



Vol. 50, no. 11

# The W.A.S.P.



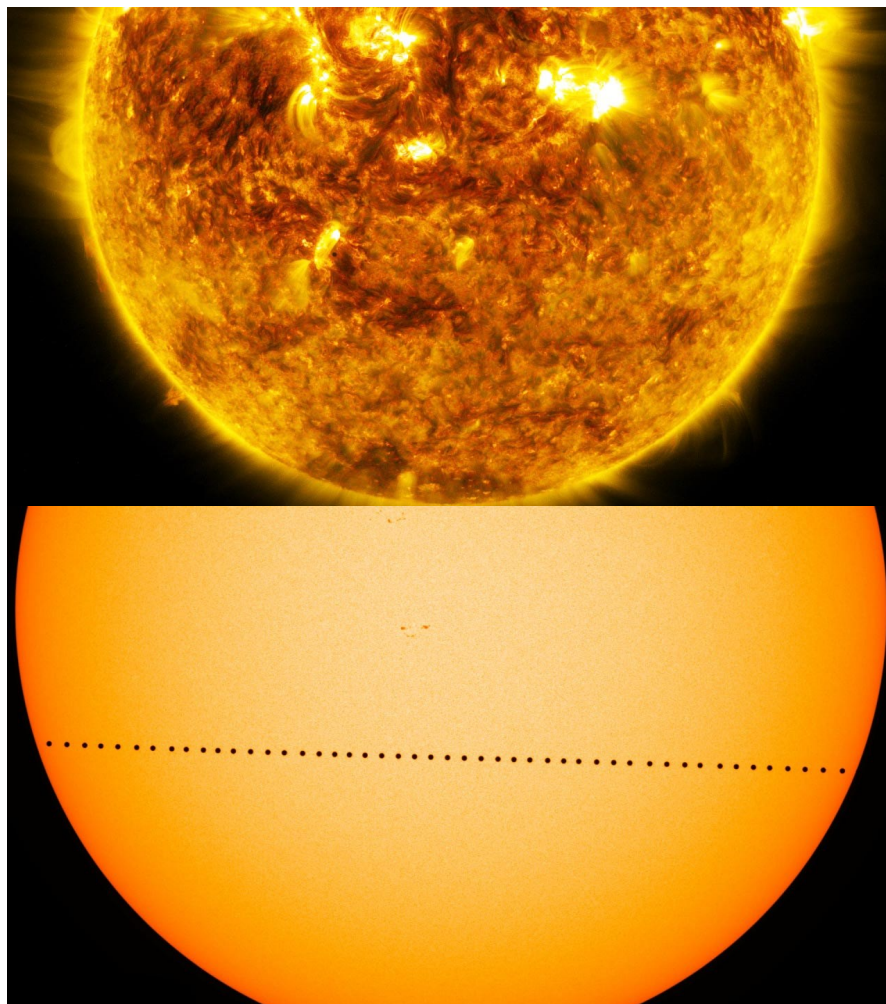
November, 2019

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## The Warren Astronomical Society Paper

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### Catch This Month's Transit of Mercury November 11, 2019



Images of the 2016 Transit courtesy NASA's Goddard Space Flight Center

There will be viewing of the transit of Mercury at Stargate from 9 am to 1:15 pm with a hydrogen-Alpha telescope, weather permitting.

See Transit on [page 4](#)

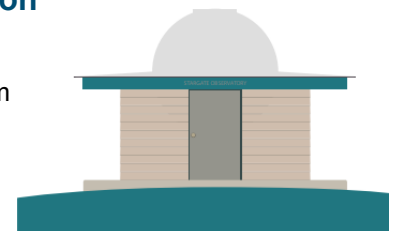
#### **Transit times at Stargate Location**

Begins: [Mon, Nov 11, 2019 at 7:36 am](#)

Midpoint: Mon, Nov 11, 2019 at 10:20 am

Ends: Mon, Nov 11, 2019 at 1:04 pm

Duration: 5 hours, 28 minutes



# The WASP

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



Dale Thieme, Editor

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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:	Third Thursday meeting:
Cranbrook: Institute of Science	Macomb Community College
1221 North Woodward Ave	South campus, Bldg. J, Room J221
Bloomfield Hills, Michigan	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.
- Free use of W.A.S. library. See librarian.

The Warren Astronomical Society Paper (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))

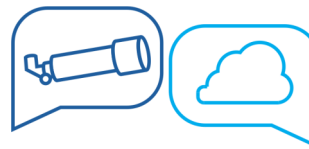
**Disclaimer:** The articles presented herein represent the opinion of their authors and are not necessarily the opinion of the Warren Astronomical Society or this editor. The WASP reserves the right to edit or deny publication of any submission.

**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

Nov 4	Cranbrook	Parker Huellmantel
Nov 21	Macomb	Riyad Matti
Dec 2	Cranbrook	Penny Wayne

If you are unable to bring the snacks on your scheduled day, or if you need to reschedule, please email the board at [board@warrenastro.org](mailto:board@warrenastro.org) as soon as you are able so that other arrangements can be made.



## Discussion Group Meeting

Come on over, and talk astronomy, space news, and whatnot!

The Discussion Group meeting for November will be at Jon Blum's home on Tuesday, November 26, at 7:00 PM. Jon has been hosting this every November for several years, so come and be part of the annual photo. Jon will provide lots of snacks, so please don't bring any food or drinks.

**NEW LOCATION:** Jon plans to move to his new apartment in Novi about a week before this Discussion Group meeting. If you do not receive the address and directions in your email by one week before this event, please email [jon@jonrosie.com](mailto:jon@jonrosie.com) for this information.

## In This Issue:

Transit of Mercury .....	<a href="#">4</a>
President's Field of View .....	<a href="#">5</a>
Astro Images .....	<a href="#">6</a>
C.W. Observatory .....	<a href="#">7</a>
Northern Cross Observatory .....	<a href="#">8</a>
Presentations .....	<a href="#">13</a>
Play Review .....	<a href="#">15</a>
Over the Moon .....	<a href="#">16</a>
Object of the Month .....	<a href="#">17</a>
History S.I.G. ....	<a href="#">18</a>
Cranbrook Monthly Sky Chart .....	<a href="#">19</a>
Stargate .....	<a href="#">20</a>
Stargate Officer's Report .....	<a href="#">21</a>
Astronomical events .....	<a href="#">21</a>
Outreach Report .....	<a href="#">23</a>
Meeting Minutes .....	<a href="#">25</a>
Treasurer's Report .....	<a href="#">26</a>
GLAAC .....	<a href="#">27</a>
NASA Night Sky Notes .....	<a href="#">28</a>



# Annual Awards Banquet

Thursday, December 5th, 2019

Price \$30 per person, \$35 at the door

Don't forget, every dinner purchased (\$30 per person, \$35 at the door) comes with one opportunity for the door prizes. More door prize tickets can be purchased at \$1.00 a piece or 6 for \$5.00. Limit \$20.00.

[Click here to reserve your seat with PayPal](#)

## Program

**6:00 pm**

Cash Bar

**7 pm**

Dinner

**8:30 pm**

Presentation

*Skylore & Mythology*

*From Around the World*

**9:30 pm**

Awards and door prizes

Ukrainian Cultural Center

26601 Ryan Road

Warren, MI 48091

## Menu

### Entrée:

Beef Sirloin Tips in Mushroom and Wine Sauce  
Roasted Chicken with Choice of Sauces  
Broiled Cod with Corn Relish, Lemons and Tartar Sauces

### Dessert

Cherries Jubilee

### Side Dishes:

Potato and cheese Varenyky (pierogi)  
Green Beans Ukrainian Style  
Seasoned Whipped Potatoes with Garlic and Butter  
Romaine Lettuce Garden Salad with House Dressing  
Fresh Rolls and Butter

Soft Drinks  
Wine and Beer Included

# Transit of Mercury

## November 11, 2019

An excellent chance of seeing the Transit of Mercury is coming up, providing we dodge the Michigan Nebula. Here are some links to some excellent resource sites:

Fred Espenak's (Mr. Eclipse) site-  
<http://www.eclipsewise.com/oh/tm2019.html>

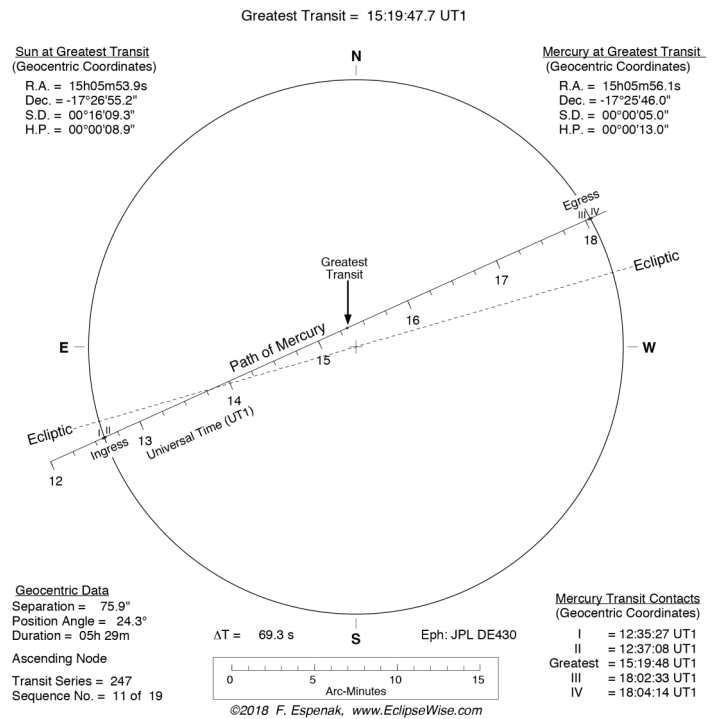
If you're not at Stargate, plug in your location here to get timings:  
<https://www.timeanddate.com/eclipse/transit/2019-november-11>

More information here:  
<https://earthsky.org/?p=316375>

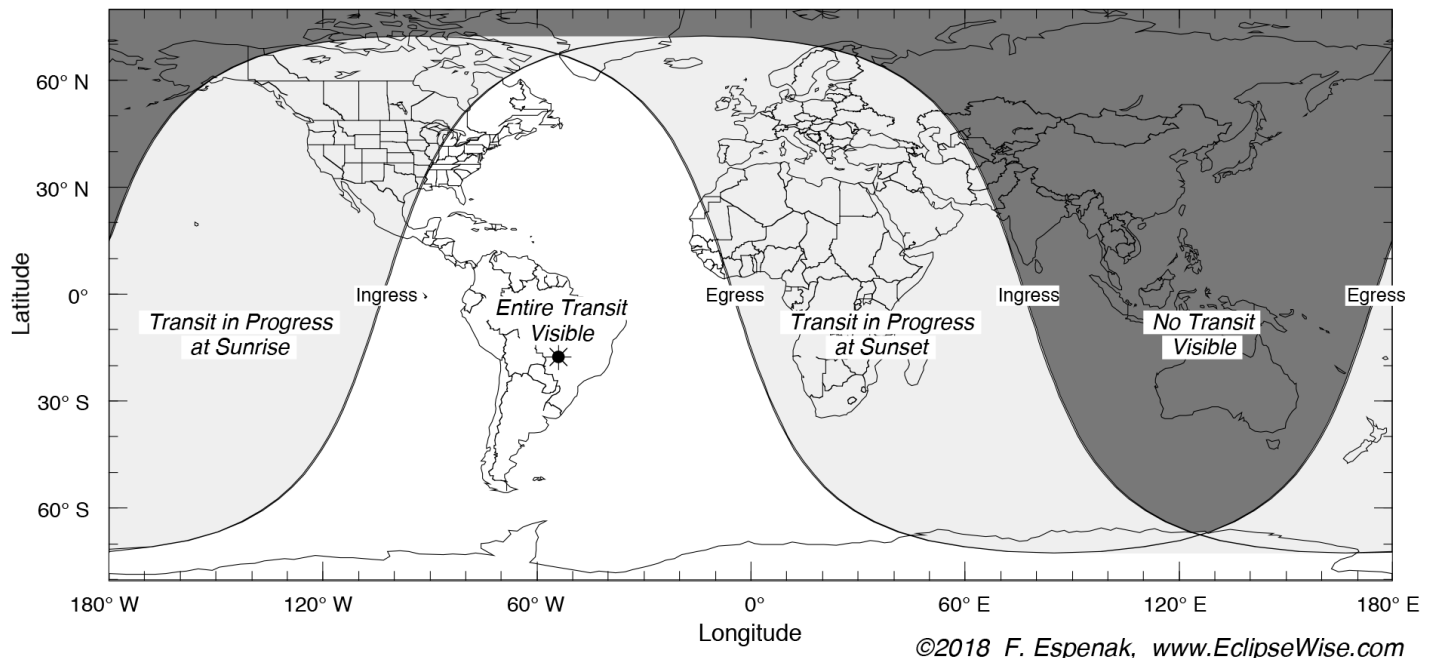
Also, we have an article from the **NASA Night Sky Network** on page 20 of this issue.

The diagrams on this page are courtesy of Ken Bertin's good friend, Fred Espenak.

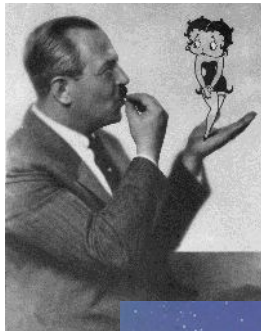
### Transit of Mercury: 2019 Nov 11



### Transit of Mercury: 2019 Nov 11



## The Astronomical Cartoons of Fleischer Studios



You know Fleischer Studios from their many popular cartoon series: Betty Boop, Popeye the Sailor, Superman, and more. But you probably don't know about the scientific side of Max and Dave Fleischer. Solar System Ambassador Ken Bertin (who is Max Fleischer's nephew by marriage) on Max Fleischer's early animation and interest in space travel, and the history of Fleischer Studios.

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

Limited parking is available in the staff parking lot off Putnam Street, a one-way street accessible from Cass Ave

Registration requested <https://dplmaxfleischer.eventbrite.com>.



Ken Bertin

**Sunday,  
November 17, 2019  
2:00-4:00 p.m.**

**Main Library**

5201 Woodward Avenue  
Detroit, MI 48202  
313.481.1409

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



## President's Field of View

Elections are right around the corner, and by the time you read this they may be over. But as of now at least we have a full slate of candidates for the 2020 board. This was a huge weight lifted for me and most of the burden fell to Jon Blum, David Baranski and Jerry Voorheis, who did a fantastic job finding potential candidates. Thank you gentlemen so much. We will also be voting on a bylaw change to extend term limits from 2 years to 3 (term of positions is still 1 year, we are just increasing the number of consecutive terms you can serve to 3.) After elections the last big event of the year will be the banquet. We have found a new venue thanks to the hard work of Laura Wade & Anita Maylis, this year the banquet will be on December 5th, with the bar opening at 6:00pm at the Ukrainian Cultural Center, located at 26601 Ryan Rd, Warren MI. This is not far from our old venue. The Banquet is going to be a blast so please purchase a ticket at the next two meetings, \$30 in advanced and \$35 at the door. We are also pre-ordering calendars for 2020, as well as starting to renew memberships. I'm going to keep this field of view short as I need to study for my second Stellar Physics test. Oh, but don't forget we have a Mercury Transit coming up the morning of the 11th, Veterans day. Some will be at Stargate after 10am, I will be in the center of Wayne State with the Planetarium Staff and SAS (Student Astronomical Society), Others will be at Campus Martius Park in Detroit.

Jeff MacLeod,  
President

### Notice

From the family of Brian Klaus -

This is an invitation to the celebration of life in memory of Brian Klaus. The August 2019 issue of W.A.S.P. includes a memorial (link below)

<http://www.warrenastro.org/was/newsletter/WASP-2019-08.pdf>

**CELEBRATION OF LIFE IN MEMORY OF BRIAN KLAUS**

AUGUST 15, 1953 - JUNE 28, 2019

PLEASE JOIN US ON SATURDAY NOVEMBER 16<sup>TH</sup> 2019

1:00pm - 6:00pm with LUNCH AT 2:00pm

CAMP ROTARY, WOLCOTT MILL METROPARK  
ACTIVITIES CENTER (north of STARGATE OBSERVATORY)  
20505 29 MILE ROAD RAY, MI 48096

We will be sharing memories of Brian including the wonderful comments from the WASP so feel free to join in by saying a few words.

R.S.V.P. [info@warrenastro.org](mailto:info@warrenastro.org)



W.A.S. member, Yusef Hakki, captured this airplane passing in front of the moon October 12, 2019.

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

We'd like to see your photos and articles in the W.A.S.P. Your contribution is ESSENTIAL! –  
This is YOUR publication!

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.

# The View From C.W. Sirius Observatory

## NGC 7293 (Helix Nebula)

The **Helix Nebula**, also known as **NGC 7293**, is a planetary nebula located in the constellation Aquarius. Discovered by Karl Ludwig Harding, probably before 1824, this object is one of the closest to the Earth of all the bright planetary nebulae. The distance from Earth is approximately 655 light-years. It is similar in appearance to the Cat's Eye Nebula and the Ring Nebula, whose size, age, and physical characteristics are similar to the Dumbbell Nebula, varying only in its relative proximity and the appearance from the equatorial viewing angle. The Helix Nebula has sometimes been referred to as the "Eye of God" in pop culture.

The Helix Nebula is an example of a planetary nebula, formed by an intermediate to low-mass star, which sheds its outer layers near the end of its evolution. Gases from the star in the surrounding space appear, from our vantage point, as if we are looking down a helix structure. The remnant central stellar core, known as the central star of the planetary nebula, is destined to become a white dwarf star. The observed glow of the central star is so energetic that it causes the previously expelled gases to brightly fluoresce.

When viewing the Helix through a smaller aperture telescope, try using averted vision (directing your gaze to one side of the nebula). Using a telescope 10" and larger will really enhance the structure. Adding an OIII or an Ultra High Contrast filter to your eyepiece in a very large telescope, >14", sometimes helps.



**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.



# Northern Cross Observatory

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## From the Desk of the Northern Cross Observatory OCTOBER DSO CAPTURES

Doug Bock | October 28, 2019

### Objective

This month I decided to image M 52, M 74, M 33 and Abell 2666.

### Process

All objects were stacked with Deep Sky Stacker, processing performed in PixInsight.

### Equipment

Telescope: 10" f/8 RC  
Camera: Asi071mc PRO one shot color.  
Mount: Losmandy g11 w/Gemini 2 controller

*(Continued on page 9)*



*(Continued from page 8)*

## **M 52**

Messier 52 is an open cluster in the Cassiopeia constellation. It was discovered by Charles Messier in 1774. M52 can be seen from Earth with binoculars. Due to interstellar absorption of light, the distance to M52 is uncertain, with estimates ranging between 3,000 and 7,000 light years.

October 26, 2019

10" f/8 RC

Asi071mc PRO, temp -5C, gain 100

40 x 300 second subs, 24 darks, 50 flats



In addition, I tracked Asteroid 162082 1998 HL1

Video on my YouTube channel: <https://youtu.be/RfMwnPdfUPg>



*(Continued on page 10)*

*(Continued from page 9)*

## **M 74**

Messier 74 is a spiral galaxy in the constellation Pisces. It is at a distance of about 32 million light-years away from Earth.

October 28, 2019

10" f/8 RC

asi071mc PRO, gain 300, temp -5C

59 x 300 second subs, 24 darks, 50 flats



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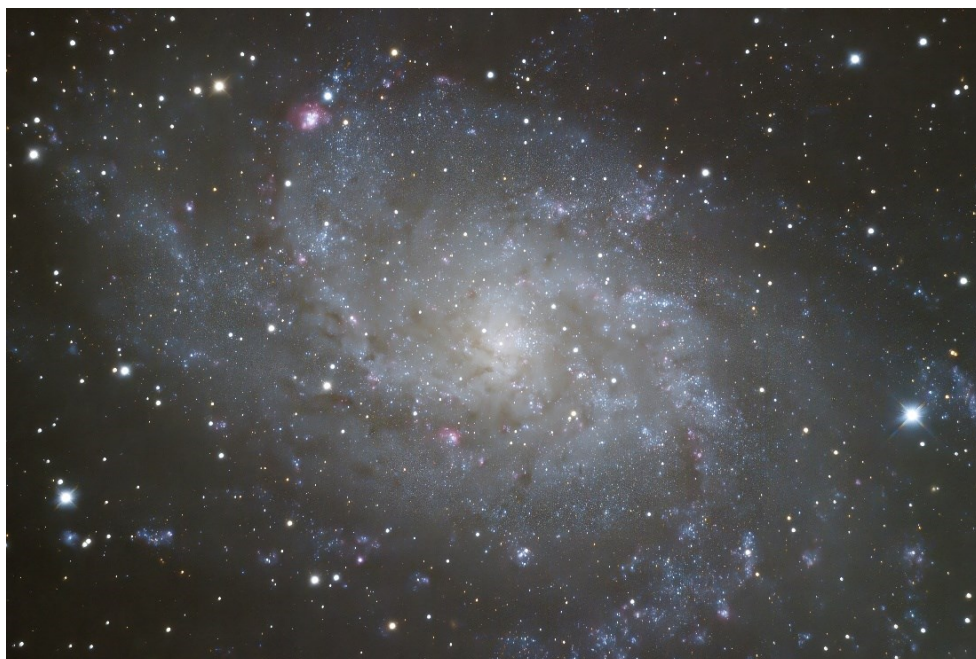
## **M 33**

The Triangulum Galaxy is a spiral galaxy 2.73 million light-years from Earth in the constellation Triangulum. It is catalogued as Messier 33 or NGC 598. The Triangulum Galaxy is the third-largest member of the Local Group of galaxies, behind the Milky Way and the Andromeda Galaxy.

October 19, 2019

asi071mc PRO camera  
72 x 180 second subs, 0C, gain 300  
10" f/8 RC

Two different processing techniques



*(Continued on page 12)*

(Continued from page 11)

## Abell 2666 – Galaxy cluster

October 8, 18, 20, 2019

6 hours, 28 minutes. 180 and 300 seconds subs

asi071mc PRO

gain 300, temp 0C

10" f/8 RC

The galaxies of Abell 2666 lie far beyond the Milky Way, some 340 million light-years distant toward the high flying constellation Pegasus. At cluster center is giant elliptical galaxy NGC 7768, the central dominant galaxy of the cluster. As the cluster forms, such massive galaxies are thought to grow by mergers of galaxies that fall through the center of the cluster's gravitational well. Typical of dominant cluster galaxies, NGC 7768 likely harbors a supermassive black hole.



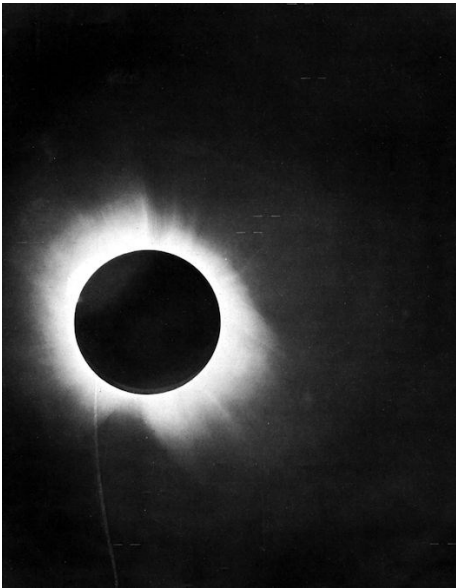
# Presentations

## Monday, November 4, 2019 Cranbrook Presentations

Main Talk:

### “The Photograph that Changed Gravity”

By Professor W.J. Llope, Wayne State University



Two days short of one hundred years ago today, the results from a conceptually simple experiment performed earlier that year were announced. All one had to do in this experiment was take photographs at a specific time and place and then measure some positions from them with a ruler. This conceptual simplicity, however, was balanced by complications. Travel to the site required months, and there was no guarantee of good weather at the required time and place. The photographs had to be precise, because the effect of interest is very, very small. The physi-

cists on the two sides of any good experiment - the experimentalists and theorists - were in this case also on opposing sides of a World War. While the experimental concept was simple, and the execution fraught with roadblocks (and later, some controversy), the goal was to test a new and quite radical theory about the most mysterious of the four fundamental forces - gravity.

As you can probably guess, the experiment was successful, and showed that the Newtonian theory of gravity, which had been solid for ~230 years, was incomplete. This talk is intended for a general audience and will discuss the experimental expeditions that set out from England to Sobral, Brazil and to the island of Principe that managed to photograph the star field behind the total eclipse of the sun on May 29, 1919. These photographs forever changed our view of gravity and made the theorist that suggested the radical new theory a household name the world around. His name, you can probably also guess.

W.J. (“Bill”) Llope, Ph.D., is an Associate Professor in the Physics & Astronomy Department of Wayne State University. His research concentrates on the experimental study of the quark-gluon plasma and the dynamics of relativistic heavy-ion collisions, and the design and fabrication of large detector systems to measure these collisions. He has no significant expertise in astrophysics or gravitational theory, the physical foundation of this talk, but was drawn to a number of fascinating historical and experimental details when reading this paper: <https://royalsocietypublishing.org/doi/pdf/10.1098/rsta.1920.0009>



*(Continued on page 14)*

## 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 Jonathan Kade at:

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

Short Talk:

## WAS Election of Officers And By-Law Change Proposal Vote

### Annual Election of Officers

The Nominating Committee (David Baranski, Jon Blum and Jerry Voorheis) presents these candidates for the WAS Board:

President	Diane Hall
First VP – Speakers	Dale Partin
Second VP – Observatory	Riyad Matti
Treasurer	Mark Jakubisin
Secretary	Glen Wilkins
Outreach	Bob Trembley
Publications	Jonathan Kade

### By-Law Change proposal: Section 5.02. Election and Term of Office.

A nomination committee consisting of 1-3 members who are not seeking nomination shall be named by the Board of Directors at its meeting preceding the annual meeting and election. The committee shall nominate persons who are willing to duly execute at least one office defined in Article V. The officers shall be elected annually by acclaim or by secret ballot (only for contested positions) at the annual meeting of the membership. Each officer shall hold office until his or her successor shall have been elected, and installed on January 1 of following year, or until the officer becomes incapacitated, resigns, or is removed. **Each office must be relinquished after two consecutive terms.**

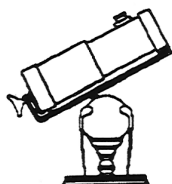
Old, existing version:

**Each office must be relinquished after two consecutive terms.**

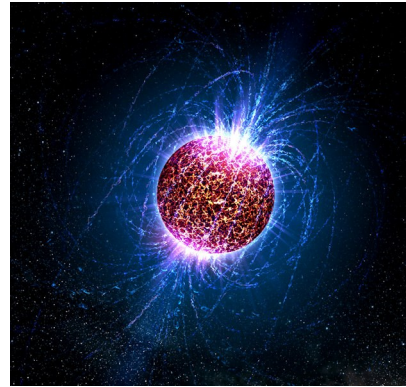
New, amended version:

**Each office must be relinquished after three consecutive terms.**

The board has reviewed the proposal and recommends that members vote **YES** on this proposal.



## Thursday, November 21, 2019 Macomb Presentation



### Neutron Stars

By Dave Bailey

Dave Bailey will explore the physics of neutron stars, using the whiteboard, with visual accompaniment by Ken Bertin. Neutron stars are the strangest among the types of stars we know to be frequent. Which is not to say they're easy to find - most of them are invisible. In fact, there is likely an undetected neutron star within fifty light years of us.

Dave will talk about what they're made of, why they're so hard to find, and how they form. We'll discuss various types of neutron stars we do know about, such as pulsars, strange stars, and quark stars, and what happens when they spiral together. You will leave with a better understanding of how much we don't know about these very unusual celestial bodies. Astronomy has always been a major part of Dave Bailey's life - his parents met at Yerkes Observatory! Dave is in the minority in the club; he is more of a theoretician than an observationalist. He doesn't own a major telescope.

As an optical engineer, he has worked on several different kinds of spy equipment (details classified). He has done laser isotope separation (NOT on uranium). He has worked with laser weapons, both offensive and defensive, and nerve gas detectors (details not classified).



Living up to his reputation as the club's resident Einstein, Dave's presentations to the club regularly expand our minds and challenge our preconceptions. They also generally use whiteboards instead of computers, and come with multi-page handouts. If you're looking for some mental exercise, don't miss his presentations!

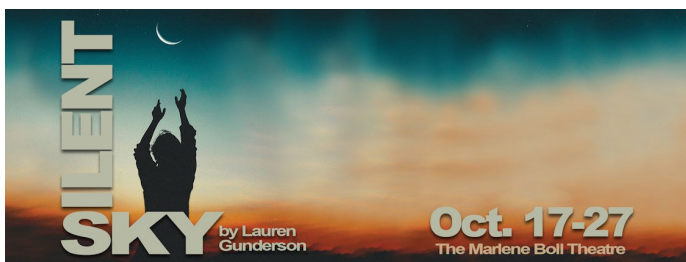
Illustration by Casey Reed - Penn State University.



# PLAY ~~Movie~~ Review

By Diane Hall

To celebrate the 50th Anniversary of Apollo 11's Moon landing, former President Diane Hall will be contributing a series of space-themed movie reviews to the WASP in upcoming months. This month's planned review of *From the Earth to the Moon* Episodes 7-9 was pre-empted by the arrival of an astronomy-themed dramatic play in town...



## Silent Sky

Written by Lauren Gunderson

Directed by Sarah Hawkins

I was fortunate to catch a performance of Lauren Gunderson's *Silent Sky* during its limited run at the Marlene Boll Theatre in downtown Detroit last month. This staging, presented by University of Detroit Mercy, was accompanied by discussions and symposia that included a night dedicated to Henrietta Swan Leavitt's contribution to science, but on the Thursday I attended, the play itself was the evening's fare.

Gunderson conveys the life arc of Henrietta Leavitt in a two-act, five-character drama; besides Henrietta we meet two of her fellow computers in "Pickering's harem" at the Harvard Observatory— Williamina Fleming and Annie Jump Cannon. Henrietta's sister Margaret Leavitt rounds out the female roles, while a fictionalized astronomer named "Peter Shaw" stands in for the absent Pickering and any other male who happened to be around the observatory.



The UMD cast did a splendid job under the direction of Sarah Hawkins; Amelia Rose Glenn as Henrietta and Elise Panneman as Margaret were almost immediately convinc-

ing to me as sisters bound by love but determined to chart different trajectories in life. Glenn's Henrietta made for a compelling lead— persistent and passionate, flint-edged but with wonder in her soul, attentive to every minute speck on the photographic plates she studied but often heedless to the emotional needs of those around her. Krista Schafer Ewbank grounded the ensemble in her role as self-possessed and witty Williamina while Nina Carlson gave a slow-burning warmth to Annie as she developed over the years from Henrietta's brusque supervisor to a caring colleague and friend. James Hardy brought a jittery and vulnerable charm to Peter, a role that I suspect would be intolerable to watch when poorly done. Peter, as an intentional placeholder for Generic Early 20th Century Academia Man, is arguably the weakest link in the cast as written but Hardy played him in a way that got under my skin as much as he did Henrietta's.

The intimate Boll Theater restricted the set design but this production made the most of simple sets and interplays of light that evoked Henrietta's famous stars; perhaps the most critical prop in this production is a simple plate of broken glass, and that single cracked plate had its desired effect on me. While Gunderson's script takes some dramatic liberties with the lives of the characters, the science done by Henrietta and her fellow computers is delivered efficiently and often elegantly. Gunderson's language is quite lovely, though marred here and there by a muffled line reading. Still, my lasting impression is not of any particular line but of how beautifully the play depicts the distance that expands around people, the unintentional moments of carelessness that widen into gulfs, the missed moments that turn into years of silence, the small cruelties that form a latticework of oppression... and the little moments of insight, of determination, of human connection that can span those distances of space and time and forge something lasting.

*Silent Sky* is a lovely play about women doing science at an age when women weren't supposed to be doing science, but more than anything it is a *humane* play, and in this year of 2019 that made for a fine evening at the theater.



5 out of 5 Moons. See it should you get the chance.

<https://www.udmercy.edu/life/theatre/silent-sky.php>

<http://laurengunderson.com/>



# Over the Moon

With Rik Hill

## On the Marsh

South of Mare Humorum is an area that looks like no more than a western embayment off Mare Nubium. This is Palus Epidemiarum, the Marsh of Epidemics a little over 300 km in diameter it is surrounded by and contains some real treats. Near the upper right corner of the image are two similar sized craters, Mercator (49km dia.) on the right and Campanus (also 49km) on the left. Above them in the extreme upper right corner of the image is Dome Kies Pi with its prominent central pit. To the left of the two large craters can be seen the roughly parallel Rimae Hippalus and parallel to them further left is the mountain chain Rupes Kelvin and then the isolated Promontorium Kelvin sticking into Mare Humorum. The rimae end at a very interesting unnamed passage between the marsh and Humorum. On the right end of this passage is the crater Ramsden (26km) with a beautiful system of Rimae Ramsden surrounding. Look to the upper right of Ramsden to the double walled little crater Marth (7km). This is worthy of high magnification!

On the right side of the image is most of the crater Capuanus (61km) with the wonderful mountains trailing off the left wall. Below these is the largely ancient highly modified

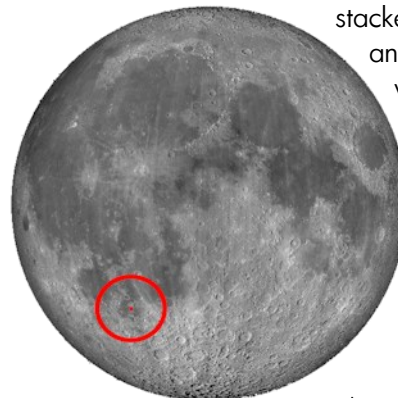
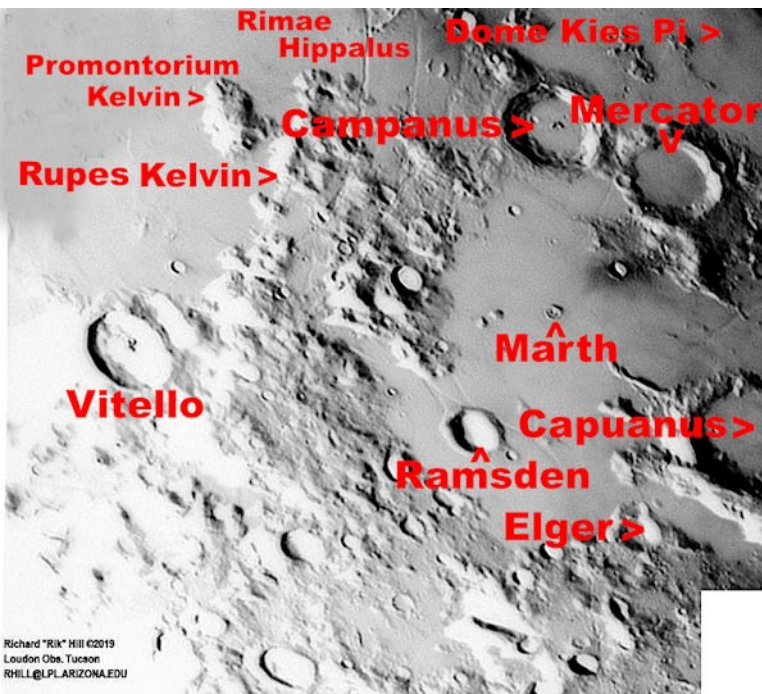
crater Elger (22km) that may be a merger of several craters. It may be as old as 4.5 billion years, as much as 18 rotations of our galaxy! Further left is a curious straight wall and a wedge-shaped shadow. This is a small mare-like area with a low short mountain range on the south side, a juxtaposition of mundane features that makes for shadow-play given the right sun angle. Lastly I zoom over to the crater on the left side of the image with an illuminated central peak. This is Vitello (43km) and it has one of the most interesting central peaks of any crater on the Moon. Unfortunately that would not be best shown until about two or three hours after this image was taken.

This image was made from two 1800 frame AVIs stacked with AVIStack2 and further processed with GIMP and IrfanView.



Palus Epidemiarum  
2019 03 17 0353UT  
colongitude:039.8°  
8" f/20 Mak-Cass  
Cam: SKYRIS 445M  
Filter: 610nm  
scale 0.25"/pix  
Seeing:8/10  
North Up

Richard "Rik" Hill ©2019  
Loudon Obs. Tucson  
RHILL@LPLARIZONA.EDU



Location maps by Ralph DeCew



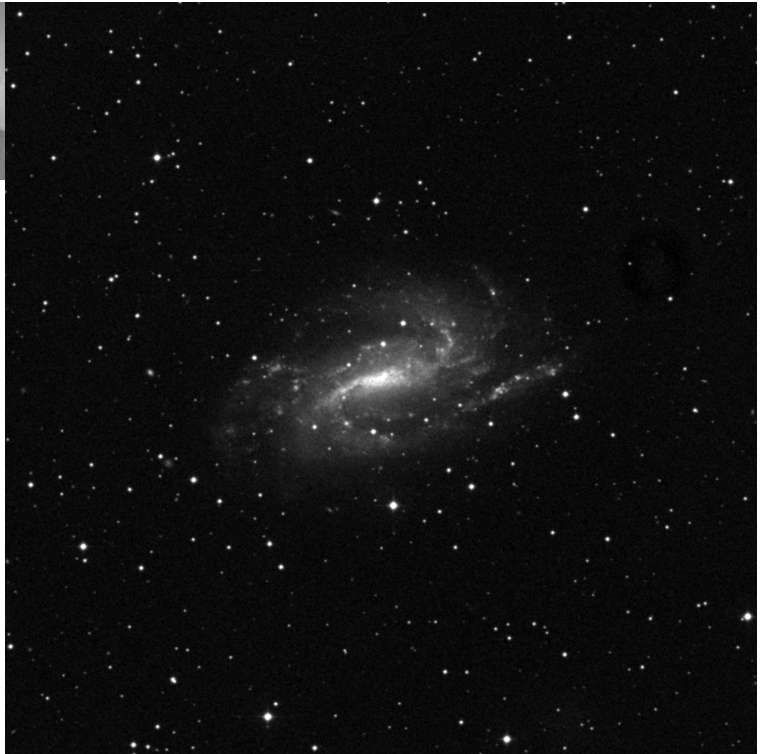


# Object of the Month

By Chuck Dezelah

## NGC 925

NGC 925 is a barred spiral galaxy in the constellation Triangulum. Despite residing in a similar part of the sky as the famed M 33 Galaxy—often called the Triangulum Galaxy as it is the brightest and most renowned of that constellation’s deep sky objects—the unnamed NGC 925 is about 10 times more distant and is often overlooked by amateur astronomers. Whereas M 33 is part of the Local Group along with the Milky Way and Andromeda Galaxies, NGC 925 is part of the NGC 1023 Group of galaxies and lies about 30 million light years away. The galaxy has an integrated apparent magnitude of 10.1, angular dimensions of approximately 9.8' x 6.0', and a morphological classification of SB(s)d, which designates an s-shaped galaxy with a distinct central bar and loosely wound spiral arms. It also possesses features of a class known as Magellanic Spirals, a category containing some irregular characteristics and where typically one spiral arm is dominant and the bar is offset towards one side, with the Large Magellanic Cloud being the prototypical example of this type.

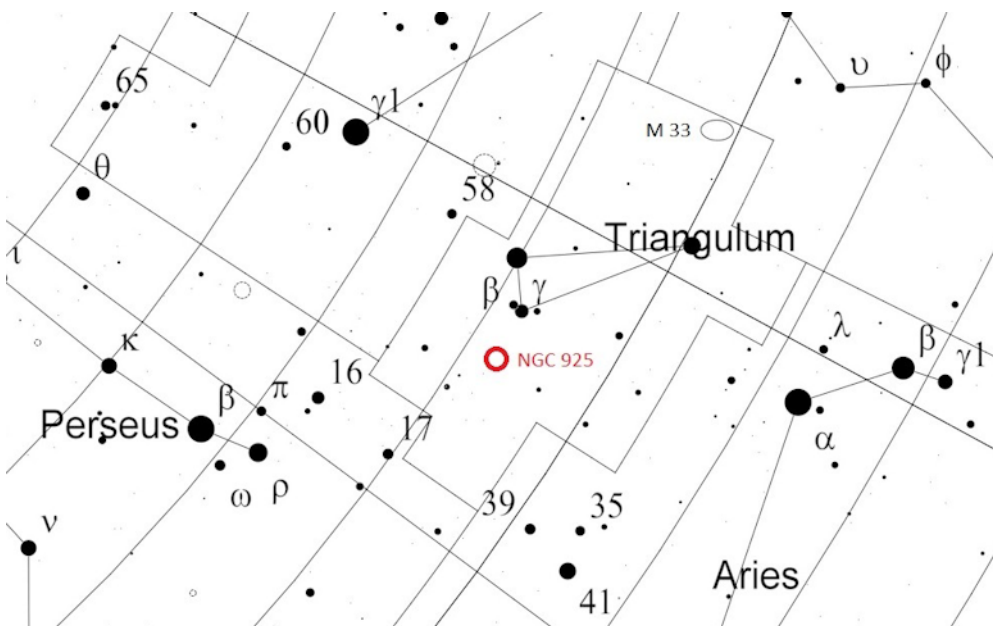


Source: Digitized Sky Survey, FoV = 20'

NGC 925 is simple to locate, but may take a bit of effort to recognize in the eyepiece. The galaxy is positioned about 2° west of  $\gamma$  Trianguli (mag. 4.03) and 4° east-southeast of  $\beta$  Trianguli (mag. 3.00). It is best observed at

low to medium power, in apertures of 8-inches or larger, although under dark sky conditions smaller telescopes can provide a glimpse of this fascinating object. Typically, observations reveal a large bright, bar-like

core region that is conspicuously elongated in the east-west direction, surrounded by a faint oval halo which comprises the spiral arms. Notably, a string of five evenly spaced stars can be spotted along the southern edge of the galaxy and can serve as an aid in identification. With averted vision and good seeing conditions, some signs of mottled structure in the peripheral regions can be detected. In 12-inch or larger telescopes at magnifications of 100x or greater, counter-clockwise loose spiral arms can be seen, albeit tenuously.



Source: Cartes du Ciel

# History S.I.G.

## November 1982

The cover of this issue features an astro-photo taken by Frank McCullough of the Double Cluster. He states it was taken with a 3" scope, guided by the club's 12½" telescope.



The first of two articles in this issue, "In Search of Dark Skies" by Doug Bock, recounts the cloudy yet somewhat successful venture some intrepid astronomers from WAS took to Cadillac, MI.

The next article, "The Flat Truth?" by Judy Butcher, isn't the refutation I thought it would be, but simply a reporting of what Judy found out by corresponding with the society. She draws no conclusions, just a last line of a "we know better" sort and a nod to critical thinking.

## November 1992

"Computer Chatter" by Larry F. Kalinowski is starting to look more like "Astro Chatter" this month.

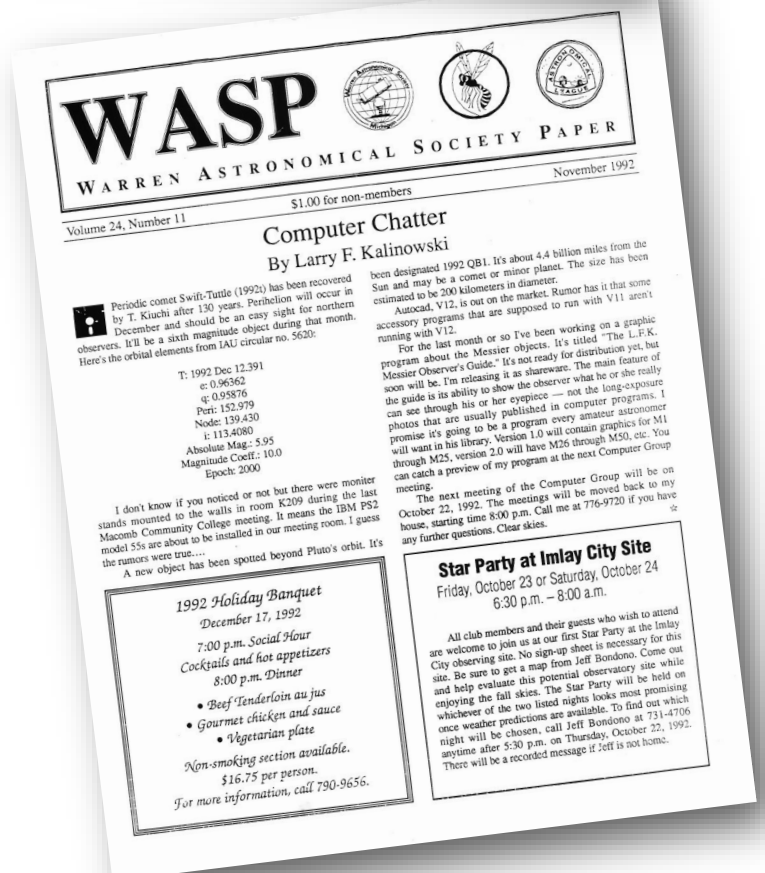
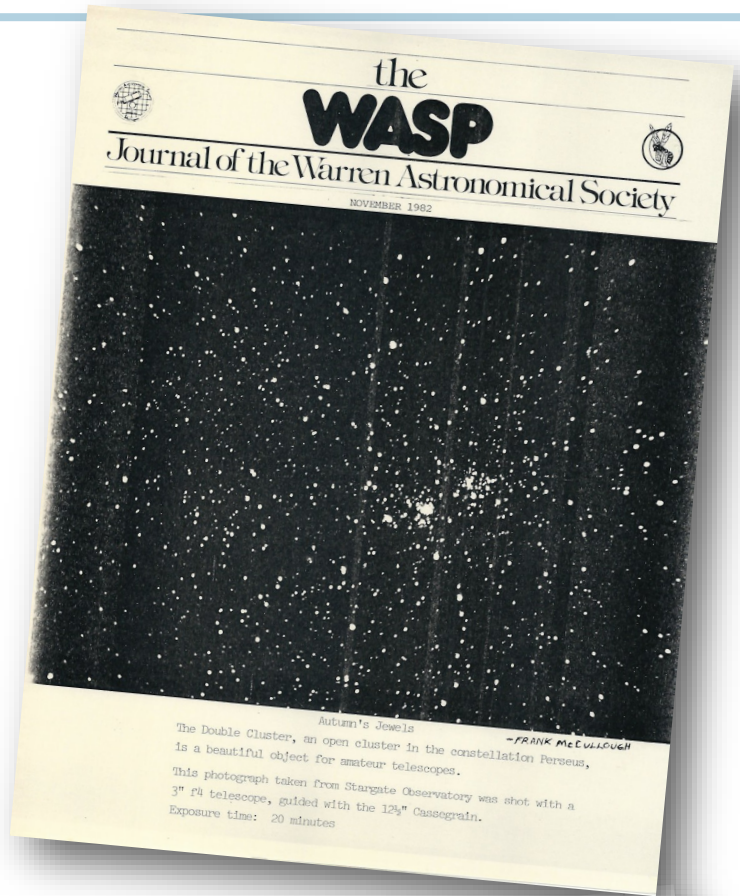
Then, four of the eight pages of this issue are taken up with NASA's Space Link articles:

NASA Space Links: Hubble Space Telescope's First 18 Months in Orbit Report; NASA Spacecraft Begins Gravity Mapping of Venus; Searching for Extraterrestrial Intelligence; Student Payload Successfully Launched on NASA Rocket

## From the Scanning Room

In June of 1989, the WAS board tackled the prospect of replacing Ken Kelly as editor of the WASP. Owners of desktop publishing software were suggested as prime candidates. Changes were also floated in the discussion: one being limiting the WASP to four sheets (8 pages of print capacity). I suppose that was to save costs of paper and, given the paucity of member contributions, feasible. The early nineties WASPs stuck to that rule pretty much, but became a NASA flyer: informative, but sadly, saying nothing about the doings of our club- could've used some minutes of meetings.

Dale Thieme,  
Chief scanner



## Club Member Name Tags

Email [publications@warrenastro.org](mailto:publications@warrenastro.org) for your personalized name tag

# NOVEMBER 2019

## Notable Sky Happenings

NOV. 1 - 7

The Moon is at the lower right of Saturn on the 1st (SSW evening). Daylight Saving Time ends at 2:00am on the 3rd. Set clocks back one hour at bedtime on the 2nd.

NOV. 8 - 14

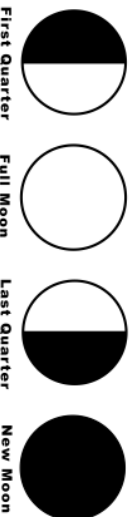
Rare transit of Mercury on the 11th. Begins at 7:36am, midpoint 10:20am, ends 1:04pm (all times are EST). The next transit will be in 2039. *Never look directly at the Sun!*

NOV. 15 - 21

The Leonid meteor shower peaks on Nov. 17-18. Expect an average of 40 per hour.

NOV. 22 - 30

Conjunction of Venus and Jupiter on the 24th. They'll be within 1.4 degrees of each other in evening twilight near the SW horizon. Binoculars will help spot them.



## Now Showing

### "Robot Explorers"

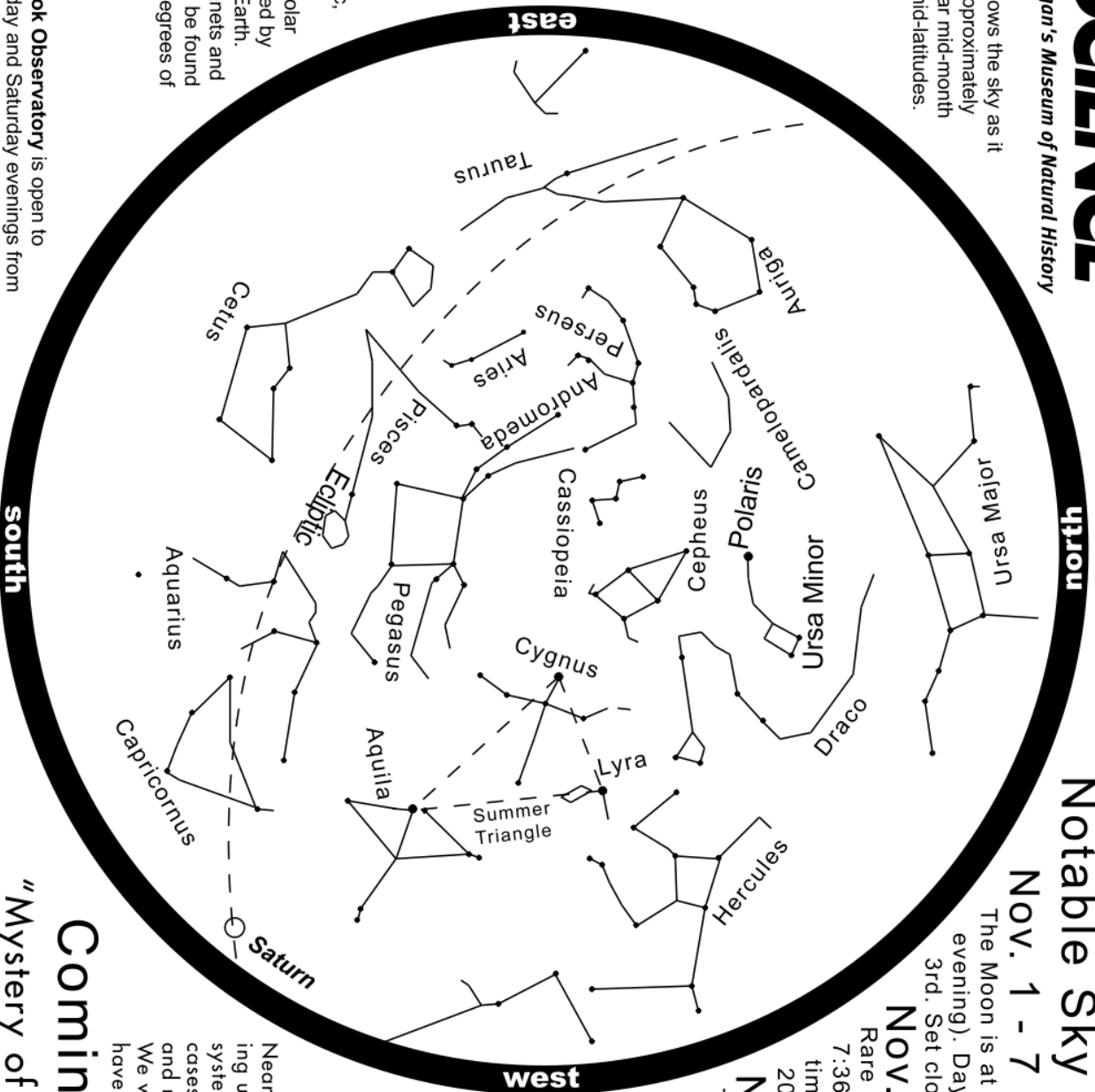
Near the end of the twentieth century, we began launching unmanned probes into the far reaches of the solar system. What they discovered was amazing and in some cases unexpected. New space missions are underway, and many of these robust spacecraft are still operational. We will pay tribute to these robots and learn what they have taught us about our solar system.

## Coming Nov. 27

### "Mystery of the Christmas Star"

Travel back in time 2,000 years to explore the nature of the "Star" that guided the wise men to Bethlehem. We will examine astronomical events that were occurring at the time and see if any were remarkable enough to have sparked the journey. (Extra shows for the holidays; please visit our Web page for the complete schedule.)

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



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 be found within a few degrees of this plane.

This chart shows the sky as it appears at approximately 8pm EST near mid-month at northern mid-latitudes.

The Cranbrook Observatory is open to the public Friday and Saturday evenings from 7:30 - 10:00pm EST, and the first Sunday of the month from 1:00 - 4:00pm for solar viewing. Come have a look through our 6" telescope!

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





## Stargate Observatory

### Monthly Free Astronomy Open House and Star Party

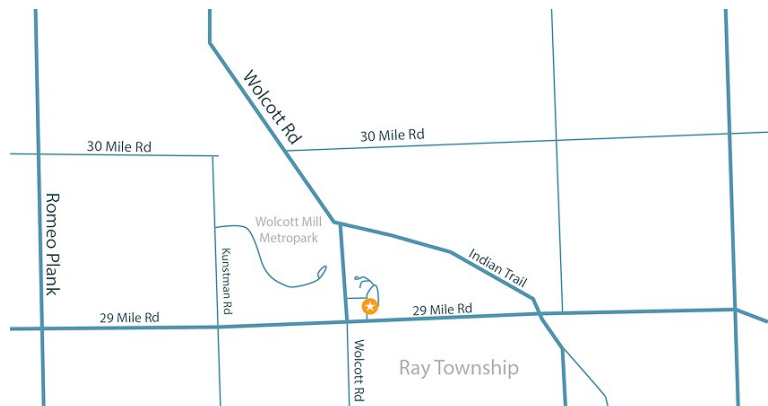
4th Saturday of the month!

Wolcott Mill Metropark - Camp Rotary entrance

- Sky tours.
- Look through several different telescopes.
- 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:

1. Closing time depends on weather, etc.
2. May be closed one hour after opening time if no members arrive within the first hour.
3. Contact the 2nd VP for other arrangements, such as late arrival time. Call (586) 634-6240 .
4. An alternate person may be appointed to open.
5. Members may arrive before or stay after the scheduled open house time.
6. Dates are subject to change or cancellation depending on weather or staff availability.
7. Postings to the Yahoo Group and/or email no later than 2 hours before starting time in case of date change or cancellation.
8. 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.
9. 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 October 2019

Mother Nature did not give us clear skies, as in the past. Instead, we were treated to a rainy, gloomy day and evening that only someone from Seattle, WA would enjoy. The event was sadly cancelled.

## Next Month Events

### Monday, November 11th, Transit of Mercury

There will be viewing of the transit of Mercury at Stargate from 10 am to 1:15 pm with a hydrogen-Alpha telescope, weather permitting.

### Saturday, November 23rd, Stargate Observatory Open House

Sunset : 5:02pm

Astronomical Twilight Ending : 6:42pm

Moonrise : 3:42am

Please arrive just after sunset (or sooner if you plan to set up a scope or do solar observing). A friendly reminder to be courteous if you arrive after dark, dim your headlights upon entry to the park, and no white light flashlights please. If you are setting up a large scope or have a lot of equipment to set up then you are permitted to park on the observing field, with your vehicle lights pointed away from the observatory and other telescopes.

Remember to dress warm and in layers!

Dave Baranski  
2nd VP, Observatory

## Saw a Fireball?

Report it to the American Meteor Society!



[www.amsmeteors.org/  
members/fireball/  
report-a-fireball](http://www.amsmeteors.org/members/fireball/report-a-fireball)

## Astronomical Events for November 2019

Add one hour for Daylight Savings Time

Source:

<http://www.astropixels.com/ephemeris/astrocal/astrocal2019est.html>

Day	EST (h:m)	Event
01	16:40	Moon at Descending Node
02	02:31	Saturn 0.6°N of Moon: Occn.
04	05:23	FIRST QUARTER MOON
05	19:00	S Taurid Meteor Shower
07	03:37	Moon at Apogee: 405060 km
09	14:18	Venus 3.8°N of Antares
09	18:07	Mars 2.6°N of Spica
11	10:00	Mercury at Inferior Conjunction
12	08:34	FULL MOON
12	18:00	N Taurid Meteor Shower
13	22:52	Aldebaran 3.0°S of Moon
16	01:00	Mercury at Perihelion
16	03:48	Moon at Ascending Node
17	06:41	Pollux 5.4°N of Moon
18	00:00	Leonid Meteor Shower
18	05:11	Beehive 0.9°S of Moon
19	16:11	LAST QUARTER MOON
19	18:24	Regulus 3.7°S of Moon
23	02:54	Moon at Perigee: 366721 km
24	04:02	Mars 4.3°S of Moon
24	21:50	Mercury 1.9°S of Moon
26	10:06	NEW MOON
28	05:00	Mercury at Greatest Elong: 20.1°W
28	05:49	Jupiter 0.7°S of Moon: Occn.
28	13:50	Venus 1.9°S of Moon
28	23:13	Moon at Descending Node
29	16:12	Saturn 0.9°N of Moon: Occn.



MICHIGAN SCIENCE CENTER &  
DETROIT PUBLIC LIBRARY PRESENT:

# SCOPES IN THE CITY

*Gaze upon deep sky objects using our telescope collection, plus hands-on space activities for all ages!*

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**NOVEMBER 26TH, 5:30-7:30 PM**  
**MAIN BRANCH LIBRARY**  
**5201 WOODWARD AVE**

Funded by the Michigan Space Grant Consortium NASA grant #NNX15AJ20H and supported by the Community Telecommunications Network and Ford.



# Outreach Report

## Mercury Transit - November 11, 2018, Sunrise - 1 PM

Mercury will transit the face of the Sun for several hours on the morning of November 11, 2019. Several W.A.S. members will be at various sites with their telescopes (weather permitting):

- Mark Kedzior will be at Grosse Pointe Woods Library (site TBD) from 8AM-1PM.
- Jeff MacLeod will be at Wayne State in the center mall with the Planetarium & SAS.
- I will be at Endeavour School; I think Connie's plan was for me to show her entire school.
- Dr. Dale Partin and Bob Berta will be at Stargate Observatory (9am-1:15pm).

## Member Spotlights:

### Camp Rotary Scout Palooza - Sat. Oct. 19

About 50 Girl Scouts were camping at Wolcott Mills Oct. 18-20; on Saturday the 19th - Sandra Macika and I were in the western building with them; Sandra was set up at a table with her meteorites, I was showing the girls (and leaders, and a couple parents) a Virtual Reality fly-over of Saturn. The troop leader said she wanted to donate to the W.A.S. - I gave her our P.O. Box address from our website.

That same evening, Bob Berta was in the east building with a large troop of Boy Scouts, helping them with badge work, so there were scouts everywhere!

Diane Hall reports that she and Jonathan Kade arrived at Stargate about 7:30 PM; Bob Berta was giving the Boy Scout troop a tour of the observatory, W.A.S. member John Pannuto had his 8" SCT on the field and Angelo Di-Donato was assisting him in having Scouts view Jupiter and then Saturn when the Girl Scouts arrived. Jonathan opened the dome and used the Kalinowski-Khula telescope to show the combined Scout groups Saturn, Albireo, and then the Double-Double, during which we lost the skies. Seemed like about 50 Scouts & leaders overall. It was a good time despite the early end to the evening as everyone got to see something.

*Thanks to all of our volunteers for helping the scouts!*

### Rotary Club - Tue Oct. 29

Bob Berta and Dale Partin did a presentation to the Rotary Club, who were responsible for allowing us to have Stargate over 50 years ago. Bob and Dale covered the history

of the W.A.S. and what the W.A.S. does for the community, schools, Scouts, etc. They also did an Astronomy 101 Q/A session that the Rotary Club loved. The Rotary Club is considering a visit to Stargate; they also plan to have Bob and Dale back for an Astronomy 102 session. (*Hey! How do \*I\* muscle-in on this presentation? -Bob T.*)

### Mark Kedzior

Mark Kedzior gave an "In the Skies" presentation at the Chesterfield Township Library on Oct. 22nd; the very next day he hosted a telescope class AND another "In the Skies" presentation at the Grosse Pointe Woods Library. Mark will be doing additional "In the Skies" presentations at both Chesterfield and Grosse Pointe in November where he will be discussing the Mercury transit on Nov. 11.

## Astronomy at the Beach NEEDS Your Help!

Astronomy at the Beach is fortunate to have a highly supportive host (Michigan's DNR) and a good location (Island Lake State Rec Area). We have great momentum, with 23 straight years of success. **However, the event is at risk.** The workload to plan and execute the event has fallen on fewer and fewer shoulders, causing the current GLAAC leadership board to step down.

**Therefore, in order to continue, this event needs a fresh infusion of enthusiastic volunteers.**

There is a great well of experience to draw from - previous volunteers are available for answers and perspective. Previous volunteers are happy to provide their documents so that new volunteers can "hit the ground running."

*Here are the jobs to be done on the GLAAC planning committee:*

**PRESIDENT** - presides over meetings, helps establish direction, coordinate and oversees activities, etc.

**VICE PRESIDENT** - assists the president with governance of GLAAC and fills in when necessary. Maintains connection to host DNR and institutions that support GLAAC (Michigan Science Center, Cranbrook, universities and others).

**SECRETARY** - keeps records/minutes, sets up and notifies of meetings.

**TREASURER** - keeps records of income and ex-

*(Continued on page 24)*

(Continued from page 23)

penditures, including donations, and gives reports

**COMMUNICATIONS DIRECTOR** – responsible for getting the word out of the event (Facebook, websites, press releases, emails to teachers, public relations of all types).

*Not up to being on the committee? Here are some of the key tasks that require help:*

**PLANNING the PROGRAM** – speakers, club tables, printed programs, science demonstrations, scavenger hunt, communicating, confirming with people.

**PLANNING the TENT LOGISTICS** – dealing with tent vendor, coordinating location with DNR, payment, who goes where, arranging A/V and electricity.

**PLANNING OTHER LOGISTICS** – signs, parking, volunteers, Ham radio helpers, telescope field ambassadors, Girl Scout volunteers, getting the many supplies beforehand, getting help with setup and takedown.

**SOCIAL MEDIA** – updating GLAAC website, creating Facebook event, doing Facebook promotions of all types, using other social media to increase awareness.

**PUBLIC RELATIONS** – sending emails to STEM teachers, getting articles written, mentions on event calendars, mentions on radio/TV.

**GETTING MONEY** – sending invoices to clubs and sponsors, chasing down checks.

**WORKING WITH DNR** – setting date, planning the event, planning logistics, getting volunteer forms completed by everyone on committee, food vendor, last-minute questions and issues.

**TELESCOPE FIELD PLANNING** – communicating with clubs, recruiting as many telescopes as possible, working with DNR on unloading/loading/parking plans, creating maps, improving guest experience, telescope volunteer satisfaction, on-site managers, keeping things safe.

**ACTUAL SETUP and TAKEDOWN** – the tents, chairs, tables, stage, electrical cords, speakers, projectors, amps, mixers, screens, many street signs, other signs, balloons, blow-up aliens, etc.

**CUSTOMER EXPERIENCE SURVEY** – designing, distributing, collecting, analyzing, reporting.

The GLAAC leadership board meets each month via online/phone teleconference in the evening. As the event gets closer, meetings in July and August can be bi-monthly.

The current volunteer board is committed to seeing this wonderful event continue. However, the new slate of volunteers will be free to decide what they want the event to be. Please forward this to anyone you think might be interested. Your opportunity to take the first step is to be part of the January GLAAC planning meeting in January 2020 (date TBD).

---

## Presenters/Volunteers Wanted:

### Apollo Adventure

at Detroit Public Library with Michigan Science Center -  
Tuesday November 26 5:30-7:30PM

The Michigan Science Center has offered the DPL a sidewalk astronomy session, with some activities for inside “just in case;” they are looking for volunteers – setup will begin around 4:30 PM, and they ask that volunteers show up around then.

The Science Center will bring four telescopes and have up to 10 indoor activities (the number of activities will depend on how many volunteers we have).

Contact: Jennifer Dye <[jdye@detroitpubliclibrary.org](mailto:jdye@detroitpubliclibrary.org)>

### Sunday Outreach

at the Detroit Public Library

They would like to have speakers on Sundays starting in December. Open dates are: [12/15](#), [1/19](#), [2/16](#), [3/15](#), [4/19](#), and [5/17](#) (These link to the W.A.S. Outreach Calendar.)

Contact: Jennifer Dye <[jdye@detroitpubliclibrary.org](mailto:jdye@detroitpubliclibrary.org)>

### City for Frazer

We recently had a successful event with them; they would like to do quarterly events with us.

Contact: Christina Woods  
<[christinaw@micityoffrazer.com](mailto:christinaw@micityoffrazer.com)> 586.296.8483

(Continued on page 25)



(Continued from page 24)

## Lake St. Clair Metropark Nature Center (Metrobeach)

They would like to plan something with us in 2020 - possibly Astronomy Day, and a couple days when the Moon will be viewable.

Contact: Samantha Volz [Samantha.Volz@metroparks.com](mailto:Samantha.Volz@metroparks.com) 586-463-4581

If you are interested in presenting at any of these locations, please let me know!

Bob Trembley  
Outreach

## 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)

## Meeting Minutes

### BOARD MEETING

October 7th, 2019

Members present: David Baranski, Bob Trembley, Dr. Dale Partin, Jeff MacLeod, Jonathan Kade via phone, Jon Blum, and Jerry Voorheis.

The meeting was called to order by Jeff MacLeod at: 6:33 PM.

#### Officer's reports

President Jeff MacLeod gave the President's report.

Jonathan Kade gave the 1st Vice President's report. He delivered a deposit check to the Ukrainian Cultural Center for the WAS banquet.

David Baranski gave the 2nd Vice President's report. The Open House was fair with about 40 people attending. The dome is still rotating.

Jerry Voorheis gave the Secretary's report. The minutes are in the WASP.

Bob Trembley gave the Outreach report. There were 500 people at Astronomy on the Beach Friday and 3000 people on Saturday. There will be a big Girl Scout event at Wolcott Metropark Saturday, October 19<sup>th</sup>. There will be a transit of Mercury on November 11<sup>th</sup>.

Dr. Dale Partin gave the Publications report. The WASP is up.

#### Old Business

Motion by Jonathan Kade to buy a solar telescope from Parker Huellmantel for \$500.00. Seconded by Dr. Dale Partin. Motion Passed.

#### New Business

There was a discussion about candidate selection for the

Paul Strong Scholarship.

There was a discussion of WAS awards.

Jon Blum, David Baranski, and Jerry Voorheis were named as the Election Committee for the WAS election.

There was a discussion of the depository of old equipment in the DOB shed.

The meeting adjourned at: 7:23 PM.

### CRANBROOK MEETING

October 7th, 2019

Meeting called to order at 7:31 PM by Jeff MacLeod, President.

Roll call: 38 persons were present.

Ken Bertin presented In the News and Gary Ross presented In the Sky.

#### Officer Reports

Jeff MacLeod gave the President's report. He thanked all who participated in Astronomy on the Beach. There was a round of applause. He announced that WAS elections would be next month.

Jonathan Kade gave the 1<sup>st</sup> Vice President's report. He reported a full schedule for the month.

David Baranski gave the 2<sup>nd</sup> Vice Presidents report. He reported a good Open House with about 40 people attending. The next Open House will be October 26<sup>th</sup>.

Mark Jakubisin gave the Treasurer's report. Details are in the WASP.

Secretary Jerry Voorheis reported that the minutes are in the WASP.

Bob Trembley gave the Outreach report. There will be a big

(Continued on page 26)

(Continued from page 25)

Girl Scout event at Wolcott Metropark Saturday, October 19<sup>th</sup>.

Dr. Dale Partin reported that the WASP is up.

Bill Beers announced that he was willing to teach anyone interested about astrophotography.

Observing reports: There was a report about Moon Observation Night.

Jeff MacLeod gave a presentation about the duties of WAS officers,

The Short Presentation was given by Kevin McLaughlin - "A visit to the LIGO Gravity Wave Detector".

Snack/Break Time.

The Main Presentation was given by Professor Sally Oey - "The Quest for Dark Skies in Michigan".

The meeting was adjourned at 10:08 PM.

## MACOMB MEETING

October 17<sup>th</sup>, 2019

Meeting called to order at 7:31 PM by Jeff MacLeod, President.

Roll call. 32 persons were present.

Jeff MacLeod gave the President's Report. He announced that tickets were available for the WAS banquet.

The Discussion Group will be hosted by Gary Ross.

Jeff MacLeod gave the 1<sup>st</sup> Vice President's report. Upcoming talks were announced.

Jeff MacLeod gave the 2<sup>nd</sup> Vice President's report. The open house was a success with 40 persons and good skies. The next open house will be on October 26<sup>th</sup>.

Jeff MacLeod gave the Secretary's report. The minutes are in the WASP

Jeff MacLeod gave the Treasurer's report.

Bob Trembley gave the Outreach report. There will be a Mercury transit on November 11<sup>th</sup>.

Jeff MacLeod gave the publications report. The WASP is out.

Bill Beers made announcements about teaching Astrophotography and about the WAS calendar.

Diane Hall presented In the News and In the Sky.

Observing Reports: Bob Trembley reported on outreach with students, Jeff MacLeod reported observing the Andromeda Galaxy with a friend using binoculars.

Jeff MacLeod gave a call for Astronomy questions. Questions were asked followed by discussion.

Snack/Break Time.

The Main presentation was given by Jonathan Kade - "Stargate Observatory: 50 Years and Counting".

The meeting was adjourned at 9:33 PM.

Jerry Voorheis  
Secretary

# Treasurer's Report

## Treasurer's Spooktacular Report for 10/31/2019

### MEMBERSHIP

We have 115 current members

### INCOME AND EXPENDITURES (SUMMARY)

We took in \$3,311 and spent/transferred \$3,887 We have \$19,404 in the bank \$0 in checks and \$597 in cash, totaling \$20,001 as of 9/29/2019.

### INCOME

\$2,196	Memberships/renewals
\$159	Astronomical League
\$557	Snacks
\$165	Calendars
\$49	Paul Strong Scholarship

### EXPENSES

\$351	Snacks / Supplies
\$90	Meetup Fees 2019
\$30	Library Storage Boxes
\$500	Banquet Deposit
\$274	Library Telescope
\$500	Paul Strong Scholarship Donation
\$500	Ha Solar Telescope
\$300	Donation to AATB 2019
\$1,146	Club Insurance 2019

## GLAAC REPORT 10/31/2019

Beginning Balance: \$5,151.34

### INCOME

\$1,949	Donations for AATB 2019
---------	-------------------------

### EXPENSES

\$514	Reimbursement for printing 2018 Flyers
\$2627	AATB 2019 Tent Rental
\$1074	Miscellaneous expenses for AATB
\$485	Sound System for AATB

Ending Balance: \$2,399

Mark Jakubisin  
Treasurer

**amazon**smile  
You Shop. **Amazon Gives.**

If you're shopping on Amazon, make sure to use Amazon Smile. It costs you nothing, and if you select us as your charity, Amazon will donate 0.5% of every purchase you make to the Warren Astronomical Society.

## 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="#">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

Warren Astronomical Society:  
Oakland Astronomy Club:  
Ford Amateur Astronomy Club:  
Sunset Astronomical Society:  
University Lowbrow Astronomers:

<http://www.warrenastro.org/was/newsletter/>  
<http://oaklandastronomy.net/newsletters/oacnews.html>  
<http://www.fordastronomyclub.com/starstuff/index.html>  
<http://www.sunsetastronomicalsociety.com/>  
<http://www.umich.edu/~lowbrows/reflections/>

### WAS Member Websites

Jon Blum: [MauiHawaii.org](http://MauiHawaii.org)  
Bob Trembley: [Balrog's Lair](#)  
Bill Beers: [Sirius Astro Products](#)

Jon Blum: [Astronomy at JonRosie](#)  
Bob Trembley: [Vatican Observatory Foundation Blog](#)  
Jeff MacLeod: [A Life Of Entropy](#)

Doug Bock: <https://boonhill.org>  
Facebook: Northern Cross Observatory <https://www.facebook.com/NorthernCrossObservatory>  
Boon Hill and NCO Discussion <https://www.facebook.com/groups/369811479741758>  
YouTube channel: <https://www.youtube.com/channel/UC-gG8v41t39oc-bL0TgPS6w>



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.org](http://nightsky.jpl.nasa.org) to find local clubs, events, and more!

## The Messenger Crosses the Sun: Mercury Transit 2019

By David Prosper

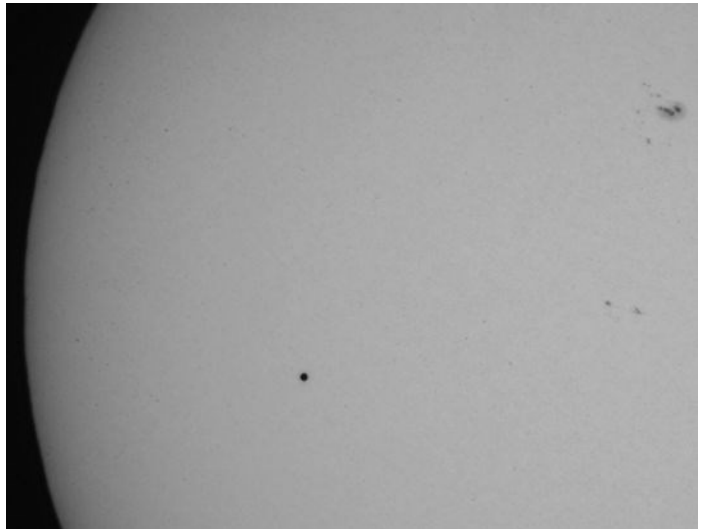
Did you know that there are two other objects in our skies that have phases like the Moon? They're the inner planets, found between Earth and the Sun: Mercury and Venus. You can see their phases if you observe them through a telescope. Like our Moon, you can't see the planets in their "new" phase, unless they are lined up perfectly between us Earthlings and the Sun. In the case of the Moon, this alignment results in a **solar eclipse**; in the case of Mercury and Venus, this results in a **transit**, where the small disc of the planet travels across the face of the Sun. Skywatchers are in for a treat this month, as Mercury transits the Sun the morning of **November 11!**



Photo of the May 9, 2016 transit of Mercury. Mercury is the small dot on the center right. Note how tiny it is, even compared to the small sunspot on the center left. Credit: Dave Huntz

You may have seen the transit of Venus in 2012; you may have even watched it through eclipse glasses! However, this time you'll need a solar telescope to see anything, since eclipse glasses will only reveal the Sun's blank face. Why is that? Mercury is the smallest planet in our solar system, and closer to the Sun (and further away from Earth) during its transit than Venus was in its 2012 transit. This makes Mercury's disc too small to see without the extra power of a telescope. Make absolutely certain that you view the transit via a telescope equipped with a safe solar filter or projection setup. Do NOT

combine binoculars with your eclipse glasses; this will instantly burn a hole through the glasses – and your eyes! While most people don't have solar telescopes handy, many astronomy clubs do! Look for clubs hosting Mercury transit observing events near you at [bit.ly/findnsn](http://bit.ly/findnsn) (USA) or at [bit.ly/awbtransit](http://bit.ly/awbtransit) (worldwide).



This photo from the same 2016 transit event shows Mercury a bit larger, as it should; it was taken at a higher magnification through a large 16 inch telescope! Credit: J. A. Blackwell

What a fun opportunity to see another planet during the day! This transit is expected to last over five hours. Folks on the East Coast will be able to watch the entire transit, weather permitting, from approximately 7:35 am EST until around approximately 1:04 pm EST. Folks located in the middle of North America to the west coast will see the transit already in progress at sunrise. The transit takes hours, so if your weather is cloudy, don't despair; there will be plenty of time for skies to clear! You can find timing details and charts via eclipse guru Fred Espenak's website: [bit.ly/mercurytransit2019](http://bit.ly/mercurytransit2019)

Mercury's orbit is small and swift, and so its position in our skies quickly changes; that's why it was named after the fleet-footed messenger god of Roman mythology. In fact, if you have a clear view of the eastern horizon, you'll be able to catch Mercury again this month! Look for it before dawn during the last week of November, just above the eastern horizon and below red Mars. Wake up early the morning of November 24<sup>th</sup> to see Mars, the Moon, and Mercury form a loose triangle right before sunrise.

Discover more about Mercury and the rest of our solar system at [nasa.gov](http://nasa.gov)