



## STAR FIELDS

Newsletter of the  
Amateur Telescope Makers of Boston  
Including the Bond Astronomical Club  
Established in 1934  
In the Interest of Telescope Making & Using

Vol. 33, No. 11    December 2021

### This Month's Meeting . . .

Thursday, December 9<sup>th</sup>, 2021 at 8:00 PM

[Zoom On-line Meeting](#)

All ATMoB meetings scheduled for the Harvard-Smithsonian Center for Astrophysics in Cambridge, MA have been **canceled indefinitely** due to concerns over the [coronavirus](#) outbreak.

We are holding virtual on-line meetings using the Zoom application. Please refer to the [ATMoB website](#) for future meetings. Members should check their email on the ATMOB-ANNOUNCE list for additional information. Please [select this Zoom link to attend the 947th Meeting of the Amateur Telescope Makers of Boston.](#)

### Science with the Mittelman-ATMoB Observatory (MAO)



(L-R) Chris Elledge and Bruce Berger working in the Mittelman-ATMoB Observatory. \*

Our speaker this month is Dr. Arne Henden. Arne has worked closely with the members of our Mittelman-ATMoB Telescope committee to help bring the telescope and its camera system

online. Arne received his doctorate from Indiana University, and subsequently worked for Goddard Space Flight Center, Ohio State University, and the U.S. Naval Observatory as an instrumentation specialist. He was the Director of the American Association of Variable Star Observers (AAVSO) for the last decade of his career, retiring to New Hampshire, where he runs several automated telescopes. He is the author of *Astronomical Photometry*, has written several hundred peer reviewed scientific articles, and has given lectures worldwide.

Arne Henden's presentation will be "Science with the Mittelman-ATMoB Observatory (MAO)". Dr. Henden writes: The Mittelman Family Foundation recently donated to ATMoB the Planewave CDK17 telescope and observatory that sat upon David Mittelman's Dover, MA house for many years. Now sited at the ATMoB Westford facility, it is the first ATMoB telescope that is fully automated and controlled remotely. Club members have done the heavy lifting of on-site installation and software configuration. While this facility could be used for casual observing and deep-sky imaging, I will highlight in this presentation how the MAO can also contribute valuable scientific observations. The AAVSO always has a number of campaigns in process to collect photometric measures of variable stars for the professional community; the exoplanet transit survey satellite, TESS, needs follow-up observations of exoplanet transits; GRB afterglow, gravitational wave event optical counterparts, and other high-energy astronomical projects are always looking for help; the SNEws supernova monitoring team is actively seeking participants. These and other research projects where amateurs with high-quality equipment such as MAO can be valued partners will be discussed.

Please join us on December 9 for what will be an amazing meeting! We hope to see you all there.

~ Rich Nugent – President ~

### President's Message . . .

During the fall of 1969 I was fortunate enough to acquire a fine 8-inch reflecting telescope. My dad was a bit of an armchair astronomer and was excited to view through the telescope. He had seen a program about astronomy that showed a galaxy rotating about its axis and wanted to see that for himself. I can still feel his disappointment when I told him it takes the Milky Way about 200 million years to complete a single rotation. Disillusioned, he went back to his armchair. But, for those of us who are patient, we can see the universe change before our very eyes!

Of course, the first object I observed with my new telescope was the Moon! I'm still amazed by the amount of detail we can see through our telescopes. But does it change? Well, geologically speaking the Moon is practically dead. Long gone is the era of bombardment when most of the large impacts occurred and the maria lavas hardened billions of years ago. Some of the youngest features are 100 million years young! But the Moon's appearance changes night-by-night, sometimes hour-by-hour! For me, the changing phase, and the variations in illumination of its surface features make lunar observing especially fun. Some

features like the Lunar X are only visible for a few hours each month. The Moon's orbital motion can be seen during lunar and solar eclipses and while observing occultations of stars and planets.

For solar observers, the sunspots can show changes over the course of hours and days. The Sun's rotation can be seen by watching the daily west to east movement of the spots. For observers with dedicated H-alpha scopes, solar prominences dance and solar flares crackle around active regions! The Sun's 11-year cycle is currently heading to a maximum in a few years so this activity will increase accordingly. Solar storms can propel charge particles outward through the solar system. When these particles interact with Earth's magnetic field and atmosphere, our skies can be flooded with auroral activity!

Mercury is visible to those who know when and where to look! Its rapid orbital motion and closeness to the Sun make it a challenging object. When Mercury is east of the Sun near the vernal equinox it is best seen by northern observers. At the autumnal equinox, northern observers hope for the planet to be west of the Sun.

Venus is a fun planet to watch as it undergoes easily observable phases as it orbits the Sun. This January the planet will pass between the Earth and the Sun – inferior conjunction. Its disk will be a relatively large, extraordinarily thin crescent. Careful observers can watch Venus pass through its conjunction with the sun!

Just a year from now, Mars will be well placed for observers in the northern hemisphere. Surface features become visible, and the planet's rotation can be observed. Casual observers can watch Mars go through its retrograde loop and, with the club's 25-inch scope, we'll be able to see Mars' two moons, Phobos and Deimos!

Changes in Jupiter's turbulent atmosphere can be seen by patient observers. Of course, Jupiter's rapid rotation brings new features into view all night long. The Great Red Spot is often visible, and eclipses, occultations, transits, and shadow transits of the four Galilean satellites are always entertaining. Saturn's rings are always pleasing to look at. And while the outer planets don't do much, their moons are fun to observe and identify.

Of course, on any clear night the sky offers meteors – sometimes bright enough to be classified as fireballs! Annual showers are always fun to watch. This year's Geminid meteors will be adversely affected by bright moonlight, but the shower produces many bright, graceful meteors so it's always a fun shower to watch! For early risers, Comet Leonard will put on a good show in early December. Asteroids are fun to find and watch as they move slowly through the constellations.

Once we leave the solar system, changes are a little harder to see. Most deep sky objects are static but are always fun to look at. Galaxies are fun to look at too, and occasionally spice things up by offering supernova eruptions. These long-ago exploding stars can sometimes be seen with backyard telescopes. My favorite in recent times was the January 2014 supernova in M82. The class

Ia event was produced when a white dwarf star in a binary star system exploded. Because M82 is a relatively nearby galaxy, about 12 million light years distant, the "new star" reached a visual magnitude of 10.5!

All the stars have a proper motion as they orbit the galaxy, but only the closest stars will show it. Barnard's Star, and 61 Cygni are examples of nearby stars which exhibit large proper motions that can be detected visually over the course of decades. True binary systems sometimes show orbital motion. Sirius and its companion, the Pup, is an excellent example of this. Over the course of its 50-year orbit, the Pup is often lost in the brilliant glare of Sirius. These days, the stars are near maximum separation, but to successfully see the Pup, the seeing must be perfect and some aperture is required. Have you seen Sirius B yet?

But what about variable stars? During my early days of my love affair with astronomy, I liked to keep track of Algol, "the Demon Star". Algol's brightness varies consistently over a 2.87-day period. What makes this star so reliable? It's a binary system with the fainter star crossing our line-of-sight as it orbits a brighter primary star. When secondary star eclipses the primary, we see a drop of 1.3 magnitudes! Some variable stars change their brightness because they actually pulsate. Cepheids are a famous example. Early in the 20th century, Henrietta Leavitt Swan discovered the period-luminosity relationship these stars exhibit, and Edwin Hubble used this relationship to determine the distance to the Andromeda nebula. Previously thought to reside within the Milky Way, Hubble's estimate put this object at nearly 2 million light years! Today we know Andromeda is 2.5 million light years distant. My favorites are the cataclysmic variables. SS Cygni is a favorite example. These are close binary systems with a white dwarf primary star and a normal star as the secondary close enough to allow matter from the secondary to flow towards the white dwarf. As it does it forms an accretion disk, and a hot-spot forms where matter enters the disk. The variability of the system is related to instabilities in the accretion disk!

So, the next time you look up at the sky and think nothing is happening, look again! While none of us will ever observe galactic rotation in real time there's plenty going on...if you look closely.

I wish everyone health and happiness during the holiday season and in the coming year. Be well, my friends!

~ *Rich Nugent – President* ~

## **Executive Board Meeting . . .**

The Executive Board will be meeting on Thursday, December 16th at 8 p.m. on Zoom, to discuss club business and proposals. The meeting is open to the membership. A Zoom invitation will be sent out on the Sunday before the meeting.

~ *Rich Nugent – President* ~

## November Meeting Minutes . . .



Michael Umbricht on Zoom \*

### ATMoB 946th Meeting Minutes November 11, 2021

Corey Mooney presented the President's welcome, including an announcement that Rich Nugent recently lost his son and cannot attend. Thanks to our members who have helped the Nugent family via their GoFundMe site.

Rich Nugent spoke with Charlie Hickey of the Harvard Center for Astrophysics (CfA) on Monday, Nov. 8, 2021 about the status of the CfA auditorium. Currently the event calendar for the CfA auditorium remains closed and we cannot book the auditorium for an in-person meeting. The Smithsonian lecture nights this fall were scheduled for the second Thursday of the month in conflict with our meetings, and have been moved back to the third Thursday in the spring schedule, but we cannot currently hold our meetings in person at the CfA.

- Alva Couch presented the Secretary's report, including a summary of the inspiring talk by Mahboubeh Asgari-Targhi of the CfA on recent advances in the understanding of dynamics inside the Sun's chromosphere.
- Eileen Myers presented the Treasurer's report and reported that income from dues and donations was roughly balanced by expenses, specifically the down payment for the Equatorial Platform for the 25-inch Dob and the yearly licensing fees for Mittelman-ATMoB Observatory software.
- Chris Elledge presented the Membership report and welcomed new members Mahboubeh Asgari-Targhi, John Gagan, Aidan Goldman, and Nasmus Nasir.
- Glenn Chaple presented the Observer's report. There is an upcoming deep partial lunar eclipse on November 19th and a dual transit of the moons of Jupiter on November 23rd. The Observer's challenge for November is NGC 7662.

- Corey Mooney presented the Clubhouse report for the work party on Oct. 23, 2021. Chris Elledge trained members on use of the new riding mower. A broken window was replaced on the second floor. The composting toilet was emptied and a new mix will be completed next time. The C14 telescope in the William Toomey Observatory will soon be replaced by a 5-inch APO refractor donated by Tal Mental. Jim Mahoney donated a very nice 10-inch Dob and a case of Ethos eyepieces. Many thanks to those who donated, time, effort, and equipment!
- Al Takeda gave the Mittelman-ATMoB Observatory report. We've submitted our first data to AAVSO for the variable star ER Cass thanks to the work of Peter Bealo and Pierre Fleurant. Chris Elledge summarized the function of the telescope and how we can expect it to operate.
- Maria Batista presented the Eclipse 2024 Committee Report. At this point we still cannot book hotel room blocks. If you can book your own room, please feel free to do so.
- Maria Batista presented the Website Committee report. We went through an experiment with Club Express to completely change the website and then undid everything, as a dry run of updating the website.
- Old business: Eileen Myers will not be ordering calendars or the *RASC Observer's Handbook* for the new year, due to the inability to meet at the CfA to distribute these. You will need to obtain these for yourselves.
- New Business: None

Our speaker for the evening was Michael Umbricht, curator of Brown University's Ladd Observatory. Umbricht described the rich history of timekeeping at the observatory. The story of the Ladd begins 40 years before it opened, with a horrific head-on train crash due to poor time-keeping at train stations.

Observing transits of stars with known transit times was the accepted method for setting clocks accurately. The correct time, kept via clocks operated in partial vacuum and calibrated regularly via star transits, was relayed to the train stations via telegraph. The Ladd observatory supplemented the time observations of the US Naval Observatory in Washington DC and a similar observatory at Harvard College, but also provided a reliable source of the correct time to local train stations and civil government.

The Ladd is now a working museum where visitors can experience astronomy and time-keeping as it was practiced a century ago.

~ *Alva Couch – Secretary* ~

## Membership Report . . .

I am pleased to welcome our newest (and returning former) members: Robert Blumstein, John Gagan, Pete Geanacopulos, Aidan Goldman, Diana Hannikainen, Arne Henden, Patrick Kelly, Nazmus Nasir, and Gary Walker.

As of November 27th, 2021 we have 313 memberships covering 389 members. This is broken down as follows:

- 132 Regular Members
- 128 Senior Members
- 6 Student Members
- 45 Family Memberships covering 121 Members
- 2 Honorary Members

Members who did not renew for FY2021-2022 were dropped on December 1st.

Please contact me if you need any help with renewing or logging into the website.

~ *Chris Elledge – Membership Secretary* ~

## Meeting Recordings . . .

The recording of ATMoB meeting #946 is available on YouTube: [https://youtu.be/ baXbAD6qXM](https://youtu.be/baXbAD6qXM)

I would like to thank Michael Ulbricht for giving his talk.

This link is to the publicly available cut of the meeting recording. To view the original version of the meetings, please see the Announce Forum on the ATMoB Website <https://www.atmob.org/forums>

~ *Chris Elledge - Membership Secretary* ~

## Clubhouse Report . . .



Slav Mlch repairing the Machine Shop door \*

## November 2021 Clubhouse Report

The November work session was held on Saturday the 20th with a total of 26 ATMoB members and friends in attendance. We appreciate the effort made by those volunteers who helped us accomplish the following projects:

Joe Henry and Joseph Rothchild marked the driveway boundary with snow stakes and fence posts to prepare the property for winter snow removal.

Vladislav Mlch, Paul Cicchetti and John Stodieck took the lead on rebuilding the machine shop (near barn) door. Slav picked up pressure treated 2 x 8's ahead of time and the work was finished by day's end. Thanks to all who helped with this work.

Mike Hill tackled organizing and sorting through materials in our Clubhouse library room.

Chris Elledge winterized our new riding mower and stored it in the far barn for the season. The snow blower was recently serviced and is ready for action.

Mittelman-ATMoB Observatory project: Chris E., Bruce B., Al T. and Alan S. installed a weather monitor, a 10-Gigabit hub in the observatory enclosure, and new LED lighting in the Clubhouse Electronics/Control Room.

Eileen Myers again topped our expectations with two types of homemade chili served over a helping of cooked grains. Along with salad, fresh fruit, and chocolate panettone, the food was delicious and well received. We were hungry!

Thanks to the following members for making our monthly work session a success:

Bruce Berger, Paul Cicchetti, Chris Elledge, Pierre Fleurant, Brett Graham, Mike Hill, Eric Johansson, Dick Koolish, Ed Los, Jon Lyna, Avery and Seth Mangum, Tom McDonagh, Vladislav Mlch, Corey Mooney, Eileen Myers, John Reed, Joseph Rothschild, Phil Rounseville, Steve Scaramini, Alan Sliski, John Stodieck, Al Takeda, Michael Touns, Robert Wolcott, and Tom Wolf.

Our next Clubhouse work session will be held on Saturday, December 18th.

~ *Clubhouse Committee Chairs* ~

~ *Steve Clougherty, John Reed and Dave Prowten* ~

## Educational DVD Videos on Monday Evenings . . .

Maria Batista is hosting Monday evening streaming lectures. These weekly Zoom meetings start at 7 PM. Members can sign up on the Event Calendar at [www.atmob.org](http://www.atmob.org).



## Outreach Report . . .



Venu Venugopal with his 8-inch Newtonian. Image by Rich Nugent

New England Sci-Tech sponsored an Astronomy Day event for its members on Saturday, October 9 and ATMoB members were on hand to help out. Scopes were set up in the parking lot for afternoon and evening observations and a mirror grinding demo was run inside. The weather didn't cooperate for the event but that didn't deter members Kelly Beatty, Bruce Berger, Jim McLaren, Corey Mooney, Rich Nugent, John Reed, and Venu Venugopal from talking up telescopes and astronomy. If I've missed anyone please let me know!

While the COVID pandemic has made it challenging for organizations to run and for us to support public astronomy events, there are two upcoming events scheduled:

### Westford Cub Scout Pack 95

Friday, December 10 (rain date December 11)

Time: 6:00 - 8:00 p.m.

Location: Westford Sportsmen's Club, 80 West Street, Westford, MA.

### Boy Scouts' Klondike Derby

Saturday, February 5 (no rain date has been scheduled)

Time: 6:00 - 9:00 p.m.

Location: Larter Field, 80 Groton Street, Dunstable, MA

Registration for both events can be found on our event calendar. If you're fully vaccinated, please consider volunteering. Please register on our event calendar. Of course, updates will be sent out via email.

*~ Rich Nugent – President and Observing Chair ~*

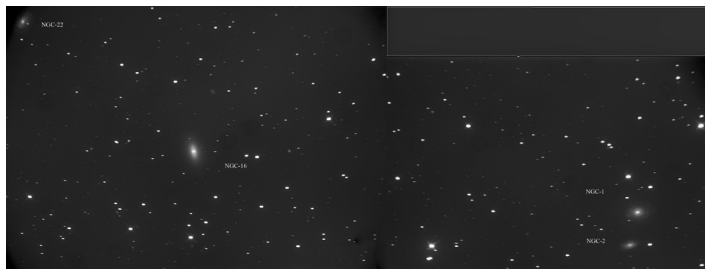
## Observer's Challenge\*\* . . .

December, 2021

### NGC 16 - Lenticular Galaxy in Pegasus

Magnitude 12.0

Size 1.8' by 1.0'

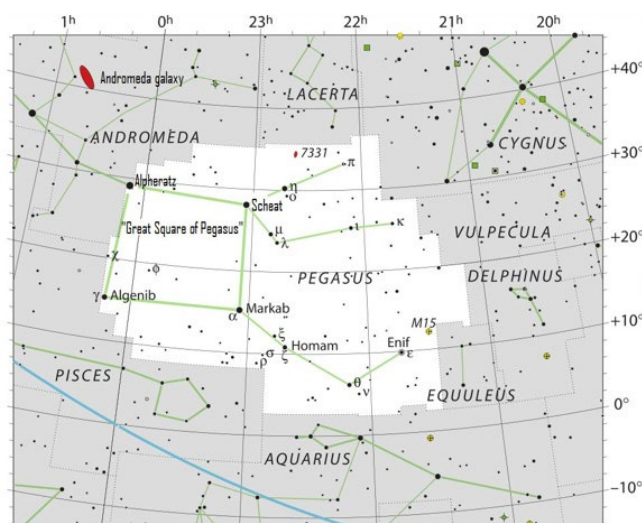


NGC 16 on the left. NGC 1 and NGC 2 on the right. 32-inch scope using SBIG STL 1001E camera, 2 image mosaic. Image by Mario Motta

Our December Observer's Challenge takes us to the northeast corner of Pegasus and a lenticular galaxy some 123 million light years away (SIMBAD data). This galaxy was discovered by William Herschel on September 8, 1784. Its appearance ("A faint star with small chevelure [hazy luminescence] and 2 burs") led Sir William to enter it into his Catalogue of Nebulae and Clusters of Stars as a Class IV (Planetary Nebulae) object.

With a visual magnitude of 12.0, NGC 16 will challenge medium aperture scopes, especially if observed from an area beset by slight to moderate light pollution. I looked for it with a 10-inch f/5 reflecting telescope on an evening when the magnitude limit was around 5. At 140X, I was able to make out little more than a faint star (the galaxy's nucleus). Visual observers in dark-sky locations or working with larger instruments may be able to make out a surrounding oval haze.

The 2000.0 celestial coordinates for NGC 16 are: RA 00h 09m 04.3s, DEC +27° 43' 45", a little over a degree south of the 2nd magnitude star Alpheratz (alpha [ $\alpha$ ] Andromedae). The accompanying finder charts should enable star-hoppers to find their way from Alpheratz to NGC 16.



NGC 16 Finder Chart A. [www.messier-objects.com](http://www.messier-objects.com)

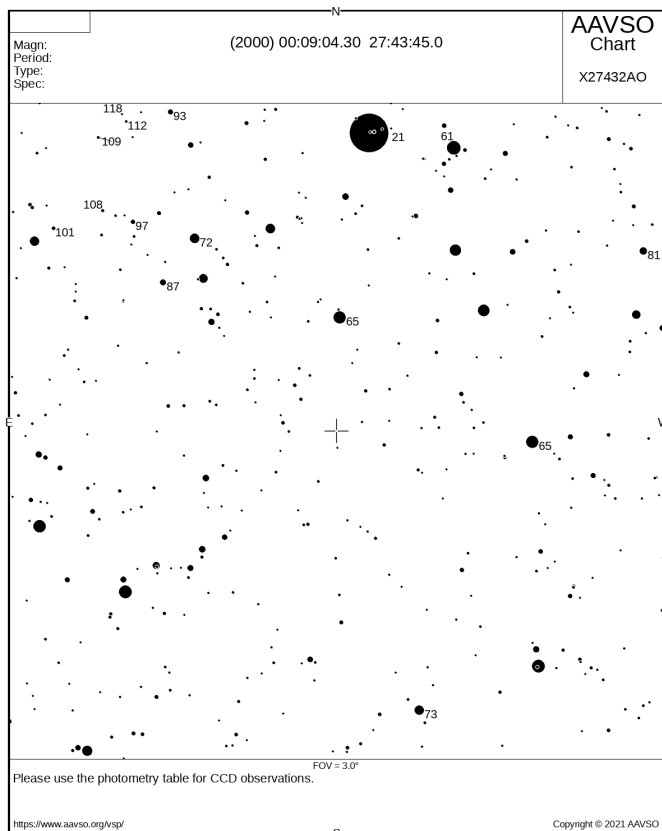


Chart created using the AAVSO's Variable Star Plotter. Numbers indicate stellar magnitudes, decimals omitted. The magnitude 2.1 star is Alpheratz. Stars plotted to magnitude 12.0. North is up in this 1.8 by 2.3 degree field.

**\*\*The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone who is interested. If you'd like to contribute notes, drawings, or photographs, we'll be happy to include them in our monthly summary. Submit your observing notes, sketches, and/or images to Roger Ivester ([rogerivester@me.com](mailto:rogerivester@me.com)). To find out more about the Observer's Challenge or access past reports, log on to <https://rogerivester.com/category/observers-challenge-reports-complete/>.**

~ Submitted by Glenn Chaple ~

## 19 Objects for December . . .

Here is a list of 19+ objects you might want to get outside and observe during December. Some are easy but some are challenging! If you revisit some of the October and November objects and add some of your favorites, you'll have an excellent observing list!

### Solar System Objects:

**Venus** is low in the SW at sunset as it approaches Inferior Conjunction on January 8. I prefer to observe it during the daytime.

We are running out of time to observe **Jupiter** and **Saturn**! They are still reasonably well-placed for early evening observing but they are best observed just after sunset!

**Neptune:** Magnitude 7.9 and located in Aquarius this month, observing this planet is easier than you think! Large apertures will show (magnitude 13.8) Triton.

**Uranus:** In Pisces at magnitude 5.7; Larger apertures will show some of its moons.

Use your planetarium software or *Sky & Telescope's* website for finder charts.

**Geminid Meteor Shower:** Peaks on December 14 but bright moonlight will reduce numbers.

### Moon Phases:

**New Moon:** Saturday, December 4

First Quarter: Friday, December 10

Full moon: Sunday, December 19

**Last quarter:** Sunday, December 26

### Multiple Stars:

**Iota Triangulum** (6 Triangulum): magnitudes 5.3/6.9; Separation: 3.9"; yellow and blue stars.

**Beta Cephei:** 3.2/7.9; 13.3"

**Alpha Piscium:** 3.8/5.2; 1.8"; Challenging. Use high power!

### Variable Stars:

**SS Cygni:** Magnitude 7.7 – 12.4; A cataclysmic variable with a period of about 50 days. Recent outbursts have been occurring about 6 weeks apart. Last peaked at the end of October. Watch nightly during mid-December. The AAVSO website will print detailed finder charts.

**Algol, Beta Persei:** Magnitude 2.1 – 3.4; An eclipsing variable with a period of 2.87 days. *Sky & Telescope* magazine publishes the dates/times of the star's minimum brightness. A convenient, primary eclipse minimum will occur on 10 December at 10:10 p.m. ET

### Galactic Clusters:

**NGC 7789:** Caroline's Rose; in Cassiopeia. A fine, faint cluster of stars.

**NGC 663:** A fine cluster in Cassiopeia.

**NGC 654/659:** Near NGC 663

**M45 and the Hyades Cluster:** Fine binocular objects!

### Planetary Nebula:

Note: Most planetary nebulae are best seen with UHC/OIII filters!

**NGC 1514:** Large planetary with a binary central star. The progenitor star is unseen, but its 9<sup>th</sup> magnitude companion is the central star we do see. Very nice!

### Galaxies:

**M33:** Large and faint! Look for NGC 604, a 12<sup>th</sup> magnitude H II region located within M33.

**M74:** One of the most challenging Messier objects

**NGC 278:** Fairly bright. About 40 million light-years away. Near NGC 147 (faint) and NGC 185 (very faint), satellite galaxies of the Andromeda Galaxy.

**M31/M32/M110:** You may want to visit these old friends.  
**NGC 1055:** Magnitude 10.5 galaxy near M77

### Observer's Challenge for December:

**NGC 16:** This 12<sup>th</sup> magnitude galaxy (surface brightness: magnitude 12.5) can be found 1.3 degrees south of Alpheratz, Alpha Andromedae. Its distance is around 150 million light-years and has an angular size of 1.0 x 1.8 arcminutes. Located at R.A. (2021.9) 00h 10m 11.12s and Dec. (2021.9): +27° 50' 58.1"

If you are unfamiliar with the location of any of these stars or deep sky objects, Google search for the object's R.A. and Dec. then consult your star atlas. Except for the solar system objects, SS Cygni, and NGC 16, these objects are plotted in *Sky & Telescope's Pocket Sky Atlas*.

Happy Holidays, everyone!

Clear skies,

~ Rich Nugent – President and Observing Chair ~

## Skyward . . .

By David H. Levi  
December 2021

### Daffy Duck



Photograph from Hubble Space Telescope, STScI

Agreed, this seems like an awfully daffy title for an astronomy article. But there is method to the madness, and there is a story. During the late summer of 2019 there was a star party in southeast Arizona that featured a dark sky and five perfect back-to-back nights. As I spent hour after hour hunting for comets, I came across the sprawling North America Nebula in the northern sky constellation of Cygnus the swan. But this time something

different appeared. It was a strange structure, the outline of a dark nebula bordered by a slightly brighter cloud. The whole feature was rather subtle, so that sometimes it was there, and then it faded so that sometimes it wasn't. I spent some time trying to determine a name for it. It looked like the head of a duck. I couldn't call it the wild duck nebula, as there is a cluster with that name. And Donald Duck is a bit confusing. So how about calling it the Daffy Duck nebula?

Thus, the structure is named after Daffy Duck. It is No. 403 in my catalog of interesting things found during my more than 56 years of comet hunting. I believe it is a small dark construction at the northern tip of the North America Nebula, about where Hudson Bay is not accurately located. It could have been where the Gulf of Mexico is, but that area is virtually impossible to spot visually, even under a dark sky. Like the Horsehead Nebula in Orion, it is very difficult to spot and it is best viewed only in a photograph. The accompanying picture shows it at its top, a little to the left of center. The accompanying photograph was taken using the Hubble Space Telescope.

There are more than four hundred other celestial objects that have come my way over the years. Beginning with NGC 1931 which I spotted in January 1966, many of these are already well-known deep sky objects in the night. But a few are interesting groupings of stars called asterisms that no one has pointed out before. One of my favorites is a structure of faint stars I call "Wendee's Ring."

These always welcome objects in the sky are fun to observe and they enhance my enjoyment of my hours under the stars. When I can see Daffy Duck, it reminds me of the happy hours I spent as a child at Beaver Lake, an artificial pond near the top of Mt. Royal in Montreal that hosts dozens of mallard ducks. On clear, moonless nights now, I offer a cosmic hello to Daffy Duck and the many objects in the night sky I have come to treasure as good friends.

~ Submitted by Mario Motta at the request of David Levy ~

Editor: \* Photos by Al Takeda unless otherwise noted.

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**January Star Fields DEADLINE**  
**Sunday, December 26<sup>th</sup>**

Email articles to Al Takeda at  
[newsletter@atmob.org](mailto:newsletter@atmob.org)

**Articles from members are always welcome.**

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Amateur Telescope Makers of Boston, Inc.  
c/o Chris Elledge, Membership Secretary  
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**FIRST CLASS**

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## How to Find Us...

### Web Page [www.atmob.org](http://www.atmob.org)

**MEETINGS:** Zoom On-Line Meetings until further notice. Meetings held the second Thursday of each month (September to July) at 8:00 PM. For meeting details go to [www.atmob.org](http://www.atmob.org) and check your email on the ATMOB-ANNOUNCE list.

**CLUBHOUSE:** Latitude 42° 36.5' N Longitude 71° 29.8' W

The Tom Britton Clubhouse has partially reopened. It is the white farmhouse on the grounds of MIT's Haystack Observatory in Westford, MA. Take Rt. 3 North from Rt. 128 or Rt. 495 to Exit 33 and proceed West on Rt. 40 for five miles. Turn right at the MIT Lincoln Lab, Haystack Observatory at the Groton town line. Proceed to the farmhouse on left side of the road. Clubhouse attendance varies with the weather.

## Heads Up For the Month . . .

**To calculate Eastern Standard Time (EST) from Universal Time (UT) subtract 5 from UT.**

Dec 4 New Moon

Dec 7 Venus 1.9 degrees North of Moon

Dec 10 First Quarter Moon (Moonset at midnight)

Dec 14 Geminid meteors peak

Dec 18 Full Moon

Dec 21 Winter Solstice

Dec 22 Ursid meteors peak

Dec 26 Last Quarter Moon (Moonrise at midnight)

Dec 31 Mars 0.9 degrees North of Moon - Conjunction

Jan 2 New Moon

Jan 5 Quadrantids meteors peak