Vol. 54, no. 5

Winner of the Astronomical League's 2021 Mabel Sterns Award

May 2022

---

## The Warren Astronomical Society Publication

---



## Warren Astronomical Society Returns To Cranbrook

For the first time since March 2020, we are going live at Cranbrook with in-person meetings. We also plan to livestream the meeting for those out-of-state members. Because of COVID concerns, no snacks will be provided.

# The WASP



Published by  
Warren Astronomical Society, Inc.  
P.O. Box 1505  
Warren, Michigan 48090-1505

Dale Thieme, Editor

## 2022 Officers

President	Diane Hall	<a href="mailto:president@warrenastro.org">president@warrenastro.org</a>
1st VP	Bob Trembley	<a href="mailto:firstvp@warrenastro.org">firstvp@warrenastro.org</a>
2ndVP	Riyad Matti	<a href="mailto:secondvp@warrenastro.org">secondvp@warrenastro.org</a>
Secretary	Mark Kedzior	<a href="mailto:secretary@warrenastro.org">secretary@warrenastro.org</a>
Treasurer	Adrian Bradley	<a href="mailto:treasurer@warrenastro.org">treasurer@warrenastro.org</a>
Outreach	Kevin McLaughlin	<a href="mailto:outreach@warrenastro.org">outreach@warrenastro.org</a>
Publications	Dale Thieme	<a href="mailto:publications@warrenastro.org">publications@warrenastro.org</a>
Entire Board		<a href="mailto:board@warrenastro.org">board@warrenastro.org</a>

The Warren Astronomical Society, Inc., is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first Monday and third Thursday of each month, starting at 7:30 p.m.

### First Monday meeting:

Cranbrook: Institute of Science  
1221 North Woodward Ave  
Bloomfield Hills, Michigan

### Third Thursday meeting:

Macomb Community College  
South campus, Bldg. J, Room J221  
14600 Twelve Mile Rd.  
Warren, Michigan

## Membership and Annual Dues

Student	Individual	Senior Citizen	for families
\$17.00	\$30.00	\$22.00	add \$7.00

### Astronomical League (optional)\$7.50

Send membership applications and dues to the treasurer:  
c/o Warren Astronomical Society, Inc.  
P.O. Box 1505  
Warren, Michigan 48090-1505

Pay at the meetings

Also via PayPal (send funds to [treasurer@warrenastro.org](mailto:treasurer@warrenastro.org))

### Among the many benefits of membership are

- Loaner telescopes (with deposit). See 2nd VP.
- Free copy of each WASP newsletter.
- Free use of Stargate Observatory.
- Special interest subgroups. See chairpersons.

The Warren Astronomical Society Publication (WASP) is the official monthly publication of the Society.

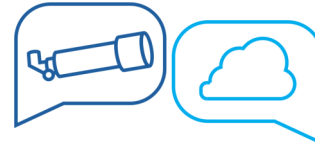
Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the end of each month. Any format of submission is accepted. Materials can either be transmitted in person, via US Mail, or by email ([publications@warrenastro.org](mailto:publications@warrenastro.org))

**Disclaimer:** The articles presented herein represent the opinion of their authors and are not necessarily the opinion of the Warren Astronomical Society or this editor. The WASP reserves the right to edit or deny publication of any submission.

**Stargate Observatory** is owned and operated by the Society. Located on the grounds of Camp Rotary on 29 Mile Road, 1.8 miles east of Romeo Plank Road, Stargate features an 8-inch refractor telescope under a steel dome. The observatory is open according to the open house schedule published by the 2nd VP.

# Snack Volunteer Schedule

The Snack Volunteer program is suspended for the duration. When it resumes, volunteers already on the list will be notified by email.



## Discussion Group Meeting

Come join us for a discussion group meeting on astronomy, space news,



## In This Issue:

President's Field of View .....	<a href="#">3</a>
Letters .....	<a href="#">5</a>
Observing Reports .....	<a href="#">5</a>
Astro Images .....	<a href="#">8</a>
C.W. Observatory .....	<a href="#">9</a>
Northern Cross Observatory.....	<a href="#">10</a>
Presentations .....	<a href="#">11</a>
Lunar Eclipse .....	<a href="#">12</a>
Skyward .....	<a href="#">13</a>
Objects That Changed Astronomy (Pt 2).....	<a href="#">14</a>
Supernova Opportunity .....	<a href="#">18</a>
Over the Moon .....	<a href="#">21</a>
History S.I.G. ....	<a href="#">22</a>
Cranbrook Monthly Sky Chart .....	<a href="#">23</a>
Calendar .....	<a href="#">24</a>
Stargate .....	<a href="#">25</a>
Stargate Officer's Report .....	<a href="#">26</a>
Treasurer's Report .....	<a href="#">26</a>
Astronomical events .....	<a href="#">26</a>
Outreach Report .....	<a href="#">27</a>
Meeting Minutes .....	<a href="#">28</a>
GLAAC .....	<a href="#">31</a>
NASA Night Sky Notes.....	<a href="#">32</a>



## President's Field of View

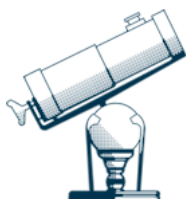
We have not assembled at our usual Monday meeting place of the ground-floor auditorium of Cranbrook Institute of Science since the first Monday of March, 2020. At that time, with a novel plague on the horizon, the discussion amongst board members turned quickly from safer snack options to how to conduct our business remotely. "Cranbrook" and "Macomb" have been, in essence, symbolic tags for the First Monday and Third Thursday of the W.A.S. ceremonial calendar for the past 26 months.

Coming back to Cranbrook is both a homecoming of sorts (especially with our first real Cranbrook outreach event coming up later this month for the lunar eclipse) and an experiment. As the scientifically-inclined know, negative data is still data and experiments can demonstrate a hypothesis is simply wrong. The hypothesis of the Board is that, at least in the large space provided by CIS, we can resume physical meetings with reasonable safety, even if we aren't comfortable yet with our grand tradition of mid-meeting snacks and the general mingling that made our in-person meetings so vibrant. Will a streamlined all-business meeting be as attractive? Will members who haven't seen each other in years be unable to resist close quarters? Will we be able to keep up streaming (we mean to try)? Are members who've been able to tune in from their rec room for two years going to make the drive to West Bloomfield?

We don't know. That's why we run experiments: to test the hypothesis that in-person meetings are a go. The Board asks for your help with this experiment. Please abide by these requests to avoid, shall we say, confounding variables. Masks are no longer required at CIS but they are strongly recommended. Given the number of W.A.S. members in an at-risk category, we would prefer masks be worn except when presenting. Please be mindful and respectful of your colleagues' personal space. Hand-sanitizer stations are available throughout the museum, and in the event that children younger than three are present, the museum asks they remain in a stroller or carrier at all times.

See you tomorrow.

Diane Hall,  
President



**DETROIT  
PUBLIC  
LIBRARY**

Business, Science & Technology  
PRESENTS

## The Birth, Life, and Death of a Star

Wednesday, May 25, 2022

6:00-7:30 p.m.



Explore the life cycle of stars, both run-of-the-mill and massive

### About this event

Local astronomer Ken Bertin has been active in the Warren Astronomical Society, as well as many other groups within the astronomy community. He passes on information about recent events in the sky and in aeronautics, and gives detailed presentations on important figures from the history of human exploration of space.

He will talk about how different types of stars are formed, live, and die, with the visual evidence for each stage in stars' life cycles.

DPL continues partnering with WSU's planetarium on these talks related to astronomy.

Zoom link will be sent to registrants before program.

*Images: Crab Nebula from NASA/ESA/JPL/Arizona State University*

**Register**

Free:

Call 313-481-1409 for more information during branch hours.

### Main Library

5201 Woodward Avenue  
Detroit, MI 48202  
313/481-1391

[www.detroitpubliclibrary.org](http://www.detroitpubliclibrary.org)



The Michiana Astronomical Society Presents:

The Twelfth Annual

# Michiana Star Party

At the

**DR. LAWLESS INTERNATIONAL DARK SKY PARK**

Box 262

South Bend, IN 46624

## June 3-5, 2022

Observing opportunities  
Special speakers  
Dark sky  
Vendors  
Interaction with astronomy enthusiasts  
Many types of telescopes  
Camping, hiking trails, outdoor activities

## PROGRAM

### FRIDAY

Camp set-up after 3:00 p.m.

- ★ Observing
- ★ Green laser constellation hunts
- ★ Informal talks
- ★ 8:00 p.m.- speaker: Robert Parrish, Dr. Lawless Park Commissioner Light Pollution and Dark Skies

#### Eating and Sleeping

- ★ Community fireplace and grill
- ★ Microwave oven available
- ★ Campsites available for tents, campers, and RV's
- ★ Public restrooms and running water available in Pavilion
- ★ Motels/hotels in nearby communities

#### Park Opportunities

- ★ Wildlife observations
- ★ Hiking trails
- ★ Biking trails
- ★ Open fields for games, Frisbee

### SATURDAY

- ★ Vendors and swaps
- ★ Solar observing
- ★ Hiking, biking, free time
- ★ Outdoor activities for kids of all ages  
11 :00 Speaker: Melinda O'Malley  
Astronomy 101
- ★ 12:00 Lunch break
- ★ 1 :00 p.m. Speaker: Jim Hopkins  
The Outer Planets
- ★ 2:30 p.m. Speaker Dr. Chris Howk  
Galaxies on the Edge: Interstellar Matters in Edge-On Galaxies
- ★ 4:00 p.m. Group photo
- ★ Dinner break
- ★ Observing

### SUNDAY

- ★ Assist with clean-up
- ★ Pack up
- ★ Head Home

SEE:

[www.Michiana-Astro.org](http://www.Michiana-Astro.org) for more information about Michiana Astronomical Society.  
[www.casscountymi.org/CountyParks/DrTKLawlessPark.aspx](http://www.casscountymi.org/CountyParks/DrTKLawlessPark.aspx) for more park information.







## Letters

Letter to award winning W.A.S.P.

### IN THE MATTER OF THE MEETING OF April, *INSTANT*.

*Primerus*. What an astonishing saga of the Martian occultation in 1976 by Professor Dunifer. Talk about cobbling together an astro-garage band -- on the roof of Wayne's Physics Building! He and his colleagues were not set up for a once in four hundred (?) year phenomenon. They succeeded in spite of being on a building in heating season, lashing up instruments obtained Radio Shack and somebody's pole barn. Last but certainly not least was the telescope (at a research school): a six-in. Dynascope on a garden variety mount. I understand said Newtonian is the equivalent of the '57 Chevrolet, while the four-in. was the analogue of Winchester '73. The result was credible data on Mars's atmosphere from middle of a large city. I have resolved to stop underestimating Dr Dunifer. He was the "Fast Mike" Simonsen of that day. He might even be better than I am in this day. I lived in Royal Oak then, so might have popped by with useless advice.

G.M. Ross

### Complaint to award winning W.A.S.P.

*In re: Hommage to Apollo XVI, April number.*

The reader encounters "crewed". Years ago I first heard that strange word at a Society meeting, and assumed it referred a garment's neck style. But no, a bizarre way to dodge **manned**, which does not trouble the real *aficionadi* of outer-space (and other) exploration.

Speaking as a non-new-age liberal, Chris Kraft and John ("Shorty") Powers would not suffer from such neurosis. Those gents' probably knew nothing of the German: *man* and *mann*. I am unlearned in the language of Schiller and Frederick Der Grosse, but understand how innocuous such usage. *See also* the double consonants in international English.

Political correctness is spiritually degrading. Yet another petition to some one's parish, suggesting ten Hail Marys . . .

G. M. ROSS,

who defends our glorious tongue against political tinkering resembling avoidance of cracks in sidewalks.



## Observing Reports

### 6 April

The Sun. 2 groups, three spots (leading), 1 spot. The extensive group, prev., has lost most members but "primate" still dominates. Suspect emerging spot near limb, but likely just plage evident from limb darkening.

Transparency good.

5-cm. refractor @ 30X w/ mylar aperture filter.

### 2-3 April

I.C. 4665 Ophiuchi. Impressive field completely filled with spaced bright stars. Dia. 50 arc-min. Better, lower magnification. "Summer beehive", Beckett in *OBSERVER'S HAND*.: "overlooked large star cluster". 5th brightest

star (Shapley method) = 7. Integrated spectral = B8, and cluster looks it.

67 Oph. Very easy double, yellow (?)/ deep blue or purple. 55 arc-sec. "Duplicity ... fixed" A = 3.9, B = 8.2. Pos. Angle estimated 160 deg., but 142 from literature. (All from *ATLAS CATALOGUE* [1964] A. Becvar)

70 Oph. Lively tints, pellucid gold-orange. 4.2 & 6.2

separation 6.7" (2022) P.A. estimated 140 deg., but 120 deg. (From Mason and Matson in *OBS. HAND*. [2022]).

Transparency fair.

10.2-cm. refractor, 55X

-----  
COMMENTARY: 4665 is junior to M-44 Cancri. Not visible to eye this A.M. allowing for elevation, but "Beehive" might have been because 90 arc-min. and 3.5 integrated photo. mag. Webb Soc. *HANDBOOK* seems not to illustrate or mention 4665 except in historical review. Cheseaux discovered 1745 or '6, but diffic. to believe not known from antiquity. 70 Ophiuchi: "Both components are small . . . with the brighter star appearing yellow-gold, while the fainter star looks more orange red". Fast moving system from proximity. (Mason and Matson, supra.)

### 9 April

OBSERVING REPORT Supplemental

I.C. 4665, supra. Previous entry re naked eye obs'n

(Continued on page 6)

(Continued from page 5)

probably over-stated.

From the venerable Burnham: "sparse group . . . Mag 6, about 20 stars Mag 7 . . .". Inspection of *ATLAS ECLIPTICALIS* notes a prominent spray of early-type stars. However, in the sky situation different. a) less than 2 deg. north of Cebalrai, 2.7 mag. b) 4665 is in the outer isophote of the Galaxy as determined by A. Pannekoek in the 1920's. Easy sighting of an open cluster problematical, and M-44 in barren Cancer not good analogy.

### 9 - 10 April

Barnard's Star. Failed attempt to find the "run-away". Frosting over of instrument + misreading finder chart in Burnham's (1978) Ophiuchus chapter.

~ 9.5 mag.

61 Ophiuchi. Observed as wide double with faint bluish "B" star @ approx.

Pos. Angle 40. Error! Per Burnham: 21 arc-sec. P.A. 237, the AB combo = 6/ 6.5. Impossible to explain.

Transparency good.

4" refractor.

10 April

The Sun. No sun-spots.

Transparency excellent, seeing excellent

5-cm. refractor @ 45X

-----  
COMMENTARY: "Cycle 25 is at last underway". Predictions vary whether less or more active than 24. Tapping's article in *OBS. HAND.* p. 185. This Observer finds the start of present Cycle insipid.

### 21 April

The Sun. Two N. hemisphere groups, the westernmost massive: three components. Two of the spots have penumbrae. Possibly 30 spots in all.

Difficult to say if a distinct group, the eastern group has only two spots, one very small.

Transparency excellent, seeing fair (wind)

5-cm. refractor f /11 @ 57X Mylar aperture filter.

### 21-22 April

Barnard's Star. Located with some difficulty using Burnham's smaller scale finder chart in vol. 2. Chart stars below lim. mag. of 'scope. Faint but not averted vision. Colourless. Class M3.5 @ 9.5 mag. per Chapman, *OBS. HAND.* (2022), p. 289.

Transparency fair (moon-rise), seeing good.

4" f /14 refractor @ 55X.

-----  
COMMENTARY. Burnham's 2nd location diagram approaching end of use given "run-away" star. Chapman: largest proper motion (citing Barnard 1916). 10.4 arc-sec./ yr. 2nd closest system after Rigel Kentaurus.

### 10 - 11 April.

The Moon. -- Gassendi -- On waxing terminator with central peak lit, but floor dark. Entire surrounding wall illuminated except a small "notch" presumably in shadow of peak. *Alter's ATLAS* Plates 31 and (less distinctly) 63 bely. Notch is exactly that in the wall from a subsequent crater, deep.

*THE MOON AS VIEWED BY LUNAR ORBITER*, p. 41.

Gassendi's wall does not rise far above the datum level of its floor, in keeping with Observer's impression of delicacy of the ring. "Considerable uplift of the floor, probably through isostatic adjustment is suggested by . . . the unusually high elevation of the floor and central peak relative to the rim crest . . .". p.95. -- Encke and Ring -- Terminator had not advanced to show Kepler to advantage, but said feature very prominent to south. *Alter* unaccountably failed to label on Plate 33 -- as opposed to *N. A. Aviation Whole Moon chart* using same 1930's photograph -- but the Crater and Ring well shown on *Alter's Plate 94*. This "ring set with stone" feature pales next to Kepler under more advantageous illumination, but Encke &c. more prominent than near-by Flamsteed ring. Plate 123 in Kopal's *PHOTOGRAPHIC ATLAS* is oblique, very close view of the region south of Kepler ( Lunar Orbiter image), but requires study to locate Encke and the Ring. -- "Cat's Eyes" -- Detached from the illuminated portion of Oceanus Procellarum, set in black = the Herodotus-Aristarchus complex. Intrinsically one of the brightest features of the near side. Struck by the rising Sun before surrounding plain seemed to suspended them above the terminator. *Kopal* Plate 124 and *LUNAR ORBITER*, p. 74 are the same picture. The brilliance of these craters in the early morning with surroundings black, and this observation performed even closer to sun-rise, hints the complex visible in low power binoculars.

Transparency good, seeing good.

5-cm. f /11 refractor @ 45X

## Join the Astronomical League!

Only \$7.50 (membership starts July 1)



- Get the Reflector
  - Participate in the Observing Program
  - Avail yourself of the League Store
  - Astronomy Books at a discount
- [alcor@warrenastro.org](mailto:alcor@warrenastro.org)



# ALCON 2022

July 28 – 30

## EMBASSY SUITES HOTEL

1000 Woodward Pl. NE

Albuquerque, New Mexico 87102

<https://alcon2022.astroleague.org/>

(Website available by January 14, 2022)

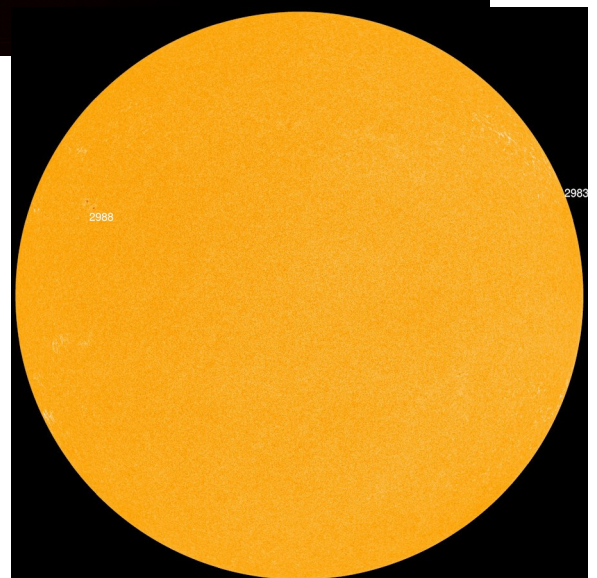


Hosted by:

**The Albuquerque Astronomical Society**

[www.TAAS.org](http://www.TAAS.org)





*H-Alpha image of the Sun, taken by Dale Hollenbaugh on 04-12-2022 1905UTC.. Excellent capture of prominences and filaments. At right the image from Spaceweather.com in visible light on that day, showing two sunspots: 2983 disappearing off the far end and group 2988 approaching center stage.*



# The View From C.W. Sirius Observatory

## Messier 81

Messier 81, or M81 (also known as NGC 3031 or Bode's Galaxy) is a grand design spiral galaxy about 12 million light-years away from Earth. It has a diameter of 90,000 light years, and is located in the constellation Ursa Major. Due to its proximity to our galaxy, large size, and active galactic nucleus (which harbors a 70 million solar mass supermassive black hole), Messier 81 has been studied extensively by professional astronomers. The galaxy's large size and relatively high brightness also makes it a popular target for amateur astronomers. In late February 2022, astronomers reported that M81 may be the source of FRB 20200120E, a repeating fast radio burst. Since Messier 81 was first discovered by Johann Elert Bode on 31 December 1774, it is sometimes referred to as "Bode's Galaxy". In 1779, Pierre Méchain and Charles Messier re-identified Bode's object, which he then listed it in his Messier Catalogue as the 81st object. Most of M81's emission at infrared wavelengths originates from interstellar dust. This interstellar dust is found primarily within the galaxy's spiral arms, and it has been shown to be associated with star formation regions. The general explanation is that the hot, short-lived blue stars that are found within star formation regions are very effective at heating the dust and thus enhancing the infrared dust emission from these regions. It is estimated M81 has approx. 240 globular clusters, and there has been only one super nova detected, which was discovered on my birthday, 28 March 1993. The other faint object in the photo directly above the galaxy and to the left is Holmberg 9, which is an irregular dwarf galaxy and a satellite galaxy of M81.



I took this photo using my 11" sct, f/7 telescope, and a QHY8L one shot color camera using no filters. It is a total of 3 hours of integration time.

M81 has a magnitude of around 6.9 which makes for an easy observing target for us astronomers using binoculars or a small telescope. It has been a favorite object for our public outreach gatherings. Viewing M81 through a larger telescope, 12" or greater, will really enhance some of the spiral galaxies detail. Since Messier 81 is located near the "bowl" of the big dipper, it is circumpolar, so it can be seen at any time of the year from our northern latitude. This object is on my "highly recommended" list of must see objects, so get those scopes out and take a look. You might also even see Messier 82 galaxy very close by.



### About CW Sirius Observatory:

C.W. (Cadillac West) Sirius Observatory is located 15 west of Cadillac Michigan. Owned and operated by WAS member Bill Beers. The dome is an 8' Clear Skies Inc dome which houses an 11" f/10 SCT telescope, a 102mm f/7 refractor telescope, Celestron CGEM DX mount, and uses an ASI ZWO 071 color CMOS camera, as well as a QHY8L color CCD camera. The telescope can be remotely operated from inside Bills house.

Anyone interested in learning about astrophotography, or any questions regarding equipment, or how to take astrophotos using your iPhones, or any related questions, can contact Bill at: [BEEZOLL@AOL.COM](mailto:BEEZOLL@AOL.COM)





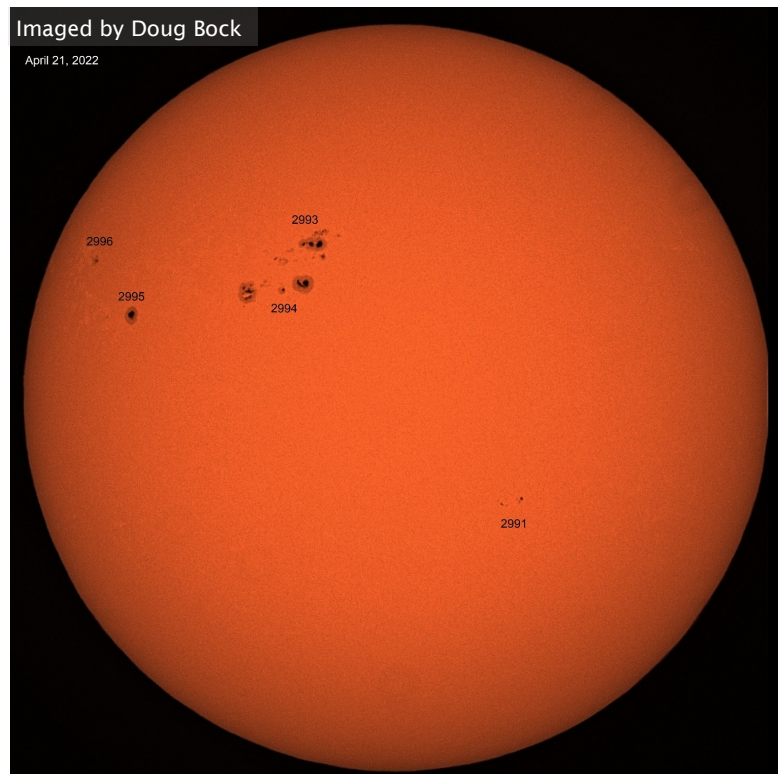
This past month I had 1 day and night that was clear long enough to do some extensive data collection. The Whirlpool galaxy was the target I worked on April 21, 2022, using the William Optics 105mm f/7 APO refractor and the ZWO asi2600MC PRO camera at a gain of 100 and a temp of 0C. 75 x 300 second light frames were used to generate this image. Stacking the data in Deep Sky Stacker and processed in PixInsight. The image was cropped as well.

According to Wikipedia The Whirlpool Galaxy, also known as Messier 51a, M51a, and NGC 5194, is an interacting grand-design spiral galaxy with a Seyfert 2 active galactic nucleus. It lies in the constellation Canes Venatici, and was the first galaxy to be classified as a spiral galaxy. Its distance is 31 million light-years away from Earth.



I also had the opportunity to do a little bit on the Sun that same day, April 21, 2022. This was taken with my Celestron 6" SCT and the ZWO asi2600mc pro camera. This is a single frame from a 30 second video I captured. Using AutoStakkart3's analysis tool I pulled just the best image of the 120 I collected. The sun has been very active this year as it heads into maximum.

**Doug Bock**





# Presentations

**Monday, May 2, 2022**

## Presentations

Main Talk:

### Very High Energy Gamma-Ray Astronomy and Cosmic Particle Accelerators

**By Dr Patrick Wilcox**

The acceleration of very energetic particles requires extreme environments. We see these energetic particles hit Earth as cosmic rays, however localizing the source of these cosmic rays is effectively impossible as the incoming direction of the charged particles is scrambled by local and galactic magnetic fields. Instead, we rely on very high energy gamma-rays to help us understand particle acceleration occurring in energetic objects as: supernova remnants, pulsar wind nebulae, and active galactic nuclei. In this talk, I will give an overview of the astrophysics behind very high energy astronomy and how we detect such extreme light, focusing on my experience with the VERITAS gamma-ray observatory in southern Arizona.

#### About the Speaker:

Patrick Wilcox is currently in his first year as a physics and astronomy instructor at St. Clair County Com-



*(Continued on page 12)*

**Thursday, May 19, 2022**

## Virtual Presentation

Feature Talk:

### Ultra Wide Angle Binoculars

“Get the bigger picture”

**By Dr Dale Partin**

The field of view (FOV) of binoculars or a telescope generally decreases as the magnification increases. For binoculars with a magnification in the range of 7x to 10x, the FOV is typically about 5 to 9 degrees. This presentation emphasizes binoculars with lower magnifications and wider fields of view. These generally have a FOV of at least 15 degrees. These binoculars are thus “in between” conventional binoculars and naked eye viewing of the sky in their field of view and also in how “deep” in the sky one can see. They sometimes seem to give “super vision” compared to naked eye viewing.

#### About the Speaker:

Dr. Dale Partin is an amateur astronomer and teaches astronomy at Macomb Community College. He has B.S. and M.S. degrees in physics and a Ph.D. in electrical engineering. Until his partial retirement, he worked in advanced research in the auto industry. He has over 80 scientific publications and 38 patents, and is a fellow of the American Physical Society and a member of Sigma Xi and of the American Scientific Affiliation. He joined the Warren Astronomical Society in 1998. He gave his first presentation that year on his measurements of the orbits of the Galilean moons. He served as a WAS officer many times since then.



## WAS PRESENTATIONS

If you would like to present either a short talk (10-15 minutes) or a full-length talk (45-60 minutes) at a future meeting, please email Bob Trembley at:

[firstvp@warrenastro.org](mailto:firstvp@warrenastro.org)

(Continued from page 11)

munity College in Port Huron. He completed his PhD in Physics from the University of Iowa in 2019, where he studied supernova remnants observed with VERITAS and worked on next-generation gamma-ray instrumentation. After his PhD, he spent a year as a lecturer and postdoc at the University of Minnesota (Twin Cities) studying active galaxies, and then a year as an Assistant Professor of Physics and Astronomy at St. Cloud State University where he also served as interim planetarium director. Dr. Wilcox is a Michigan native, growing up in Cadillac, and has returned to the state with his wife and two kids.

Short Talk:



By Bob Trembley

Bob Trembley will give a demonstration of Universe Sandbox. Universe Sandbox is a physics-based space simulator that merges gravity, climate, collision, and material interactions.

Universe Sandbox has several built-in demonstrations - many demonstrate answers to some questions he's been asked:

- What would happen if the Sun was a black hole?
• What would happen to Earth if the Sun went out?
• What would happen to the solar system if you deleted the Sun?
• What would happen to the solar system if another star went through it?

He may also demonstrate a moon of a gas giant being torn apart by gravity, and for fun, see what happens if you throw the Moon at the Earth, or throw Proxima Centauri at the Sun!

About the Speaker:

Bob Trembley, currently first VP of WAS, Outreach Director for a total of 5 terms, is fantastically interested in asteroids, Near Earth objects (NEOs), and meteorites. Bob is a HUGE fan of educational space-related PC software such as: NASA's Eyes on the Solar System, Universe Sandbox, SpaceEngine and Kerbal Space Program. Bob and his wife Constance, a middle-school science teacher and also a Solar System Ambassador, run an after-school astronomy and space science club at Connie's school called the "Endeavour Space Academy."



May 15-16 Lunar Eclipse

Coming up May 15, we will experience a rather lengthy lunar eclipse. Totality promise to be nearly one and a half hours long as the moon passes through the earth's shadow close to mid-line. The complete process will take five hours and nineteen minutes, starting at 9:32pm for the beginning of the Penumbral Eclipse, ending at 2:50am with maximum at 12:11am (1.413 Magnitude.)

Image and chart from Time and Date.com

Timings are for Warren, MI.

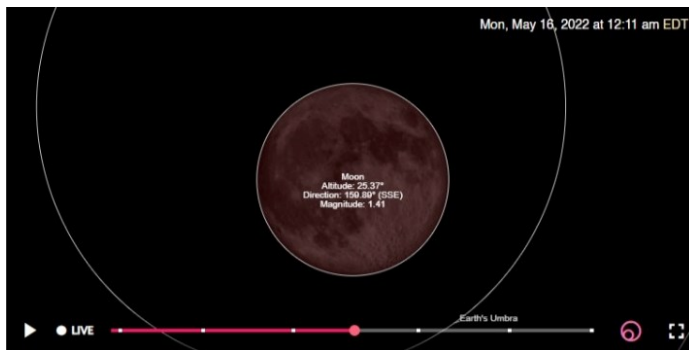


Table with 3 columns: Time, Phase, Event. It lists the progression of the May 15-16 lunar eclipse from 9:32 pm on May 15 to 2:50 am on May 16, including phases like Penumbral Eclipse, Partial Eclipse, and Total Eclipse.





## Pegasus

In the late summer of 1964 I was leaving the Observatory of the Royal Astronomical Society's Montreal Centre with some friends, one of whom was David Zackon. I asked the group if they would like to drop by my house to observe with a 3.5-inch reflector. Before they had a chance to answer, David upped the ante by asking if we'd like to come by his house to look through an 8-inch reflector.

When we arrived at his place, we found a very competent 8-inch reflector with a focal ratio of 7. It gave us wide field views of Jupiter and Saturn plus a few other nice things to see. It was rather pleasant. Just a week later, David telephoned me to invite me for a second look. As we used the telescope to view Saturn, David was adjusting one of the mount's large bolts. As I looked at Saturn I remarked, "I think that's Titan," after seeing one of the planet's large moons. David looked up toward me and said, "No, it is still loose."

David told me that he was soon to leave for his university year, and each year he had a tradition of lending the 8-inch to someone who would use it. He then began asking me a few questions, and I told him that I had observed most of the planets, especially Jupiter.

"And the Moon, I suppose."

"Yes. And just a few weeks ago I completed the Lunar training program."

"The whole program? All three hundred craters?"

"Yes, and the 26 (lettered A to Z) mountain ranges, valleys, and the Straight Wall."

"You did all this with a 3 1/2-inch telescope?"

"Yes."

"David, you've just borrowed an 8-inch telescope."

It is difficult to describe the feeling of joy I felt as the new telescope and I returned home and I spent the rest of the night getting acquainted with it. The following day I decided to name it Pegasus, after the large satellites that NASA was launching at the time in on their new Saturn 1 rockets. When my grandfather found out about this a few days later he was thrilled. "I am especially proud of David, he said, "for having the insight to know that you would put it to good use."

Over the next several months Pegasus was used heavily. When David returned from school, Constantine Papacosmas, another good friend, suggested that my parents purchase the telescope for me. David agreed, and we settled on a \$400 price for it.

On December 17, 1965, I used Pegasus to begin my comet searching program. Twenty-two years later, on the evening of October 11, 1987, Pegasus and I discovered Comet C/1987Y1.

The name Pegasus has since been attached to other fine Pegasus telescopes. One of them is a large 20-inch belonging to Lario Yerino from Kansas City. I used this fine telescope one autumn while attending the Heart of America Star Party.

The third Pegasus belongs to Carl Jorgensen, one of my closest friends and someone I have known since 1963. He brings it each year to our Adirondack Astronomy Retreat in the mountains near Lewis, NY. Under the peaceful and beautiful Adirondack sky, when my left eye touches the eyepiece of this telescope, my mind wanders back to those earlier years when I began using my Pegasus during the springtime of my life.



*The Pegasus telescopes.*

*From left to right, the original Pegasus, the one belonging to Lario Yerino, and the one belonging to Carl Jorgensen.*



# The Objects That Changed Astronomy

(And How to Observe Them)

-Brad Young, Astronomy Club of Tulsa

## Part Two: Galileo to Daguerre

As noted in the previous article, before 1600, humans made our most fundamental discoveries about how the universe works. But, as with any collection of ideas, some of them were wrong. Because people lacked some of the tools that modern scientists have, they arrived at conclusions that only new instruments, technology, and, most crucially, different thinking would correct. In astronomy, the most important invention is the telescope.

## New Tools Require New Thinking

*"Come with me now, pilgrim of the stars, for our time is upon us and our eyes shall see the far country and the shining cities of Infinity which the wise men knew in ages past, and shall know again in ages yet to be." — Robert Burnham Jr., Burnham's Celestial Handbook: An Observer's Guide to the Universe Beyond the Solar System, Volume 1: Andromeda Through Cetus*

The invention of the telescope, coinciding with and integral to the Scientific Revolution, transformed astrologers and natural philosophers into astronomers. As the use of the instrument spread, the technology improved, with new and better eyepieces, lenses, and mirrors. Better views and careful observations provided data that needed explanations in a world that had not seen anything like these new objects and phenomenon. New scientific methods allowed us to build theories, ruin them, and rebuild them again.

## Wabi-Sabi

*Moving shadows; moonlight streams through the broken window*

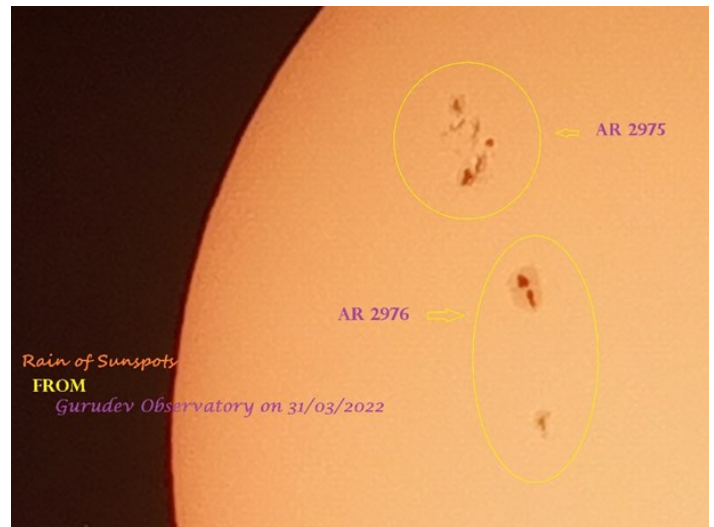
*Japanese poem*

As we all know, Galileo Galilei used the telescope to discover many things about the Solar System and the stars. Seeing the moons of Jupiter revolve around their planet, he argued that Copernicus was right about the Sun centered Solar System.

11	* * ○	14	* * ○ * *
12	* ○ *	15	○ ○ * ○ ○
13	* ○ *	16	... ○ *

His report on the phases of Venus further supported Copernicus, showing it to be an inferior planet, orbiting the sun. Seeing sunspots on the Sun and detail in the markings on the moon, he posited that the heavenly bodies were not perfect immutable works but were instead part of a vibrant cosmos. Tracking the spots showed that the Sun rotated about its axis just like planets and moons do. In a way, it was these imperfections inspired astronomers to seek a better understanding of our universe. The Japanese have a philosophy of wabi-sabi, the view of finding beauty in the imperfection of nature.

These earliest telescopic sights are the same that inspire wonder at public star parties and outreach events. The rings of Saturn, the moons of Jupiter or the craters on the Moon through a telescope are sights no one should miss. For the sunspots and other solar phenomena, you can either project the sun's disc through a telescope onto a piece of cardboard or use a relatively cheap mylar filter to fit over the front of your telescope to see the disc in white light.



There are also more sophisticated filters available to observe in hydrogen alpha and other wavelengths that may bring out other details. As always **never look at the sun directly** and always use approved equipment and methods when looking at the sun in any telescope.

## New Ocean of Discovery

*Then felt I like some watcher of the skies when a new planet swims into his ken;*

*(Continued on page 15)*

(Continued from page 14)

*Or like stout Cortez when with eagle eyes he  
star'd at the Pacific—and all his men  
Look'd at each other with a wild surmise— silent,  
upon a peak in Darien.*

*“On First Looking into Chapman's Homer”  
by John Keats*

The telescope also opened a vast ocean of discovery of objects never seen by human eyes. More comets were discovered, and Edmund Halley proved that one, later named for him, returned every 76 years, the first time the previously terrifying objects became tamed and predictable. Charles Messier made his list of fuzzy deep sky objects that were stationary, so he wouldn't confuse them with comets. His list of “rejects” represents some of the most enticing objects to view in a small telescope. William Herschel also observed thousands of nebulae, clusters, etc., and produced the first deep sky catalog of the entire sky with his sister Caroline's able assistance.



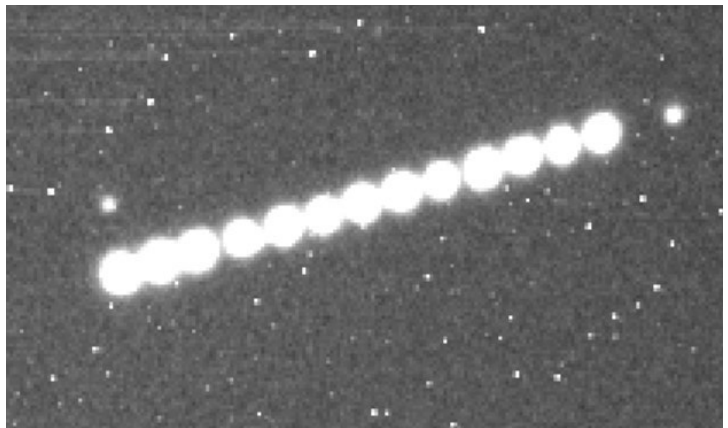
Telescopes of modest to enormous size will show all these objects in varying degrees of clarity and detail. But the most amazing thing discovered in the telescopic age was that there are other planets in our solar system. William Herschel was appointed Court Astronomer and given the money to build his large telescopes because he found the unexpected, a planet beyond the orbit of Saturn. His proof of the planetary nature of Uranus was indeed an epochal discovery, equal in magnitude to Balboa's discovery of the hitherto unimagined Pacific Ocean (Keats had the wrong conquistador).

Throughout human history, it was known that there were five planets other than Earth, and this was considered the final answer. Later review of records as far back as Galileo and perhaps even Hipparchus showed that Uranus had been seen by others before and even given a catalog number (34 Tauris). But Herschel provided scientific proof through diligent observation, and after his discovery came those of Piazzi and others who found dozens of asteroids. The search for what turned out to be the asteroid belt centered on a distance predicted by Bode, who noticed a periodicity in the location of the planets from the sun.

Later, inconsistencies in Uranus' orbit led to the discovery of Neptune by Le Verrier, Galle, and Adams, all using math and visual telescopes. You can easily

	Mean Distance from Sun in AU (Earth = 1AU)	Mean Distance from Sun by Bode's Law: ( $a = 0.4 + 0.3[2^n]$ )	
Mercury	$n$ -∞	$a$ 0.39	0.4
Venus	0	0.72	0.7
Earth	1	1.00	1.0
Mars	2	1.52	1.6
????	3		2.8
Jupiter	4	5.20	5.2
Saturn	5	9.54	10.0
Uranus	6	19.18	19.6

repeat these astounding discoveries with binoculars or a small telescope. Uranus, Neptune, and several of the brighter asteroids are visible at some point in the year around their opposition. Check your local astronomy magazine, website, or software to find when they are easily visible. Be sure and bring a chart with you as the only way to identify a planet or asteroid is either noting a star that shouldn't be there or sketching the star field over a few nights to see which one moved.



*Hygiea every 20 min 12Apr 2022 by author*

*Note that in May 2022, both Uranus and Neptune are near the sun. Hygiea, an asteroid, is in Virgo, but you'll need a 4-inch telescope.*

The Messier objects provide a great introduction to the deep sky objects observable by modest visual telescopes. Messier's first item (M1), the Crab Nebula in Taurus, is a supernova remnant and it is easy to see how Messier confused it with a comet. Other catalogs, such as Herschel, Caldwell, and books by Rev. Webb, Burnham, and many others will point out the famous, the strange, and the beautiful objects first seen by the pioneers in telescopic astronomy. *In May 2022, M1 is up right after dark but will be hard to see by mid-May. But there are dozens of Messier objects well placed this month.*

## The Survey Era

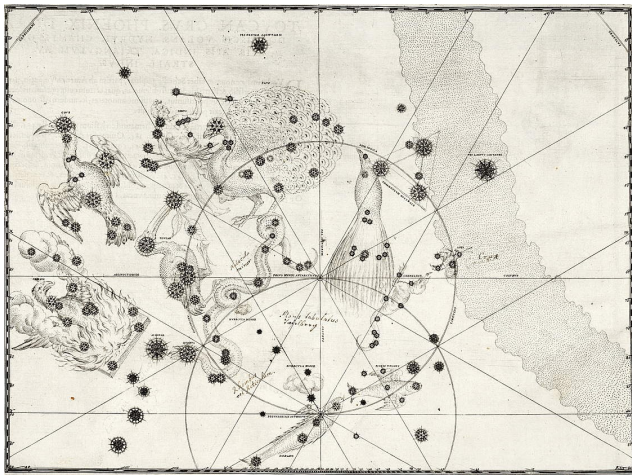
(Continued on page 16)



(Continued from page 15)

*I propose to take such a survey of the Universe that the mind may be able really to receive and to perceive an individual impression.*

*"Eureka: A Prose Poem", by Edgar Allen Poe*



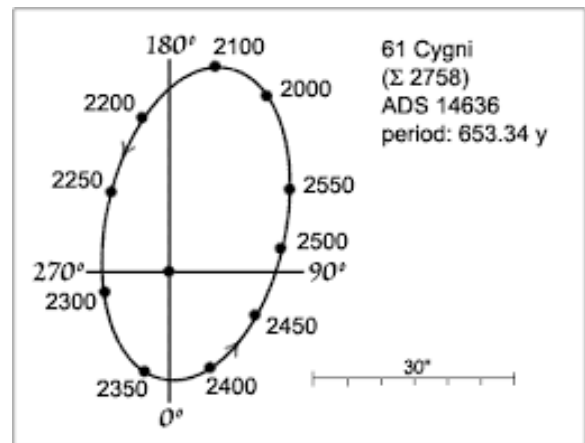
The Age of Discovery opened the southern sky to European eyes, as Halley, John Herschel, and especially Lacaille voyaged to the southern hemisphere and charted the stars and objects seen there. New constellations were devised, although the native peoples there had long had their own star stories. The invention of the micrometer and better achromatic lenses allowed for splitting and measuring double stars. Many of these were seen to be actual pairs, orbiting each other exactly as Newton and Kepler predicted, following the same rules of gravity and elliptical orbital motion devised for objects in our Solar System.

The most important discovery of this period was the fundamental scale of the nearby universe. The relative distances between the sun and planets were known, but it took the careful, scientific method (proposed by Halley) of timing the Transit of Venus in 1769 to provide the scale. Until ocean voyages and harsh overland travel could be mastered, we could not cover the great distances needed to make the needed observations. Jeremiah Horrocks first observed the Transit in 1639 but had no other reports to provide the needed data.



Once the actual distance was known from the Earth to the Sun (the astronomical unit AU), all distances in the solar system could be calculated. Later, Friedrich Bessel used stellar parallax, the change in position of the stars over the course of six months (the extent of Earth's orbit), to provide distances to stars in our region of the Milky Way.

Double and multiple stars can be seen with a telescope, and you can even track their orbital motion, though many take years to show movement. There are many beautiful double stars, but you might visit 61 Cygnus later in the summer. Not only is it possible to split it with mounted 10 x 50 binoculars (though a small scope helps), it is also the star that Bessel used stellar parallax to determine the distance of the 61 Cygnus system from Earth.



*61 Cygni Orbital Motion*

A trip to the tropics or Southern Hemisphere will open a fantastic sky journey also, with the southern constellations and magnificent deep sky objects available you can never see from up north. Hopefully, you just observed one of the Venus transits, as they will not repeat this century. However, Mercury also transits the sun, either in May or November. We will have to wait until 2032 for the next one.

### Other Light

*"What's the frequency Kenneth?"*

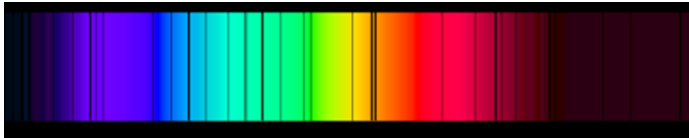
*Spoken to newsman Dan Rather by his assailants; inspired a song by R.E.M.*

Rainbows had been known since recorded history began, and prisms and the splitting of light into its constituent colors were studied by Newton. However, the true beginnings of spectroscopy and studying the entire electromagnetic spectrum began in 1800 with William Herschel. Herschel measured the temperature of each color and noticed there was a large increase beyond the red end of the spectrum, what we now call infrared light.

(Continued on page 17)



(Continued from page 16)



In 1814, Fraunhofer built the first spectrometer and identified dark (absorption) lines in the solar spectrum, which were later named in his honor. He matched these with known chemical elements and provided a way to determine what stars are made of. Helium, 10% of the visible matter in the universe, was found in the solar spectrum decades before it was identified on Earth.

Spectroscopy is indeed a powerful tool. We were beginning to understand that there were other ways to study our universe, using new technology. This would expand enormously in the next 200 years, as we will see in later articles. Doing your own spectroscopy is more difficult than the other telescopic work discussed above. It requires a diffraction grating and is used, in modern times, with imaging equipment. So, we will need to move into astrophotography, and later, astroimaging. The next article will discuss how we invented those, and how you can use the tools to rediscover the objects that changed astronomy.

You can, however, note the color of stars and from that understand their temperature and other characteristics. Annie Jump Cannon invented the stellar classification system by color, using letters to differentiate the classes. A common mnemonic for the system is “Oh, Be A Fine Girl Kiss Me”. O stars are very hot and blue, and each class gets cooler through white, yellow, orange, and finally red (M). A small telescope or binoculars will help draw out the color, and you can also spot colors in double stars, which may both be the same shade or very different.

### Sources and links:

<https://getyarn.io/yarn-clip/a5e642ae-5301-4c4d-9f36-0c8e5f45e72c>

<http://www.gurudevobservatory.co.in/>

[http://www.dibonsmith.com/cyg\\_61.gif](http://www.dibonsmith.com/cyg_61.gif)

[https://en.wikipedia.org/wiki/Dan\\_Rather#%22Kenneth,\\_what\\_is\\_the\\_frequency?%22](https://en.wikipedia.org/wiki/Dan_Rather#%22Kenneth,_what_is_the_frequency?%22)

<https://www.youtube.com/watch?v=jWkMhCLKVOg>

All other figures public domain

## Your Friend the Telescope



Maybe the telescope. Look through it backwards, shrink your enemies.

NEXT CLIP >

Learning how to use a telescope can be a daunting task, but it is well worth the effort. There are many more things to see, and the objects you admire with your eyes often have wonderful detail and deeper beauty through a scope. Man’s grasp of the universe has been increased exponentially by the telescope, and your enjoyment of astronomy can be too. Peering through a telescope is a joy shared by many people, and you can join that community if you like. Attending a star party or outreach event is always a treat, and the wonder observing the planets and stars ignites in children of all ages is amazing. It all began 400 years ago and has been a cornerstone of the Scientific Revolution that has changed human history. Whether a meters wide world class scope or a cheap refractor from a big box store, optical aid has made the universe wider, and our understanding of it deeper.

*“Love looks through a telescope; envy, through a microscope.”*

*Josh Billings*

## W.A.S.P. Photo and Article Submissions

Send items to: [publications@warrenastro.org](mailto:publications@warrenastro.org)

Documents can be submitted in Microsoft Word (.doc or .docx), Open Office (.ods), or Text (.txt) formats, or put into the body of an email. Photos can be embedded in the document or attached to the email and should be under 2MB in size. Please include a caption for your photos, along with dates taken, and the way you’d like your name to appear.



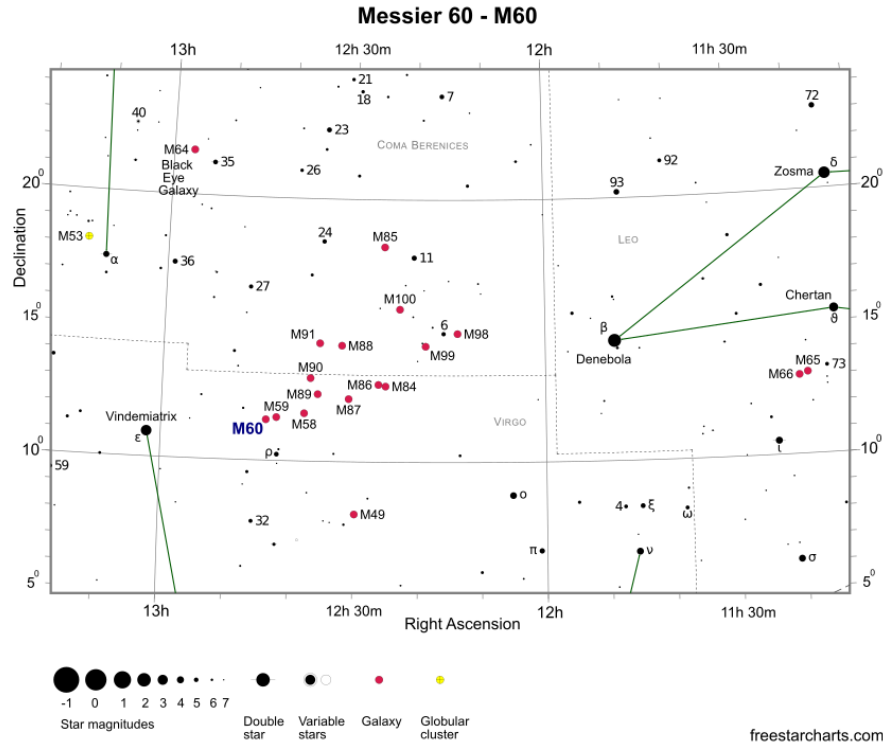
# Extragalactic Supernova Near M60

-Brad Young, Astronomy Club of Tulsa

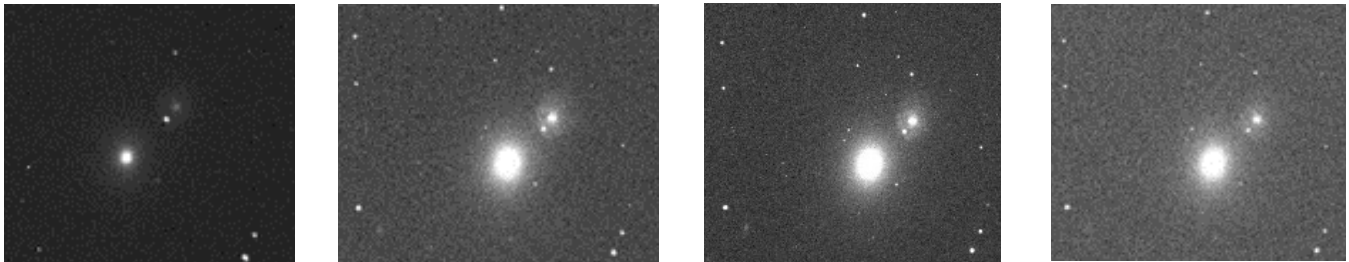
A new supernova (its official designation is **SN2022hrs**) has been spotted in Virgo, near the bright galaxy Messier 60. If you have a 8" or larger telescope, or access to imaging, here's a convenient chance to see a supernova in another galaxy. It was discovered on April 16, 2022, by [Koichi Itagaki](#).

## How to Find M60

M60 is conveniently located at the east end of a well-known line of galaxies in Virgo:



Once you arrive at M60, the supernova is located between the bright elliptical and its fainter, spiral neighbor, NGC 4647 (the supernova is in this galaxy). My images below are of SN 2022hrs in B,V,R,I (blue, green, red, infra-red) light from left to right.



Note these images provided my early set of magnitudes reported to AAVSO (see below).

## About the Galaxy

NGC 4647 is an intermediate spiral galaxy estimated to be around 63 million light-years away in the constellation of Virgo. NGC 4647 is listed along with Messier 60 as being part of a pair of galaxies called Arp 116;

*(Continued on page 19)*

(Continued from page 18)

the galaxy is located on the outskirts of the Virgo Cluster. It is listed as 11.9 mag, so the supernova is nearly as bright as its host galaxy, with an [absolute magnitude](#) of -18.5.

To put this in perspective, the sun's absolute magnitude is 4.8. Therefore, SN 2022hrs placed at Alpha Centauri's distance from Earth would shine at -14, or 35 times brighter than the Full Moon.

## Brightness and Behavior

SN 2022hrs is a [type Ia supernova](#) which tend to have fast peaks and slow declines. This example seems to still be brightening. To check the latest brightness, select the following from [AAVSO \(American Association of Variable Star Observers\) homepage](#). The "V" band (green light) is closest to visual magnitude.

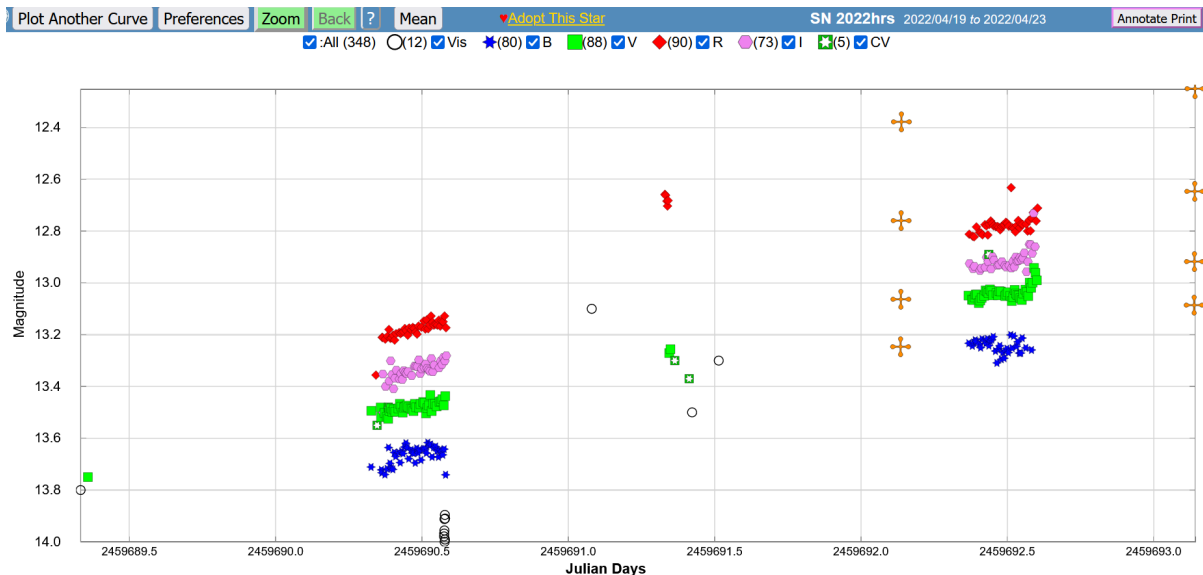
The AAVSO light curve as of 4/24/2022 - my reports as crosses. Note time scale is only a few days.

## Resources

### Pick a Star

SN 2022hrs

- Plot a light curve
- Check recent observations
- Create a finder chart



## Sources and Info

Discovery data and other updated information available from [Latest Supernova website](#); the exact position of SN 2022hrs is in NGC 4647 at R.A. = 12h43m34s.335, Decl. = +11°34'35".87

Remote telescope data at right. All images bin 3 and 60 sec exposure, with filters.

Info	
APERTURE:	0.4 m
FOCAL LENGTH:	2011.0 mm
F-RATIO:	5.7
FILTERS:	gprime, rprime, iprime, U, B, V, R, Clear, Ic, SPEC200
CCD SIZE:	1600 x 1200 (7 um pixels)
FOV:	20.2 x 15.2 arcmins
SITE:	Perth Observatory

<http://www.k-itagaki.jp/freestarcharts.com>

[https://en.wikipedia.org/wiki/Absolute\\_magnitude](https://en.wikipedia.org/wiki/Absolute_magnitude)

[https://en.wikipedia.org/wiki/Type\\_Ia\\_supernova](https://en.wikipedia.org/wiki/Type_Ia_supernova)

<https://www.aavso.org/>

All my variable star reports are available at aavso.org - look for user YBA.

<https://www.rochesterastronomy.org/supernova.html>



UNIVERSITY OF CHICAGO | 2022 BRINSON LECTURE

# HOW OUR UNIVERSE WAS MADE:

ALL FROM NOTHING



Carlos Frenk

University of Durham, UK

**Tuesday, May 17, 2022**  
**6:00 PM**

THE UNIVERSITY OF CHICAGO | Department of  
Astronomy & Astrophysics

The Brinson Foundation

The 2022 Brinson Lecture will feature Carlos Frenk of University of Durham (UK) on “How our Universe was Made: All from Nothing” on May 17 at 6:00 p.m.

The lecture is free and open to the public and will also be livestreamed at:  
<https://vimeo.com/event/2000541/30853c70ce>.

Professor Frenk is Director of the Institute for Computational Cosmology, Durham University's world-renowned theoretical cosmology research group. Along with collaborators from all over the world, he builds model universes in state-of-the-art supercomputers trying to understand how the structures in our Universe evolved from simple beginnings to the complex structures composed of stars and galaxies that we see today. His lecture will address some of the most fundamental questions in science: How and when did our universe begin? What is it made of? How did galaxies and other structures form? There has been enormous progress in the past few decades towards answering these questions and a coherent picture of cosmic evolution going back to a tiny fraction of a second after the Big Bang is beginning to emerge. However, fundamental issues like the identity of the dark matter and the nature of the dark energy remain unresolved.

**Tuesday, May 17, 2022**

6:00 p.m. CDT

University of Chicago

Eckhardt Research Center Room 161

5640 S. Ellis Ave.

<https://astrophysics.uchicago.edu/events/brinson-lecture/carlos-frenk-2021-22/>

Livestream available at <https://vimeo.com/event/2000541/30853c70ce>



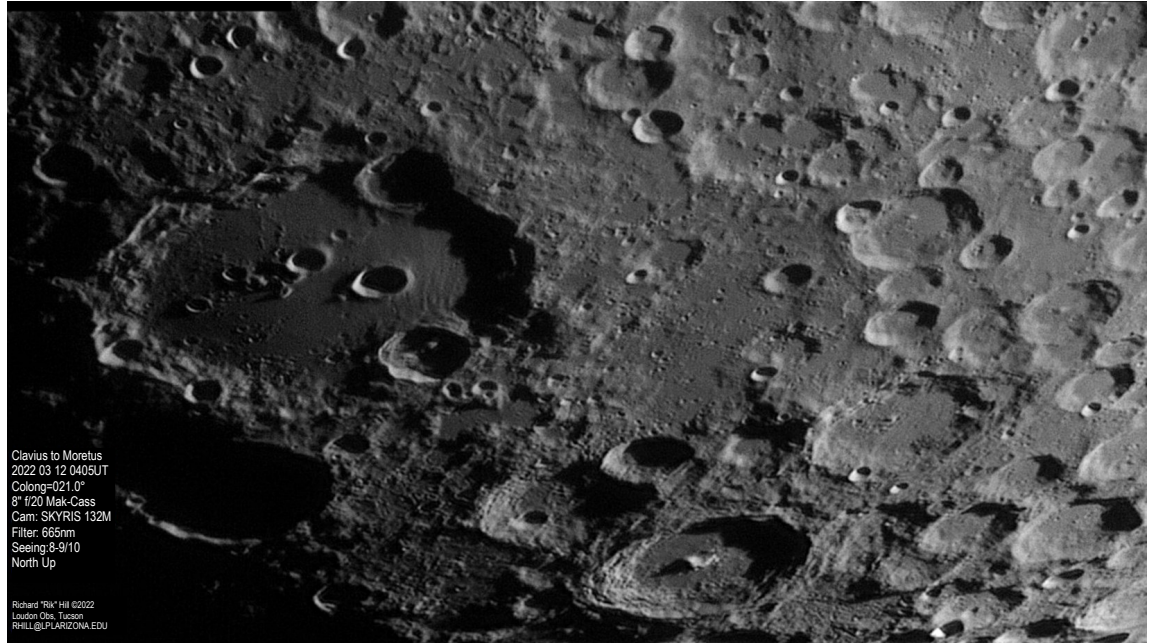


## Clavius to Moretus

The monster crater on the left side is the 231km diameter Clavius, one of the larger craters on the near-side of the Moon. It has a fabulous arc of smaller craters on its floor starting with Rutherford (56km) on the bottom wall of Clavius up to Clavius-D (28km) above it, then farther on is Clavius-C (21km) and next is Clavius-N (13km) ending with Clavius-J (12km). This distinctive arc of craters makes Clavius very identifiable. Notice the radial streaks of impact ejecta from Rutherford across the floor of the great crater. Also notice the small piece of a flat ridge catching the first sunlight just to the right of Rutherford and next to it on the Clavius crater wall is an odd little wisp that is a breach in the wall itself as

seen on the LROC QuickMap. Below Clavius is the shadow filled Blancanus and further below is the spectacular crater Moretus with its beautifully terraced walls and clear central peak, very like Tycho just north of Clavius.

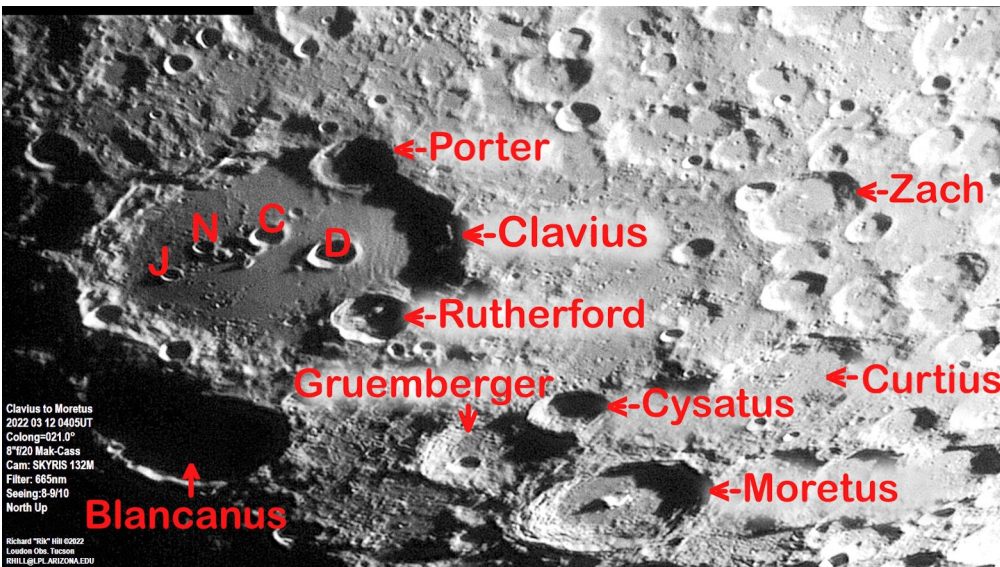
Above left of Moretus is Gruemberger (97km) and to the right of that is Cysatus (51km). Then to the right of Moretus is Curtius (99km). North of Curtius, just above the mid-line of the image, is the flat floored crater Zach (73km). Above right of Zach is a curious gathering of merged and flooded craters. It's not named but is still fascinating and intricate in detail. One of those unnamed treasures you can find all over the Moon!



Clavius to Moretus  
2022 03 12 0405UT  
Colong=021.0°  
0° 1'20" Mak-Cass  
Cam: SKYRIS 132M  
Filter: 66nm  
Seeing: 8.9/10  
North Up

Richard "Rik" Hill ©2022  
Loudon Obs., Tucson  
RHILL@PL.ARIZONA.EDU

This image was made from pieces of 3 images each of which was a stack of 1800 frame AVIs using AVIS-tack2 (IDL). Post stacking processing was done with GIMP and IrfanView.



Clavius to Moretus  
2022 03 12 0405UT  
Colong=021.0°  
0° 1'20" Mak-Cass  
Cam: SKYRIS 132M  
Filter: 66nm  
Seeing: 8.9/10  
North Up

Richard "Rik" Hill ©2022  
Loudon Obs., Tucson  
RHILL@PL.ARIZONA.EDU



Location maps by Ralph DeCew





## May 1988

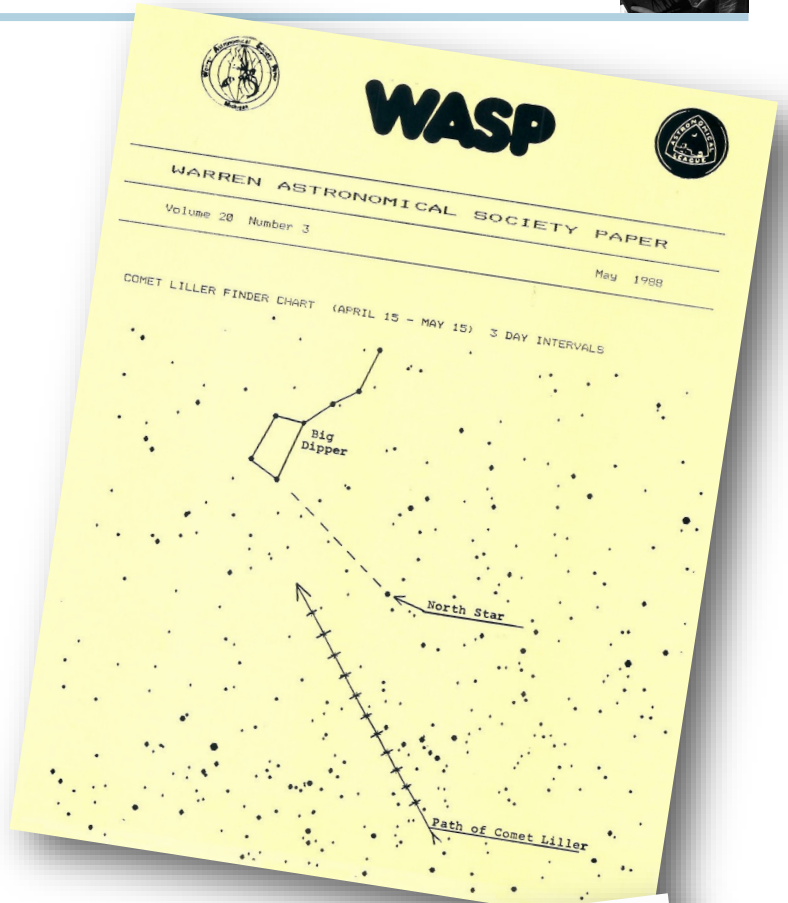
On the cover of this issue, we find a map showing the positioning of Comet 1998a - Liller (and on page 3, the ephemeris for said comet). Later in the issue, "Minor Planets for Apr. - May" - Calculated by Ken Kelly:

- (4) Vesta
- (9) Metis
- (15) Eunomia
- (43) Ariadne

Ken Kelly read the book by Michael Cyrek, *The Truth About the Heavens*, and picked the bit about sunspots as his focus of contention in "The Cause of Sunspots." For Mike's rebuttal (and Ken's subsequent response, see the [June 1988 WASP](#)). Ken then slipped in "Planetary Attractions", reproduced from *The Minor Planet Bulletin (1988)* (April-June.)

## May 1998

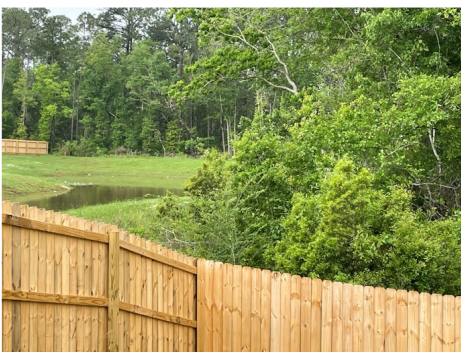
Due to a complete lack of computer news this month, "Computer Chatter" by Larry Kalinowski consists completely of local observation events and astronomy news. The rest of the issue contains Minutes of Meetings by Bob Watt, Secretary and some "Astro Facts" dug up by Greg Milewski



## From the Scanning Room

We are finally in our new digs. I'm reasonably established in "Fortress of Solitude III"- still a lot of unboxing to do, but I can work on the WASP, at least so we won't miss an issue. The moving company completely filled the garage with boxes that we need to find space for in this house (anyone got a magic wand?) and somewhere in there are the WASP/astronomical collections that I need to revisit for any stray WASPs that might be in there. Onward and upward...

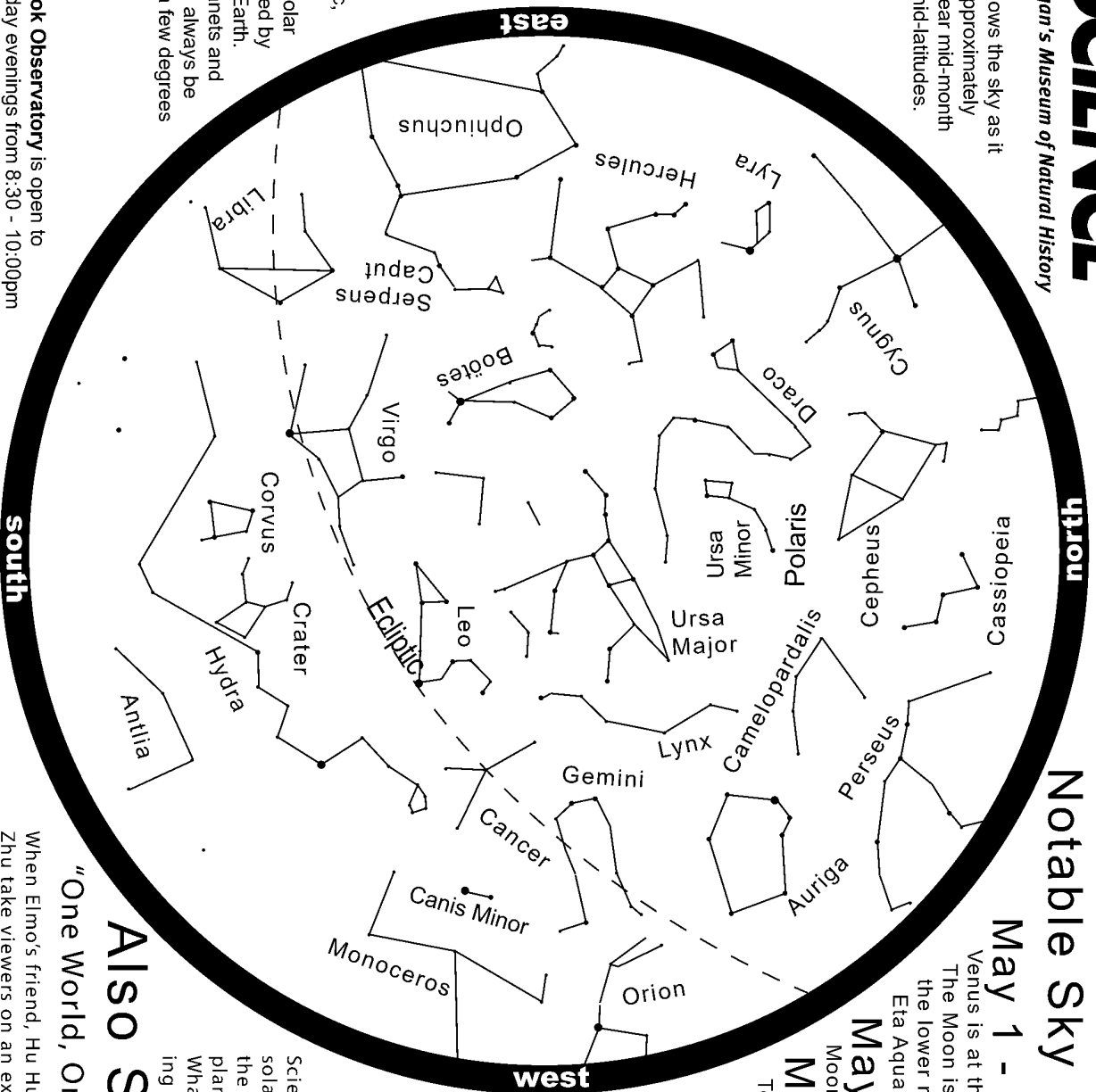
Dale Thieme,  
Chief scanner



The view from my back porch in our new digs. The view from the new Fortress of Solitude is the house next door \*sigh\* .



This chart shows the sky as it appears at approximately 10pm EDT near mid-month at northern mid-latitudes.



What is that dashed line? It's the ecliptic, the reference plane of the solar system, defined by the Sun and Earth. The major planets and the Moon can always be found within a few degrees of this plane.

The Cranbrook Observatory is open to the public Friday evenings from 8:30 - 10:00pm EDT, and the first Sunday of the month from 1:00 - 4:00pm for solar viewing. Come have a look through our telescopes! For observatory information visit <http://science.cranbrook.edu/explorer/observatory>

# MAY 2022

## Notable Sky Happenings

### May 1 - 7

Venus is at the lower left of Jupiter on the 1st (E predawn). The Moon is to the right of Aldebaran and Mercury is at the lower right on the 2nd (WNW evening twilight). The Eta Aquarid meteor shower peaks the night of May 6.

### May 8 - 14

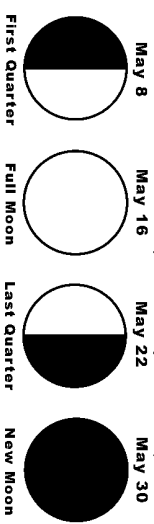
Moon is above Regulus on the 9th (SW evening).

### May 15 - 21

Total lunar eclipse on the 15th: Umbral (darkest) phase begins 10:27pm EDT. Totality begins at 11:29pm. Maximum eclipse is 12:11am. Totality ends 12:53am. Umbral phase ends at 1:55am.

### May 22 - 31

Moon is below Saturn (22nd, SE predawn). Moon is at the lower left of Jupiter, Mars is to the right (25th, ESE predawn). Moon is at the lower left of Venus (27th, E predawn).



## Now Showing

### "Birth of Planet Earth"

Scientists now believe that our galaxy is filled with solar systems, including up to a billion planets roughly the size of our own. How did Earth become a living planet in the wake of our solar system's violent birth? What does its history tell us about our chances of finding other worlds that are truly Earth-like?

## Also Showing

### "One World, One Sky: Big Bird's Adventure"

When Elmo's friend, Hu Hu Zhu, visits from China. Big Bird, Elmo and Hu Hu Zhu take viewers on an exciting discovery of the Sun, Moon, and stars. They learn about the Big Dipper and the North Star and take an imaginary trip to the Moon where they learn that the Moon is a very different place.

For astronomy information visit <http://science.cranbrook.edu>







Bob Berta - Sun in Hydrogen Alpha

# May 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 Cranbrook	3	4	5 Eta-Aquarid Meteor Shower Moon at Apogee: 405287km Cinco de Mayo	6	7 International Astronomy Day
8 Mothers Day	9	10	11	12	13	14
15 FULL MOON	16	17 Moon at Perigee: 360298km	18	19 Macomb	20	21
22	23	24	25	26	27	28 Stargate Open House
29	30 Memorial Day NEW MOON	31				



# Stargate Observatory

## Monthly Free Astronomy Open House and Star Party

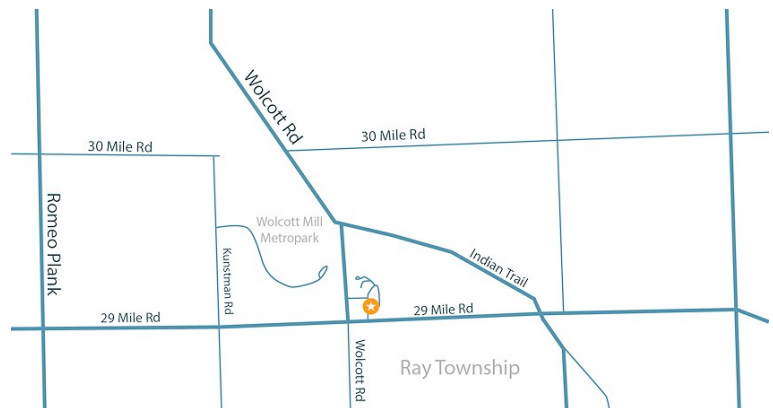
#:30 PM, 4th Saturday of the month!  
Wolcott Mill Metropark - Camp Rotary entrance

**Advisory:** Concerns are circulating in the amateur astronomy community about a possibility of COVID-19 being passed from one person to another via contact of different persons' eyes with a telescope eyepiece. Sharing telescopes may be considered by some to be high-risk due to the possibility of eyes touching eyepieces. Masks are encouraged, mandatory for children.

- Sky tours.
- See different telescope types in operation.
- Get help with your telescope.
- We can schedule special presentations and outings for scouts, student or community groups.

Contact: [outreach@warrenastro.org](mailto:outreach@warrenastro.org)

Find us on [MeetUp.com](https://www.meetup.com)



20505 29 Mile Rd (1.8 miles east of Romeo Plank Rd) Ray, MI 48096  
82° 55'04" West Longitude, 42° 45'29" North Latitude

### Observatory Rules:

- Closing time depends on weather, etc.
- May be closed one hour after opening time if no members arrive within the first hour.
- Contact the 2nd VP for other arrangements, such as late arrival time. Call 586-909-2052.
- An alternate person may be appointed to open.
- Members may arrive before or stay after the scheduled open house time.
- Dates are subject to change or cancellation depending on weather or staff availability.
- Postings to the Yahoo Group and/or email no later than 2 hours before starting time in case of date change or cancellation.
- It is best to call or email the 2nd VP at least 2 hours before the posted opening with any questions. Later emails may not be receivable ([secondvp@warrenastro.org](mailto:secondvp@warrenastro.org)).
- Generally, only strong rain or snow will prevent the open house... the plan is to be there even if it is clouded over. Often, the weather is cloudy, but it clears up as the evening progresses.

# Stargate Report

## Stargate Observatory Open House Report for April:

The observatory was opened at 6:39 pm. The sky was mostly cloudy and hazy. A few bright double stars were observed through some thin clouds with the WAS 10" dobsonian, Mark Kedzior and Jeff MacLeod used an 8" Meade SCT LX3, and Steve Stuart used his 8" Celestron SCT. A portable radio telescope was demonstrated and used to detect the milky way. Marty Kunz is working on mounting the WAS H-alpha telescope to the KK 8" refractor.

There were roughly 35 people attending including WAS members, visitors, and scouts. The observatory was closed at 11:02 pm.

Next Open house is scheduled for Saturday May 28, starting at 7:30 pm

Riyad I. Matti  
2022 WAS 2nd VP,  
Observatory Chairperson

# Treasurer's Report

## Treasurer's Report for April 30, 2022

### Main account:

Balance: \$23,103.07  
Deposits: \$109.50  
Withdrawals: \$33.80

### PayPal Account:

Balance: \$1,326.45  
Received: \$22.00  
Paid: \$17.90

### Money in

(memberships, GLAAC account closing) : \$221.50

### Money out

(for postage, Webex) \$ 33.80

Total Paid Memberships 105

We welcome the new members: the Ellsworth family

...and the renewals: Geoffrey Vasquez, Dan Cross, Therese Oldani, and Joseph Ruggirello

## News from the Treasury:

The GLAAC account is now officially closed, all funds have been transferred.

The process for ordering a physical copy of Sky & Telescope has changed, and prices have gone up above \$40 per year for a member of an astrono-

## Astronomical Events for May 2022

Add one hour for Daylight Savings Time

Source:

<http://astropixels.com/almanac/almanac21/almanac2022est.html>

Day	EST (h:m)	Event
01	14:53	Moon at Ascending Node
02	04:00	Pleiades 3.6°N of Moon
02	09:17	Mercury 1.8°N of Moon
05	03:00	Eta-Aquarid Meteor Shower
05	04:00	Uranus in Conjunction with Sun
05	07:46	Moon at Apogee: 405287 km
06	17:56	Pollux 2.1°N of Moon
08	19:21	FIRST QUARTER MOON
15	10:00	Venus at Aphelion
15	18:44	Moon at Descending Node
15	23:11	Total Lunar Eclipse; mag=1.414
15	23:14	FULL MOON
16	21:48	Antares 3.1°S of Moon
17	10:23	Moon at Perigee: 360298 km
21	14:00	Mercury at Inferior Conjunction
21	23:43	Saturn 4.5°N of Moon
22	13:43	LAST QUARTER MOON
24	14:24	Mars 2.8°N of Moon
24	18:59	Jupiter 3.3°N of Moon
26	21:52	Venus 0.2°N of Moon: Occn.
28	21:33	Moon at Ascending Node
29	04:00	Mars 0.6°S of Jupiter
30	06:30	NEW MOON

my club. Please let me know via email at [treasurer@warrenastro.org](mailto:treasurer@warrenastro.org) if you would like more information.

Adrian Bradley,  
Treasurer



# Outreach Report

## Outreach Requests

Who	Date	What/when
Cranbrook	15-May	Lunar eclipse on May 15/16. Looking for support.
Help At Wolcott Mills	10-June	Looking for help at Wolcott 10June. to open the telescope. I have no name, but it is a Cub Scout pack and phone number (586) 292-9164.

## Outreach Support:

Who	Date	What
Steve Stuart	29-April	Supporting a Jay Swanson's boy scout sky-view party at Wolcott Mills.
G. M. Ross	3/10	Veen Observatory, Lowell 23 April: "Part of the team for Public Night, poor conditions but better than anticipated. All Observatory instruments employed + several private telescopes. I contributed no instrument but explained the geometry of Alcor-Mizar, the provenance of Cor Caroli, the significance of Arcturus to the 1933 world's fair in Chicago, and the location of the Realm of the Galaxies. Approx. 100 visitors."

### Mark Kedzior reports on SWAN at Stargate:

I got there about 7PM, Adrian arrived shortly after. While we were discussing things about the observatory, he started getting excited with all the "sucker holes" we were seeing in the sky, then the moon magically appeared and Adrian cracked out his camera and went to town. Our first two visitors arrived, one was from Salem, Oregon, in town visiting a family member who lived in Washington and brought him to Stargate. The third person arriving was W.A.S. member, John Rasmussen. Riyadh arrived about 7:15, opened the observatory, but assessed the skies and deemed it not worthy to set up the Khula-Kalinowski refractor. We did open



the Dob Shed and set up the Orion 10" Dob for our visitors. We were able to view the moon easily, then we went into double star mode with Riyadh getting Sirius in the scope, and also Betelgeuse for an added bonus. Adrian kept on taking images of the moon and in reviewing his captured shots, he saw he caught the Lunar X and V features - he was excited to say the least. Riyadh and I spent some time assessing the state of the Dob Shed and its

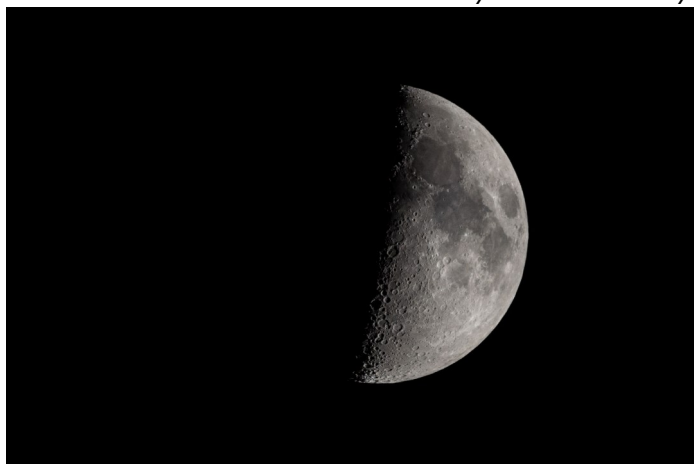
contents. Yes, it is packed to the gills. We discussed some things we could do short term (clean the 22" Mirror, work on the smaller reflector loaner scopes. moving the 12"donated SCT in a different location to ease access of the 22' Dob, and assessing all equipment and possibly have a clearance sale on unused items). I told him I would assist in doing these items, and getting the Dob Shed in a more user-friendly state.

Riyad just started to drive this week after slowly recovering from his injuries in the Super Bowl pileup on I-696. We are



fortunate that he is recovering and is able to get about a little more but still is healing. I'm looking forward to the warmer weather so we can start doing some of these projects until the mosquitos take over. I also will be putting another coat of sealant at the base of the dome to prevent any leaks from occurring. The last time that was done was in 2011 when I did the leak repair along with Jonathan on a 95 degree day. It's time to do a refresh on the coating. This was discussed with Riyadh and he said "Go for it".

*Photos by Adrian Bradley*



# Meeting Minutes

## WARREN ASTRONOMICAL SOCIETY MINUTES OF (VIRTUAL) BOARD MEETING

**APRIL 4, 2022 @ 6:30PM**

Meeting called to order @ 6:30PM. Officers in attendance: Diane Hall - Riyadh Matti - Mark Kedzior - Adrian Bradley - Kevin McLaughlin - Dale Thieme (Quorum present).

### OFFICER REPORTS:

Diane Hall reported that the outreach@warrenastro.org has been corrected to go to Outreach Chair Kevin McLaughlin.

2nd VP Riyadh Matti reports that Friday, April 8th is State Wide Astronomy Night which will be held at Stargate. Volunteers to assist are asked to arrive at 6:30PM. Adrian Bradley and Mark Kedzior will be attending to assist.

Secretary Mark Kedzior reported that a TELMAT Mirror Alignment Centering Tool was donated to the WAS by Bob Schalck of TELMAT Sales. This tool allows any ATM'er to accurately place a center ring/dot on their primary mirror to aid in collimating reflecting telescope's optics. Mark will send thank you letter to Mr. Schalck, and the TELMAT will be stored in the observatory safe until needed by any club member, along with instructions.

Treasurer Adrian Bradley reported on the account balances of WAS and PayPal. He also reported that the GLAAC account funds that the WAS maintained has now been transferred to the GLAAC and the account closed in the WAS account. He also reports 103 paid memberships to date.

Outreach Chair Kevin McLaughlin reports on the April 8th Belle Isle SWAN event, a request for volunteers for the May 15/16 Total Lunar Eclipse event at Cranbrook, and a request by a scouting group for June 10th at Stargate.

Publications Chair Dale Thieme reports the April issue of the WASP is posted online.

### OLD BUSINESS:

The WAS Website Committee has not yet met but will do so later this month. Adrian Bradley is currently working with the Hartford Insurance Company and the Jon Root Family in regard to his bequest to the WAS.

### NEW BUSINESS:

2nd VP Riyadh Matti made motion for WAS to pur-

chase spectroscope and accompanying software for Stargate Observatory - approximate purchase value \$400 - motion seconded by Dale Thieme - motion passed unanimously. Discussion on return to in-person meetings - discussion with pros & cons from each individual member regarding return to in-person meeting resumption at Cranbrook. Motion made by Adrian Bradley for WAS to return to in-person meetings on May 2, 2022 at Cranbrook, with live streaming of meeting, members bringing their own snacks for break time, and strongly encouraging the wearing of PPE and social spacing in the auditorium. Motion seconded by Kevin McLaughlin. Motion passed 5-1. (\*\*NOTE: The return to in-person meetings ONLY applies to the Cranbrook venue at this time - Macomb meetings will still be in virtual format until further notice).

Motion to adjourn meeting by Mark Kedzior - second by Adrian Bradley. Motion passed. Meeting adjourned at 7:29PM.

Respectfully submitted,

Mark Kedzior  
Secretary  
W.A.S.

## WARREN ASTRONOMICAL SOCIETY CRANBROOK (VIRTUAL) MEETING

**APRIL 4, 2022 7:30PM**

Meeting called to order at 7:30PM by President Diane Hall (WebEx attendance - 27 & YouTube - 14 @ 8:30PM).

### OFFICER REPORTS:

President Diane Hall reported that the WAS Board voted in favor of returning to in-person meetings on May 2, 2022 for the Cranbrook meeting. The meeting will be live streamed, masking/PPE is strongly recommended, masks and hand sanitizer will be provided, social spacing while seated is strongly encouraged, and attendees are asked to bring their own snacks/refreshments since the WAS will not be providing them to maintain social distancing. 2nd VP Riyadh Matti reports State Wide Astronomy Night will take place on Friday, April 8th at Stargate. The next monthly Open House will take place on Saturday, April 23rd. The monthly inspection of our Stargate Observatory ad Dob Shed found everything in good order. Secretary Mark Kedzior reported on the donation of a TELMAT Mirror Alignment Centering Tool donated by Master Optician Bob Schalck of

*(Continued on page 29)*

(Continued from page 28)

Oregon, to the WAS. This tool will help any ATM'er to accurately place a center dot/ring on their primary mirror to assist in collimating their optics before observing. This tool will be stored in the Stargate Observatory and be available for any club member to use by contacting the observatory chair. Treasurer Adrian Bradley gave account balances, reported on the transfer of the GLAAC funds to the GLAAC, and current WAS paid membership totals of 110. Outreach Chair Kevin McLaughlin reports on SWAN events being held on April 8th at both Stargate and Belle Isle, a request for volunteers for the May 15/16 Total Lunar Eclipse at Cranbrook, a scout request for Stargate on June 10th, and lecturers needed for the Belleville Library Summer Lecture series. Publications Chair Dale Thieme reports the April issue of the WASP is online.

### **SPECIAL INTEREST GROUPS:**

Solar - Lots of sunspot activity, with latest images from SOHO showing large sunspot complex and CME. Double Stars - Spring double stars will be observed at both SWAN and April Open House. History - Dale Thieme gave historical snippets from WASP issues of 10 and 20 years ago. Astrophotography - Adrian Bradley discussed astronomical twilight, civil twilight and nautical twilight, and shared images of aurora over Lake Huron at Pointe Aux Barque Lighthouse in the Thumb. Paul Goelz shared his images of the Horsehead and Flame Nebulas.

### **OBSERVING REPORTS:**

David Levy reported his recent observations of sunspots and prominences, and read "Pleasures of Hope" from Scottish poet Thomas Campbell from 1799. Dale Hollenbaugh reported observing with his newly acquired Lunt H Alpha telescope and will be taking images soon.

### **SHORT TALK:**

Diane Hall introduced (with bio) Dr. Jerry Dunifer and his presentation of "1976 Mars-Epsilon Geminorum Occultation and the Discovery of the "Third Moon of Mars". Dr. Dunifer discussed the characteristics of Epsilon Geminorum, with a star this bright being occulted every 400 to 500 years. He described the setup of the instrumentation to record the events of this occultation as taken from Wayne State University, and the data recorded.

Questions and discussion followed his excellent presentation.

### **MAIN PRESENTATION:**

Diane Hall introduced (with bio) Ken Bertin, with his presentation of "In the News 2021: Year in Review", a recap of the big astronomical stories of 2021: 1) Discovery of Comet Bernardinelli-

Bernstein 2) Amateur astronomer discovers new moon around Jupiter 3) NASA will return to Venus this decade 4) The Sun is reawakening 5) Event Horizon Telescope takes hi-resolution image of black hole jet 6) James Webb Space Telescope flies into space 7) Scientists spot the closest known black hole to Earth 8) Earth's "second moon" flies off into space 9) Parker solar probe travels through Sun's atmosphere 10) Perseverance rover begins studying rocks on Mars 11) OSIRIS-Rex heads home 12) Scientists peer behind a black hole 13) The Hubble Space Telescope "hiccups" 14) The Cosmic Web shows off its glow 15) Citizen Scientists and Major Discoveries 16) Astronomers spot a new type of supernova 17) The commercial spaceflight scene heats up 18) Arecibo Observatory collapses 19) Mars gets busy 20) New research has revealed the solution to Jupiter's "energy crisis" (which has puzzled astronomers for decades).

Questions and discussion followed Ken's informative presentation.

To see both presentations in their entirety, go to:

<https://www.youtube.com/warrenastro>

Meeting ended at 9:38 PM.

Mark Kedzior  
Secretary

## **WARREN ASTRONOMICAL SOCIETY MACOMB (VIRTUAL) MEETING**

**APRIL 21, 2022 7:30PM**

Meeting called to order at 7:30 PM by 1st VP Bob Trembley (WebEx attendance - 18 & YouTube - 6 @ 8:15 PM).

### **IN THE NEWS:**

Bob Trembley described that the Decadinal Survey of the Uranus Orbiter and probes are in the works.

### **OFFICER REPORTS:**

2nd VP Riyad Matti reported on the March 26th Open House, the April 8th SWAN event at Stargate, the upcoming April 23rd Open House, and Scouts at Stargate on April 29-30. Secretary Mark Kedzior added additional comments on the April 8th SWAN event.

### **SPECIAL INTEREST GROUPS:**

Solar - Doug Bock shared his images of sunspots taken on 4-21-2022. Dale Hollenbaugh shared his 1st light images of the sun taken in hydrogen alpha with his Lunt H Alpha telescope. History - no activity but shared past gleanings from WASP issues from 30 and 40 years ago. Steve Stuart described his imaging attempts in suburban skies. GLAAC - Bob Trembley reports on the

(Continued on page 30)



planning/details for an in person AATB event in September. Astrophotography – Doug Bock shared his images taken of M101, M67, M44 and the Leo Triplet with his 4” refractor. Steve Aggas shared images from the Apache-Sitgreaves Observatory taken with his 36” telescope.

### OBSERVING REPORTS:

David Levy is looking forward to the upcoming lunar eclipse – also reports observing the sun, seeing 5 groups with total of 64 sunspots along with 16 prominences – also reports of a possible meteor shower on May 30, with the earth plowing through a debris field of a comet that broke up.

### MAIN PRESENTATION:

Bob Trembley introduced (with bio) Dr. Brian Ottum and his presentation on “Enhancing Public Star Parties with Electronically Assisted Astronomy”. Dr. Ottum explained his methods of augmenting the observing experience through multimedia and the equipment he uses in his efforts to bring astronomy to the public. Many questions and plenty of discussion followed his excellent and informative presentation.

To see his presentation in its entirety, go to:

<https://www.youtube.com/warrenastro>

The meeting ended at 9:31 PM.

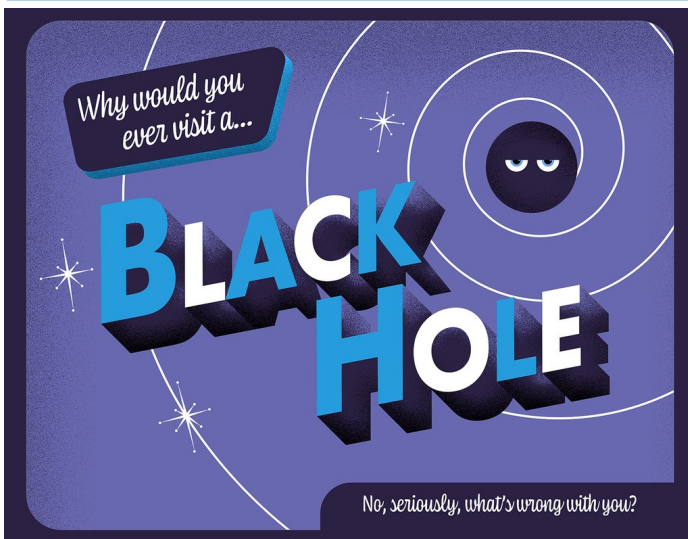
Mark Kedzior

Secretary

---

## Black Hole Week–May 2-6, 2022

---



Dr. Barb Mattson, of NASA/Goddard writes :

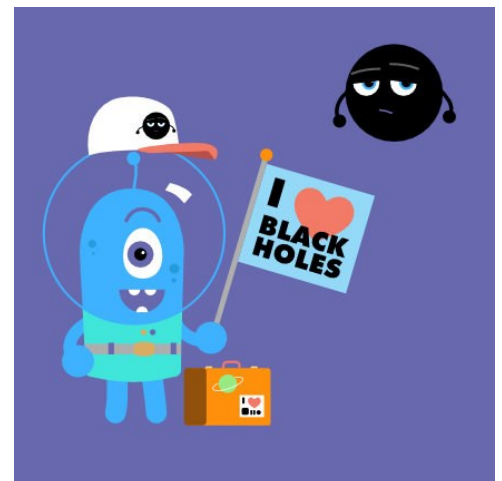
Black Hole Week is happening May 2-6, 2022, and we’d like to invite you to join us to celebrate one of our favorite cosmic objects. NASA will be “sizing up” black holes that week, with planned content about the different types of black holes that we find and study.

If you are not familiar with Black Hole Week, this will be the third installment of an event where we invite our science communications colleagues to raise our collective voices to share news, videos, and social media posts about black holes. While the week was founded by my team at NASA, we see it as an opportunity for the whole astronomy community to chime in with their black hole stories, and we’d love to see black hole content plastered all over that week.

There’s a big portion of Black Hole Week that is on social media, but we’ll also have some news features coming out that week. For those who are on social media, they should follow NASAUniverse on [Twitter](#) or [Facebook](#). For those who are not on social media, they can watch the main NASA black hole news page for new stories and multimedia: <https://www.nasa.gov/black-holes>

We also have a ton of resources and stories from past Black Hole Weeks that are still great resources, including our [black hole safety video](#) and [black hole field guide](#). All of these are collected in a gallery on NASA SVS site here:

<https://svs.gsfc.nasa.gov/Gallery/BlackHoleWeek.html>



## The Warren Astronomical Society is a Proud Member of the Great Lakes Association of Astronomy Clubs (GLAAC)

GLAAC is an association of amateur astronomy clubs in Southeastern Michigan who have banded together to provide enjoyable, family-oriented activities that focus on astronomy and space sciences.

### GLAAC Club and Society Meeting Times

Club Name & Website	City	Meeting Times
<a href="#">Astronomy Club at Eastern Michigan University</a>	Ypsilanti/EMU	Every Thursday at 7:30PM in 402 Sherzer
Capital Area Astronomy Club	MSU/Abrams Planetarium	First Wednesday of each month 7:30 PM
<a href="#">Farmington Community Stargazers</a>	Farmington Hills	Members: Last Tuesday of the month Public observing: 2nd Tuesday of the month
<a href="#">Ford Amateur Astronomy Club</a>	Dearborn	Fourth Thursday of every month (except November and December) at 7:00 PM
<a href="#">McMath-Hulbert Astronomy Society</a>	Lake Angelus	Board and paid members-First Sunday of the month Public open house—first Saturday at 11 am
<a href="#">Oakland Astronomy Club</a>	Rochester	Second Sunday of every month (except May)
<a href="#">Seven Ponds Astronomy Club</a>	Dryden	Monthly: generally the Saturday closest to new Moon
<a href="#">Sunset Astronomical Society</a>	Bay City/Delta College Planetarium	Second Friday of every month
<a href="#">University Lowbrow Astronomers</a>	Ann Arbor	Third Friday of every month
<a href="#">Warren Astronomical Society</a>	Bloomfield Hills/ Cranbrook & Warren/ MCC	First Monday & third Thursday of every month 7:30 PM

### GLAAC Club and Society Newsletters

<b>Warren Astronomical Society:</b>	<a href="http://www.warrenastro.org/was/newsletter/">http://www.warrenastro.org/was/newsletter/</a>
<b>Oakland Astronomy Club:</b>	<a href="http://oaklandastronomy.net/">http://oaklandastronomy.net/</a>
<b>McMath-Hulbert Astronomy Club</b>	<a href="http://www.mcmathhulbert.org/solar/newsletter/">http://www.mcmathhulbert.org/solar/newsletter/</a>
<b>Ford Amateur Astronomy Club:</b>	<a href="http://www.fordastronomyclub.com/starstuff/index.html">http://www.fordastronomyclub.com/starstuff/index.html</a>
<b>University Lowbrow Astronomers:</b>	<a href="http://www.umich.edu/~lowbrows/reflections/">http://www.umich.edu/~lowbrows/reflections/</a>

### WAS Member Websites

Jon Blum: <a href="#">Astronomy at JonRosie</a>	Bob Trembley: <a href="#">Balrog's Lair</a>
Bill Beers: <a href="#">Sirius Astro Products</a>	Bob Trembley: <a href="#">Vatican Observatory Foundation Blog</a>
Jeff MacLeod: <a href="#">A Life Of Entropy</a>	
Doug Bock:	
Facebook: Northern Cross Observatory <a href="https://www.facebook.com/NorthernCrossObservatory">https://www.facebook.com/NorthernCrossObservatory</a>	
Boon Hill and NCO Discussion <a href="https://www.facebook.com/groups/369811479741758">https://www.facebook.com/groups/369811479741758</a>	
YouTube channel: <a href="https://www.youtube.com/channel/UC-gG8v41t39oc-bL0TgPS6w">https://www.youtube.com/channel/UC-gG8v41t39oc-bL0TgPS6w</a>	



This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!

## Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light

**David Prosper**

Have you spotted any “night lights”? These phenomena brighten dark skies with celestial light ranging from mild to dazzling: the subtle light pyramid of the zodiacal light, the eerie twilight glow of noctilucent clouds, and most famous of all, the wildly unpredictable and mesmerizing aurora.

Aurora, often referred to as the northern lights (aurora borealis) or southern lights (aurora australis), can indeed be a wonderful sight, but the beautiful photos and videos shared online are often misleading. For most observers not near polar latitudes, auroral displays are relatively rare and faint, and without much structure, more gray than colorful, and show up much better in photos. However, geomagnetic storms can create auroras that dance and shift rapidly across the skies with several distinct colors

and appear to observers much further away from the poles - on very rare occasions even down to the mid-latitudes of North America! Geomagnetic storms are caused when a magnetic storm on our Sun creates a massive explosion that flings a mass of particles away from its surface, known as a Coronal Mass Ejection (CME). If Earth is in the path of this CME, its particles interact with our planet’s magnetic field and result in auroral displays high up in our ionosphere. As we enter our Sun’s active period of its 11-year solar cycle, CMEs become more common and increase the chance for dazzling displays! If you have seen any aurora, you can report your sighting to the Aurorasaurus citizen science program at [Aurorasaurus.org](https://Aurorasaurus.org)

Have you ever seen wispy clouds glowing an eclectic blue after sunset, possibly towards your west or northwest? That wasn’t your imagination; those luminescent clouds are noctilucent clouds (also called Polar Mesospheric Clouds (PMC)). They are thought to form when water vapor condenses around ‘seeds’

*(Continued on page 33)*



Comet NEOWISE flies high above a batch of noctilucent clouds in this photo from Wikimedia contributor Brwynog. License and source CC BY-SA 4.0 [https://commons.wikimedia.org/wiki/File:Comet\\_Neowise\\_and\\_noctilucent\\_clouds.jpg](https://commons.wikimedia.org/wiki/File:Comet_Neowise_and_noctilucent_clouds.jpg)

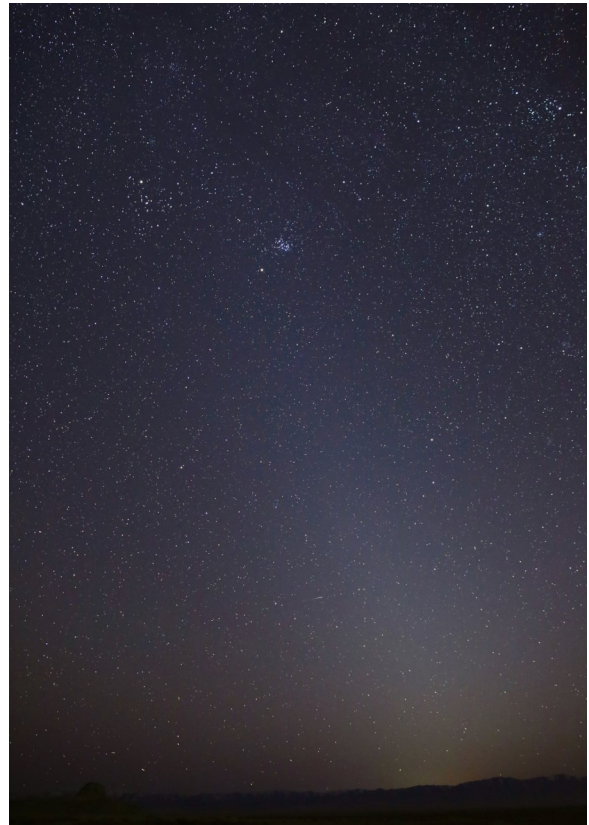


(Continued from page 32)

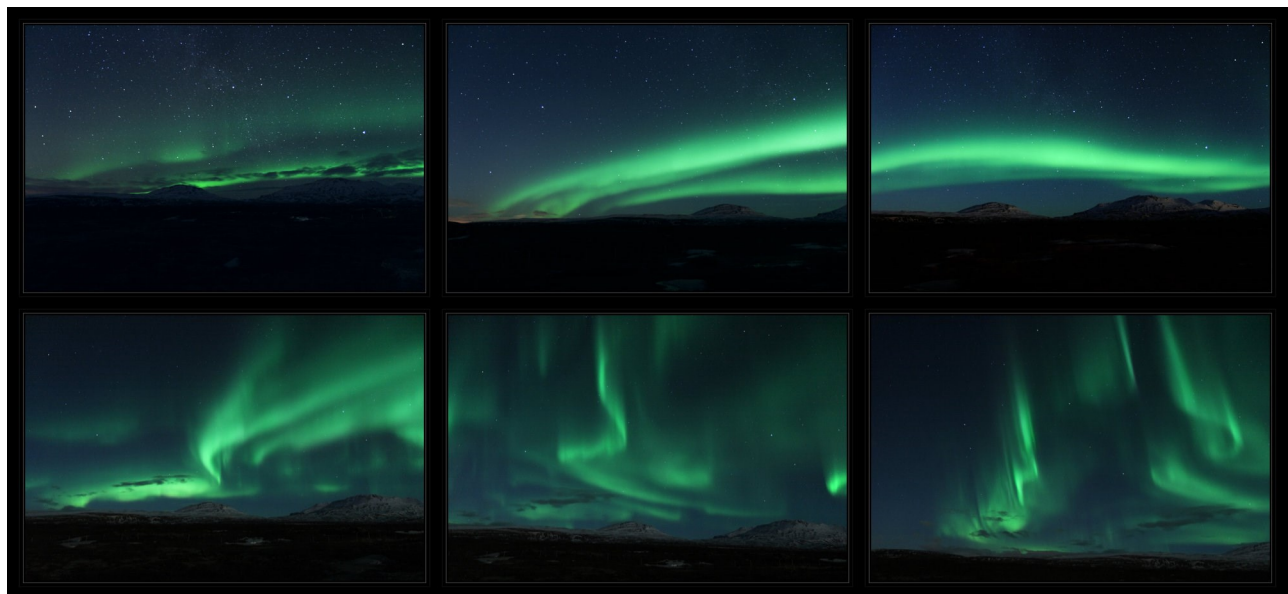
of dust from vaporized meteorites - along with other sources that include rocket launches and volcanic eruptions - around 50 miles high in the mesosphere. Their glow is caused by the Sun, whose light still shines at that altitude after sunset from the perspective of ground-based observers. Noctilucent clouds are increasing both in frequency and in how far south they are observed, a development that may be related to climate change. Keeping in mind that observers closer in latitude to the poles have a better chance of spotting them, your best opportunity to spot noctilucent clouds occurs from about half an hour to two hours after sunset during the summer months. NASA's AIM mission studies these clouds from its orbit high above the North Pole: [go.nasa.gov/3uV3Yj1](https://go.nasa.gov/3uV3Yj1)

You may have seen the zodiacal light without even realizing it; there is a reason it's nicknamed the "false dawn"! Viewers under dark skies have their best chance of spotting this pyramid of ghostly light a couple of hours after sunset around the spring equinox, or a couple of hours before dawn around the autumnal equinox. Unlike our previous two examples of night lights, observers closer to the equator are best positioned to view the zodiacal light! Long known to be composed of interplanetary dust orbiting in the plane of our solar system reflecting sunlight, these fine particles were thought to originate from comets and asteroids. However, scientists from NASA's Juno mission recently published a fascinating study indicating a possible alternative origin: dust from Mars! Learn more about their serendipitous discovery at: [go.nasa.gov/3Onf3kN](https://go.nasa.gov/3Onf3kN)

Curious about the latest research into these night lights? Find news of NASA's latest discoveries at [nasa.gov](https://nasa.gov)



The zodiacal light as seen in the evening of March 1, 2021 above Skull Valley, Utah. The Pleiades star cluster (M45) is visible near the top. Credit and source:: NASA/Bill Dunford <https://www.flickr.com/photos/asfc/51030289967>



A sampling of some of the various patterns created by aurora, as seen from Iceland in 2014. The top row photos were barely visible to the unaided eye and were exposed for 20-30 seconds; in contrast, the bottom row photos were exposed for just 4 seconds- and were clearly visible to the photographer, Wikimedia contributor Shnuffel2022.

License and source: CC BY-SA 4.0 [https://commons.wikimedia.org/wiki/File:Aurora\\_shapes.jpg](https://commons.wikimedia.org/wiki/File:Aurora_shapes.jpg)