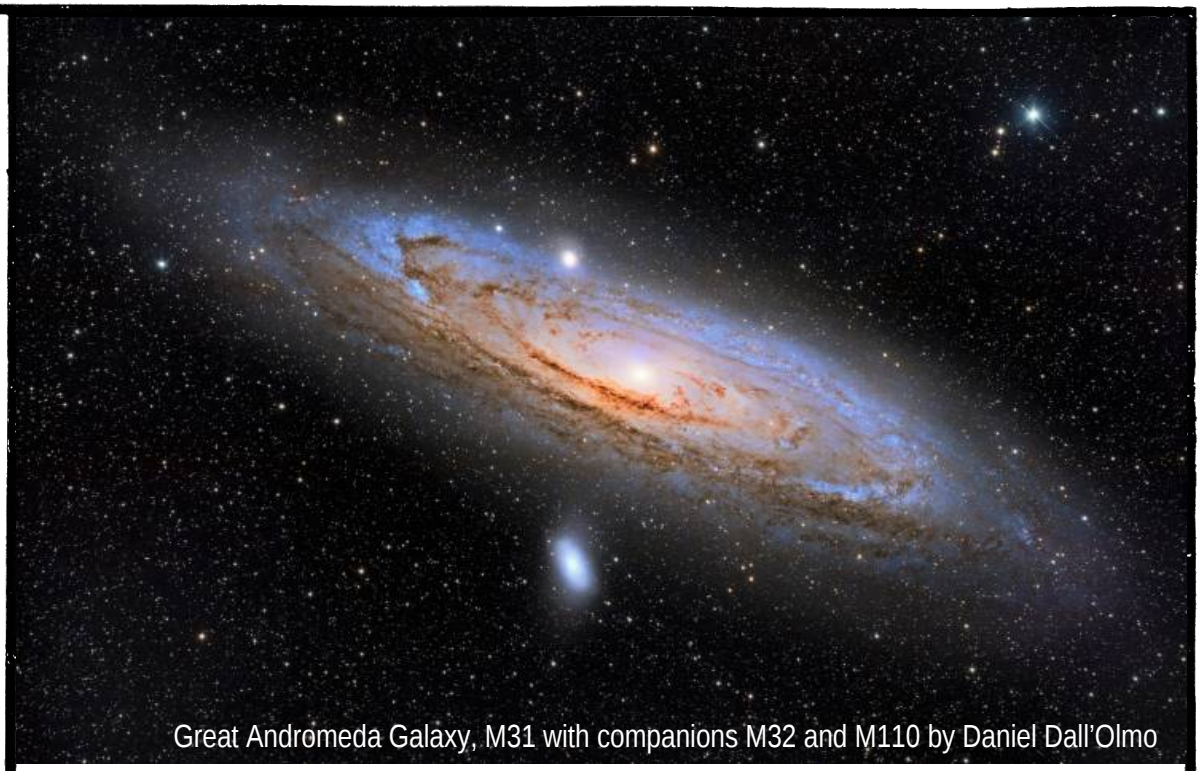
STELLAR SENTINEL
Grand Traverse Astronomical Society October 2026



Great Andromeda Galaxy, M31 with companions M32 and M110 by Daniel Dall'Olmo

Our Expanding World View

By Bob Moler

Humankind's idea of the size of the world has increased from primitive times to now. By the world, I mean in the sense of the universe. From primitive ideas the sky dome over a flat earth, the earth centered universe pretty much believed up till the time of Copernicus to the universe we know it today.

Copernicus posited that the motion of the planets would be much simpler if we assume that they were viewed from a moving earth, the third planet from the sun. This didn't go down well with church leaders, both Catholic and Protestant, who thought that both the earth and we were the pinnacle of Creation, and rightly belonged in the center of it all.

The geocentric models of the solar system that I've seen have the stars on a sphere outside the orbit of Saturn. There is no idea of depth of that sphere, because they had no way of measuring it. In the latter half of the 16th century a fellow by the name of Giordano Bruno put forth the idea that the stars in the sky were suns. That they may have planets and those planets may have life. For this and other heretical beliefs of his, he was burned at the stake in 1600. Galileo with a small telescope scanned the Milky Way and found that the haze of the Milky Way resolved into stars too faint to see with the naked eye. This brought up the question in some quarters as to why God would create stars too faint to actually be seen with the naked eye. It also introduced the idea that the starry sphere was indeed deep.

From then, until the early 20th century astronomers pretty much thought that the Milky Way was the entire universe except for those two little Clouds of Magellan. That was it.

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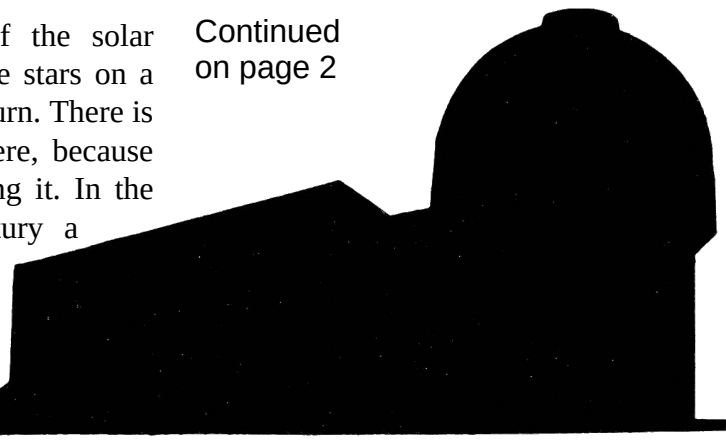

Our Expanding World View (Continued from page 1)

Among the objects that were discovered with the telescope visually were little compact nebulae or clouds that were sprinkled all over the sky, the biggest of which was it the great Andromeda Nebula. Lord Rosse with his 72 inch telescope in Parsons Town, Ireland was able to see a spiral structure in one of them, It's called the Whirlpool Galaxy or M51. I myself have seen on a couple of occasions M51 show itself as a spiral. The others of these nebulae were not so forth coming with their structure visually.

With the advent of photography it was shown that many of these objects also had a spiral structure. So what they what could they be? One thought that these spiral nebulae were actually new solar systems or star systems evolving according to Immanuel Kant's nebular hypothesis of solar system formation proposed in 1755. Kant was basically correct. However, the problem is that they did not have the same distribution in the sky as the stars around us in the Milky Way. There were none in a milky band itself. If they were among the stars around us, they would be concentrated more in the milky band. The spiral nebulae were distributed all over the sky, except in the milky band.

Observations using spectroscopy to break light into its various colors revealed that spiral nebulae had star-like continuous spectra with absorption lines. Nebulae of emission and planetary types found in the Milky Way showed the bright line spectra of gas clouds.

Things kind of came to a head in 1920 with, what is called, the Great Debate between Harlow Shapley and Heber Curtis. The latter proposed that these spiral nebulae were other Milky Ways. Since the Milky Way was considered a universe at that time they gained the name for a while, Island Universes. Shapley stuck with the old notion that the Milky Way and its constituents, everything we could see, all were the whole universe. That these spiral nebulae were relatively nearby. Shapley was studying globular clusters and found that they were concentrated mainly towards one sector of the sky, namely, toward the constellation of Sagittarius. And he thought the of the Milky Way Galaxy or universe center was in that direction. He was correct about the distribution of the globular star clusters, which put the sun far from the center of the Milky Way.

In science, a debate proves nothing, but it does crystallize the issues. What is needed is evidence. This was provided by Edwin Hubble a few years later when he a found a Cepheid variable star in the Great Andromeda Nebula. This star was so far away that it could not be part of the Milky Way system.

When I was lad, a bit over 70 years ago, I consolidated my casual interest in the celestial realm into the hobby of astronomy in the early 1950s. Most of the books from the library, which could have been a decade old or so, stated that the Andromeda Galaxy was 750 thousand light years away. Definitely outside the Milky Way, but much closer than what we recognize today of about 2.5 million light years.

Harlow Shapley's study of globular star clusters included observing the Cepheid variable stars within them. Henrietta Swan Leavitt in 1908 discovered that there is a relationship between brightness and period of Cepheid variables, so they could be used as distance indicators. During Los Angeles blackouts during World War II, Walter Baade was able of using the dark skies at Mt. Wilson to photograph and resolve the stars in the central bulge of the Andromeda galaxy, and discovered dimmer Cepheids. This meant that there were two types of Cepheids, just

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Grand Traverse Astronomical Society - Est. June 1982 – 44 years of service

-----Officers-----		*-----Directors-----*	*----------Patrons----------*
President	Jerry Dobek	Charles Bell	Charles Bell, Robert Carroll & Terri Mills, Daniel Dall'Olmo, Don and Kathy Flegel, Bill Hathaway, Judy Moler, Chris & George Renner, Ronald & Jan Uthe
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Secretary	Don Flegel	Kim Dobek	
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Editor	Bob Moler		

Upcoming Society Events

Events not held at the Joseph H. Rogers Observatory depend on the weather.

Friday, October 2 – Monthly meeting and star party at NMC Rogers Observatory. Also available via **Zoom**. See our website http://www.gtastro.org. for instructions and a link to click.

No Board of Directors Meeting

8 PM – General Meeting: Bob Moler will present *Our Galactic Neighborhood*.

9 PM – Observing, if it is clear.

Friday, November 6 – Monthly meeting and star party at NMC Rogers Observatory. Also available via **Zoom**. See our website http://www.gtastro.org. for instructions and a link to click.

No Board of Directors Meeting

8 PM – General Meeting: *Tips for buying a telescope.* Learn from our mistakes.

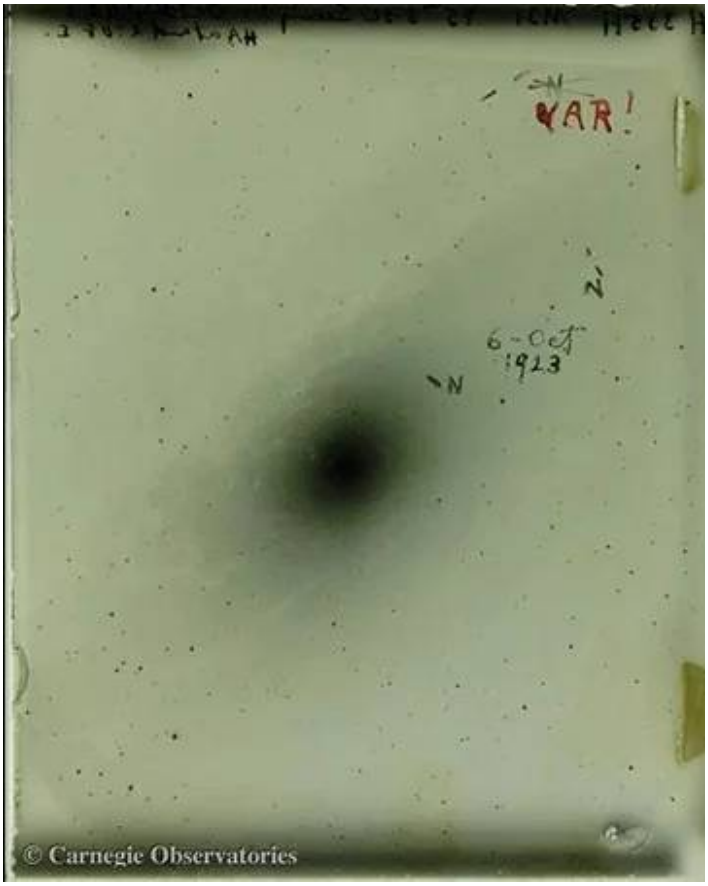
9 PM – Observing, if it is clear.

Zoom Meeting Link: https://us02web.zoom.us/j/8388913229?omn=88435646093

Our Expanding World View (Continued from page 2)

as there are two populations of stars based on age. The younger Population 1 stars that are basically within the spiral arms of our Galaxy, and the older Population 2 stars are found in the centers of galaxies and in globular clusters. The difference between them is the amount of metals in their atmospheres that produces spectral lines in those stars. And to astronomers a metal is anything any element heavier than helium. So metal poor stars are Population 2 and stars like the sun are Population 1. It turns out Cepheids of Population 1 are four times brighter than those of Population 2 that are found in globular star clusters, which are the most ancient of stars in the galaxy. The Cepheid that Hubble found in the spiral arms of the Andromeda Galaxy was Population 1 and 4 times brighter than it was originally thought to be. And since it's four times brighter, by the inverse square law it was twice as far away. The distance has been further refined so today we think that the Andromeda Galaxy is 2 1/2 million light years away. Also, all distance measurements based on Cepheid variables doubled.

Hubble also discovered that the Universe was expanding. And now we have evidence that the expansion is even accelerating!★



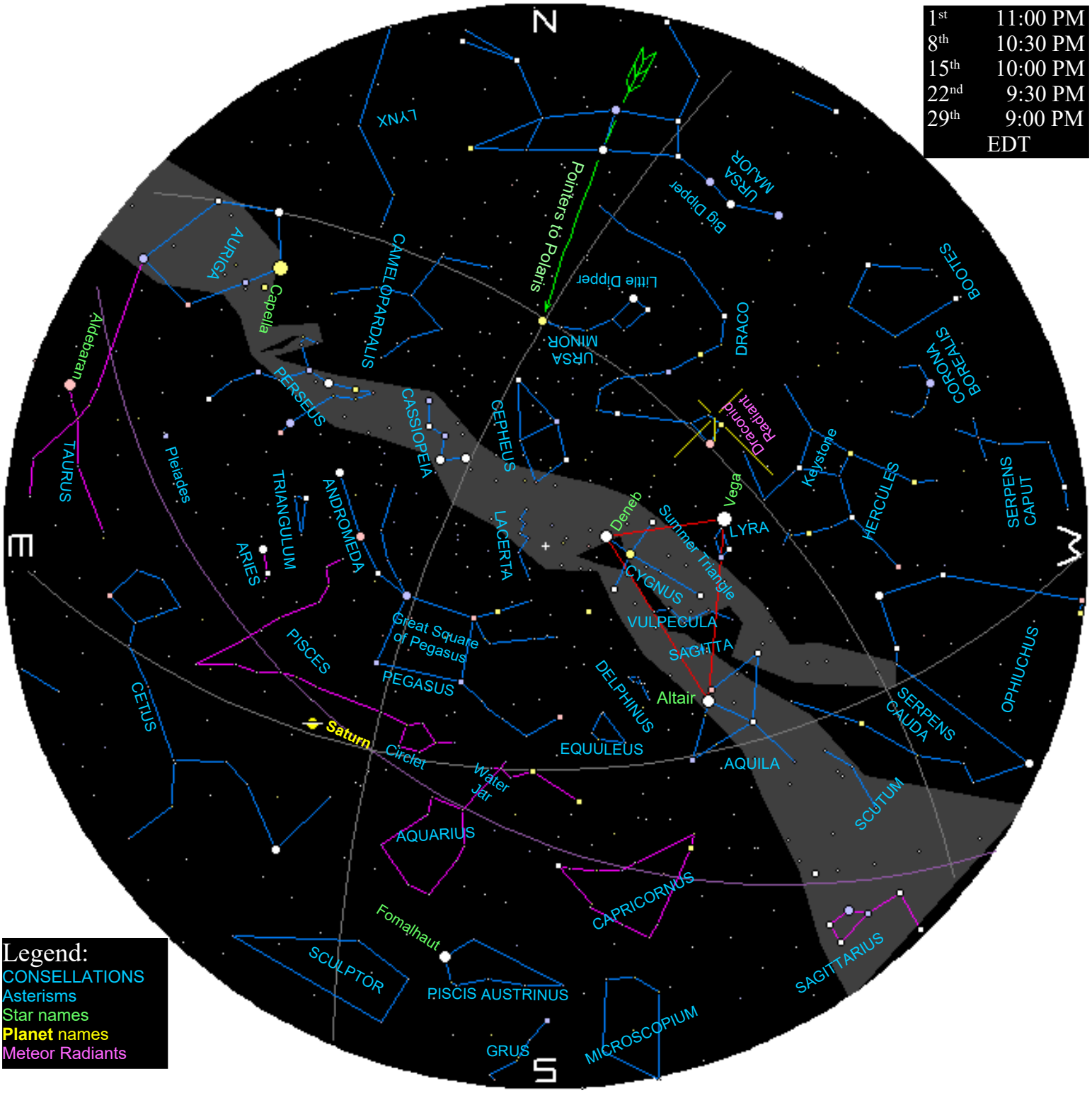
Photographic plate recording Hubble's discovery of a Cepheid variable star in the Andromeda Galaxy.

The Stars and Planets for October 2026

By Bob Moler

Planets are plotted for mid month. The star positions are correct for:

1st	11:00 PM
8th	10:30 PM
15th	10:00 PM
22nd	9:30 PM
29th	9:00 PM
	EDT



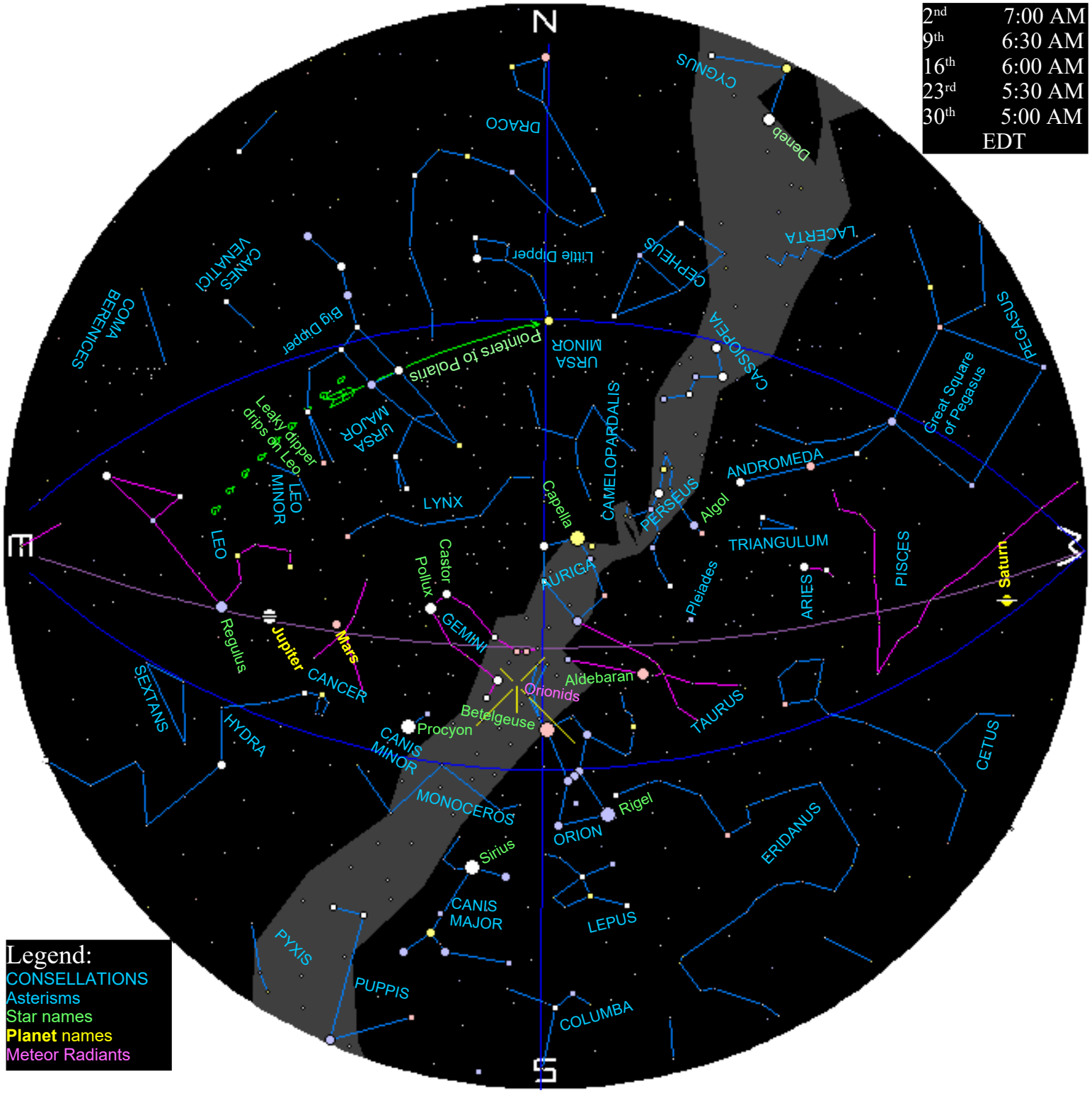
Legend:
CONSELLATIONS
Asterisms
Star names
Planet names
Meteor Radiants

The naked-eye planet Saturn is visible at chart time. Saturn is in Pisces. October brings the autumn constellations into prominence in the eastern half of the sky. The Pleiades is the beautiful star cluster rising in the east. The northernmost of the summer constellations are still hanging on in the western sky. The Milky Way, overhead, seems to rotate slowly counterclockwise over the evening. Another sign of autumn is low in the south, the bright star Fomalhaut appears for a few hours in the evening. There's still a lot to scan with binoculars for in the Milky Way as it is twisted now from northeast, through the zenith (+) and the star Deneb, to the southwest.

The Stars and Planets for October Mornings 2026

By Bob Moler

Planets are plotted for mid month. The star positions are correct for:

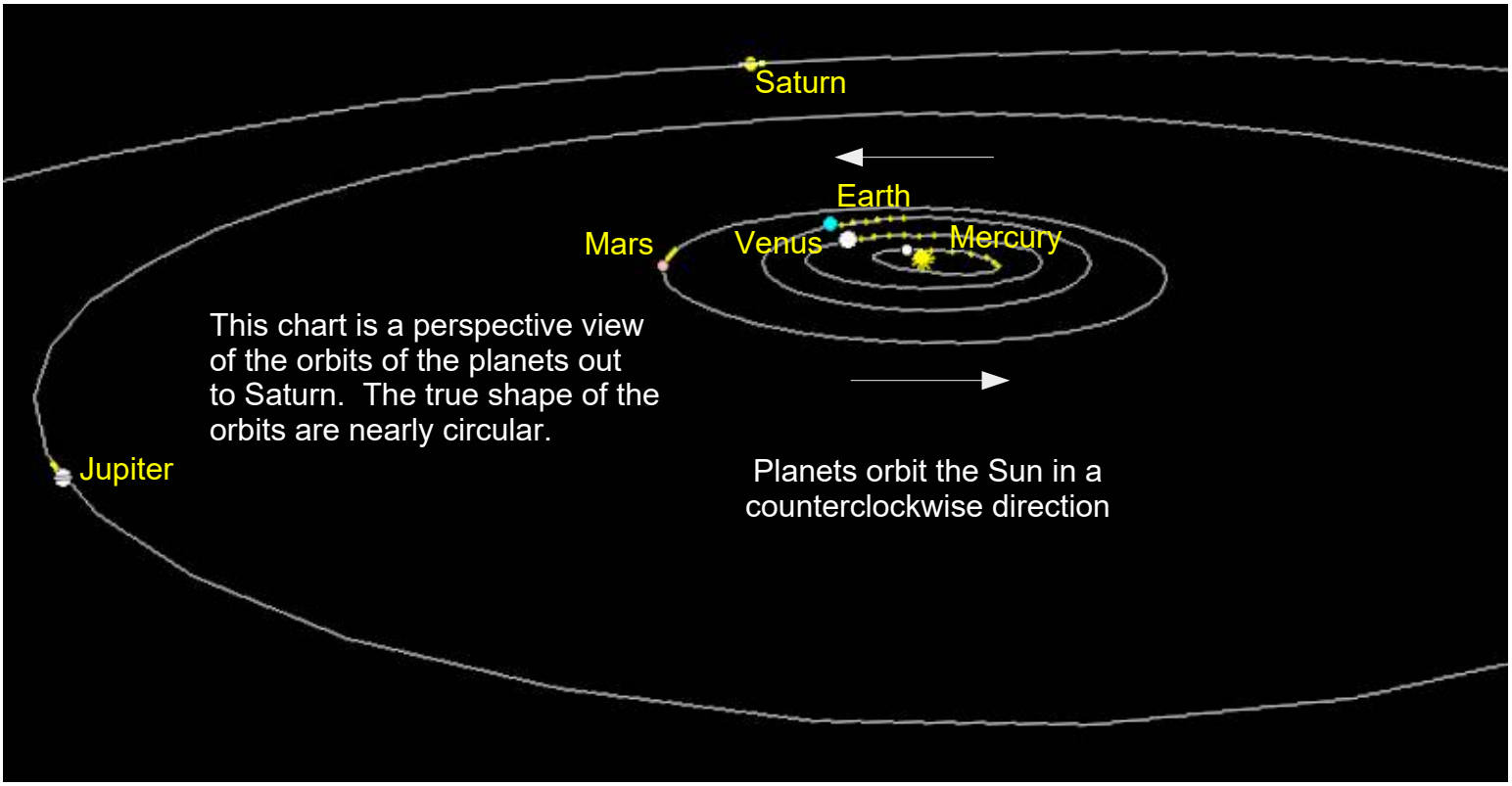


Two of the naked-eye planets are in the morning sky at this hour this month, Jupiter and Mars. Orion, the central constellation of the coming season of winter is now centered in the south, and is surrounded by his entourage of other constellations containing the bright stars of the winter circle. The Winter Circle consists of Capella at the top. Moving clockwise there is Aldebaran, Rigel, Sirius, Procyon and Pollux, with Betelgeuse in the center. The Big Dipper is in the northeast, and Leo the lion in the east hint that spring will follow winter. The Orionid meteor shower will reach it's peak during early morning of the 21st. However the waxing gibbous moon will interfere until the early morning. With the Orionids the Earth passes through the stream of particles liberated from Halley's Comet as they head in to the inner solar system.

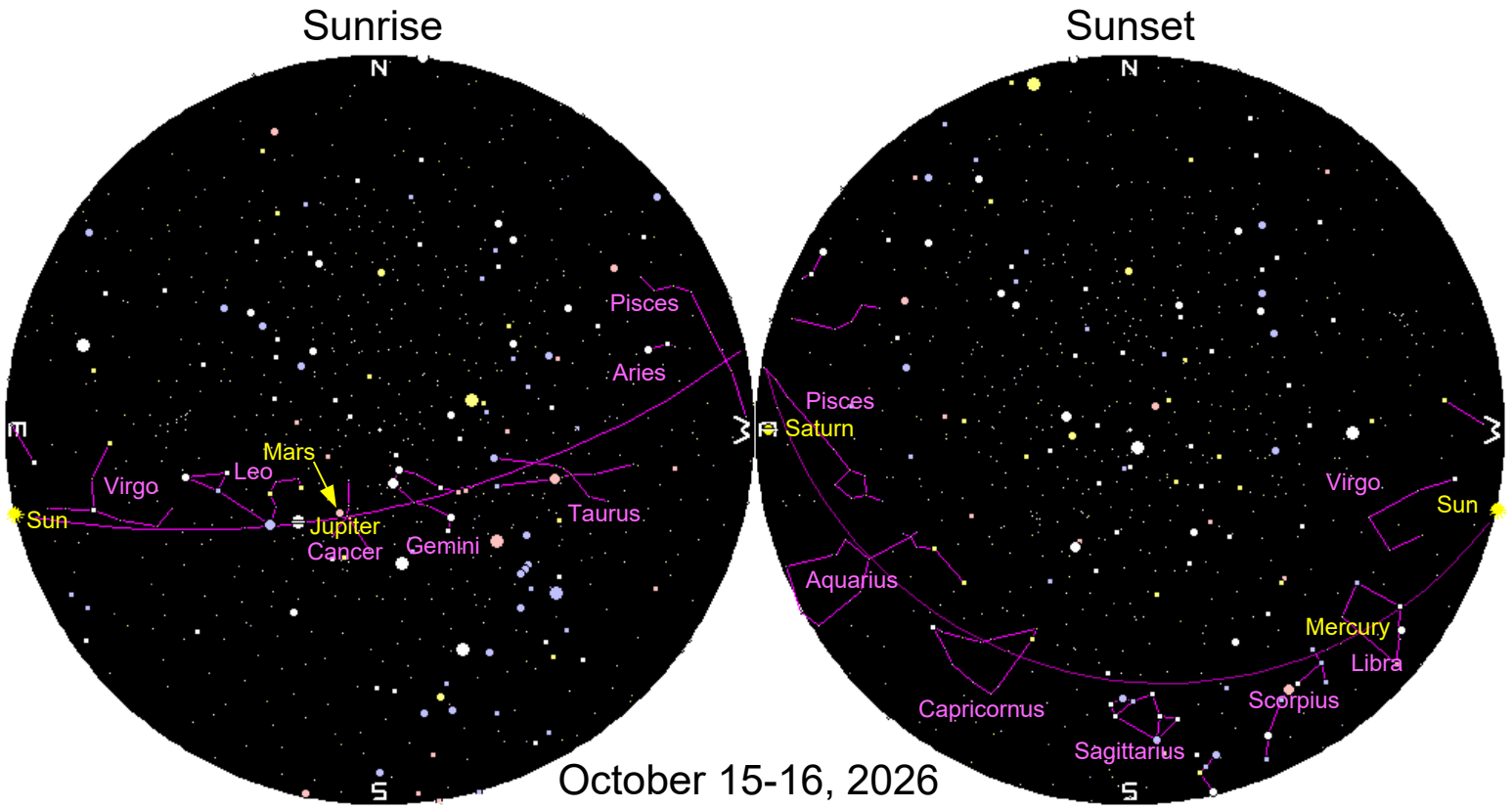
For more information on planets each Wednesday:
https://bobmoler.blog

The Naked Eye Planets

October 1st, 6th, 11th, 16th, 21st, 26th, 31st



The Planets as Seen From Northern Michigan



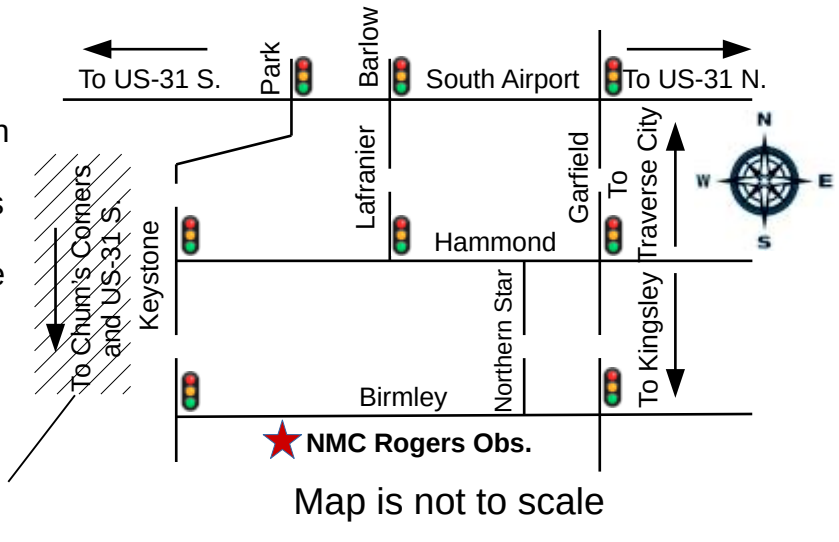
October 15-16, 2026

CELESTIAL CALENDAR

Date		Time	Event
Oct 1	Th		Venus: 30.8° E
1	Th	4:41 PM	Moon Perigee: 369300 km
2	Fr	7:35 AM	Moon North Dec.: 28° N
3	Sa	9:25 AM	Last Quarter
4	**Su**	**7:52 AM**	**Saturn Opposition**
5	Mo	1:30 AM	Moon-Mars: 1.2° S
5	Mo	7:06 AM	Moon-Beehive: 0.4° S
6	Tu	6:18 AM	Moon-Jupiter: 0.2° S
6	Tu	9:19 PM	Moon Descending Node
6	Tu	10:57 PM	Moon-Regulus: 0.6° N
6	Tu	11:59 PM	Mercury-Venus: 5° N
10	Sa	11:50 AM	New Moon
10	Sa	11:55 AM	Mars-Beehive: 0.4° S
11	Su	10:30 PM	Moon-Venus: 3.3° S
12	Mo	5:59 AM	Mercury Elongation: 25.2° E
12	Mo	4:08 PM	Moon-Mercury: 2.3° N
14	We	4:25 PM	Moon-Antares: 0.5° N
15	Th	10:45 PM	Moon South Dec.: 27.9° S
16	Fr	6:56 PM	Moon Apogee: 404600 km
18	Su	12:13 PM	First Quarter
21	We	4:53 AM	Moon Ascending Node
21	**We**	**2:16 PM**	**Orionid Shower: ZHR = 20**
23	Fr	11:29 PM	Venus Inferior Conjunction
25	Su	11:12 PM	Full Moon
27	Tu	8:11 PM	Moon-Pleiades: 1° S
28	We	1:01 PM	Moon Perigee: 364400 km
29	Th	12:40 PM	Moon North Dec.: 27.8° N
Nov 1	Su		Venus: 13.9° W

Sky Events Calendar by Fred Espenak and Sumit Dutta (NASA's GSFC), http://eclipse.gsfc.nasa.gov/SKYCAL/SKYCAL.html to make your own for any year. Some additions and clarifications were made by the editor.

The Grand Traverse Astronomical Society meets on the 1st Friday of each month except August at the Northwestern Michigan College Rogers Observatory. The public is invited to all society functions as our guests. We are a non-profit group dedicated to the study of astronomy. If you'd like more information about us, our meeting and outreach schedule, see our website: www.gtastro.org.



Map is not to scale

Sun, Moon, and Twilight for NMC Observatory (Traverse City)

October, 2026 Local time zone: EDT

DATE	SUN RISE	SUN SET	DAYLIGHT HOURS	TWILIGHT* END	TWILIGHT* START	MOON PHASE	MOON RISE OR SET**	TIME	ILLUM FRACTN
Thu 1	07:40a	07:22p	11:42	08:25p	06:37a		Rise	10:06p	68%
Fri 2	07:41a	07:21p	11:39	08:23p	06:38a		Rise	11:11p	56%
Sat 3	07:42a	07:19p	11:36	08:21p	06:40a	L Qtr	Rise	12:25a	45%
Sun 4	07:44a	07:17p	11:33	08:20p	06:41a		Rise	01:44a	34%
Mon 5	07:45a	07:15p	11:30	08:18p	06:42a		Rise	03:02a	24%
Tue 6	07:46a	07:13p	11:27	08:16p	06:43a		Rise	04:18a	15%
Wed 7	07:47a	07:11p	11:24	08:14p	06:44a		Rise	05:32a	8%
Thu 8	07:49a	07:10p	11:21	08:12p	06:46a		Rise	06:43a	3%
Fri 9	07:50a	07:08p	11:17	08:11p	06:47a		Rise	07:54a	1%
Sat 10	07:51a	07:06p	11:14	08:09p	06:48a	New	Set	06:47p	0%
Sun 11	07:52a	07:04p	11:11	08:07p	06:49a		Set	07:09p	2%
Mon 12	07:54a	07:03p	11:08	08:05p	06:51a		Set	07:35p	6%
Tue 13	07:55a	07:01p	11:05	08:04p	06:52a		Set	08:06p	11%
Wed 14	07:56a	06:59p	11:02	08:02p	06:53a		Set	08:45p	18%
Thu 15	07:57a	06:57p	10:59	08:00p	06:54a		Set	09:32p	26%
Fri 16	07:59a	06:56p	10:56	07:59p	06:55a		Set	10:27p	34%
Sat 17	08:00a	06:54p	10:53	07:57p	06:57a		Set	11:28p	44%
Sun 18	08:01a	06:52p	10:51	07:56p	06:58a	F Qtr	Set	12:33a	53%
Mon 19	08:03a	06:51p	10:48	07:54p	06:59a		Set	01:40a	63%
Tue 20	08:04a	06:49p	10:45	07:52p	07:00a		Set	02:48a	72%
Wed 21	08:05a	06:47p	10:42	07:51p	07:02a		Set	03:57a	80%
Thu 22	08:06a	06:46p	10:39	07:49p	07:03a		Set	05:07a	88%
Fri 23	08:08a	06:44p	10:36	07:48p	07:04a		Set	06:20a	94%
Sat 24	08:09a	06:43p	10:33	07:46p	07:05a		Set	07:35a	98%
Sun 25	08:10a	06:41p	10:30	07:45p	07:06a		Set	08:55a	100%
Mon 26	08:12a	06:39p	10:27	07:44p	07:08a	Full	Rise	06:34p	99%
Tue 27	08:13a	06:38p	10:24	07:42p	07:09a		Rise	07:11p	95%
Wed 28	08:14a	06:36p	10:22	07:41p	07:10a		Rise	08:00p	89%
Thu 29	08:16a	06:35p	10:19	07:39p	07:11a		Rise	09:02p	81%
Fri 30	08:17a	06:34p	10:16	07:38p	07:13a		Rise	10:15p	71%
Sat 31	08:18a	06:32p	10:13	07:37p	07:14a		Rise	11:34p	60%

* Nautical Twilight
** Moonrise or moonset, whichever occurs between sunset and sunrise

Grand Traverse Astronomical Society

Membership Application / Renewal for 2026

For renewing members, all we need is your name and email or street address to identify you, plus any information that has changed.

___ I am interested, please send me more information about the next GTAS meeting. (Also see www.gtastro.org)

___ I'll join, payment enclosed

___ Membership renewal

Membership term runs from January to December

Email Address:_____

Newsletter Delivery: ___ Email ___ Mail (Postcard only)

Interests: _____

Name(s): _____ Home Phone: _____ Cell:_____

Address: _____ __

(Street, City, State ZIP)

Dues: ___ Single Membership $25.00/yr

___ Family.....….....$30.00/yr

___ Student (up to 18 years age)....$15.00/yr

___ Patron (Donation)……..……..$_____

Mail check to: G.T.A.S.

Gary Carlisle, Treasurer

1473 Birmley Road

Traverse City, MI 49696-8808

For new members just joining mid-year, pro rate the dues thus: Annual Dues x months remaining in the year / 12.
Example: Single Joining in June: $25.00 X 6 (Jul-Dec) / 12 = $12.50

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WANTED: Astronomers interested in working with Project ASTRO POLARIS.
Willingness to work with K-12 students and teachers. Visiting classrooms and conducting experiments, discussing astronomy interests and events. Sharing your love of astronomy with others. Will provide; training, materials, instuctionals and support.
Please contact: Jerry Dobek Site Coordinator Project ASTRO POLARIS NMC Science & Math 1701 East Front Street Traverse City, MI 49686 email jdobek@nmc.edu phone 946-1787 obsv. 223-4545 home