Skylights

Newsletter of the Astronomical Society of Northern New England

DEC 2015

Member of NASA's

Astronomical League

ASNNE MISSION

ASNNE is an incorporated, non-profit, scientific and educational organization with three primary goals:

1) To have fun sharing our knowledge and interest with others.

2) To provide basic education in astronomy and related sciences to all who are interested.

3) To promote the science of Astronomy.

ASNNE's Annual Christmas Party...

Dec 4th Pot Luck (Bring an entree or a dessert)

What's Up In December

By Bernie Reim

December always marks the beginning of winter for us in the Northern Hemisphere. That will happen at exactly 11:48 pm on Monday the 21st. The winter solstice is the lowest point that the sun will reach in the sky for any given latitude on earth. The word solstice means "sun stands still" which is what it seems to do for a few days at the lowest point of its continual arc through our sky.

If you could photograph the sun at high noon every few days throughout the year, you would see that it traces a figure eight in the sky, called the analemma. This giant graph in the sky is loaded with information if you know how to read it. It tells you the tilt of the earth, the fact that we are orbiting in ellipses, your latitude on earth, sunrise and sunset times, the equation of time, when we are moving faster and slower around the sun, and many more things. If the earth was not tilted and our orbit was a perfect circle, the whole analema would just be a single dot in our sky, since the sun would always be at the same place at high noon.

Starting from the North Pole, you would only see half of this analema, because the sun doesn't rise at all for half a year. By the time you get down to the Arctic Circle, would see the whole thing and it would be upright and each loop would be the same size. Then it gets more and more tilted over and the top loop gets smaller. By the time you get to the equator, it is completely horizontal and then the top loop gets larger and it starts tilting the other way as you get farther south until it is upright and even again as you get to the Antarctic Circle and then part of it starts disappearing again, as it did above the Arctic Circle.

You can actually measure the tilt of the earth for yourself at either of the solstices by just measuring the shadow of a level stick and knowing your latitude. You could even trace the entire analemma on the ground with a sundial, which is much easier than photographing it in the sky over the course of a whole year.

Many exciting highlights abound once again this month that will make it well worth it to brave any cold weather that we may get. Getting up an hour or so before sunrise for several mornings this month will also reap great rewards for you, as it did for me last month.

Our four brightest planets will all grace our morning sky this month, the Geminid Meteor Shower will happen without the moon in the way, a lesser meteor shower called the Ursids will peak near the winter solstice, a new comet will be visible in the morning sky, and the moon will occult Venus in the daytime sky on December 7.

Jupiter starts the month rising about half an

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What's Up "*Continued from page 1*"

hour after midnight and will end the month rising two hours earlier. Then Mars rises next around 2 am and it will only rise about half an hour earlier by the end of the month. Then brilliant Venus rises around 4 am and Saturn will join the trio by the middle of the month rising only about one hour before sunrise.

So there you have your morning planetary line up along the ecliptic plane of our solar system. To add some real drama to these planets , watch the last quarter moon pass near Jupiter on the 3rd and 4th, then close to Mars on the 5th and 6th, and then very close to Venus on the morning of the 7th about one hour before sunrise. Later that same day, as the thin waning crescent moon creeps ever closer to our brightest planet, it will actually cover up Venus completely starting at 12:40 pm. Then the waxing gibbous Venus will reappear from the moon's dark limb, which will be invisible in the daylight, about one hour later, at 1:40 pm. This shows you that the moon is always moving eastward in our sky at the rate of half a degree per hour, which is its own width.

I have seen an event like this before. It is quite amazing to witness and it really demonstrates many interesting aspects of the relative sizes and motions of neighboring objects in our solar system along with great excitement in trying to capture it on film. You will need a telescope or a good pair of binoculars to see this daytime event.

The best meteor shower of the year, the Geminids, will peak a week later on the morning of Monday the 14th. They are expected to reach 120 meteors per hour, which is a fantastic rate of 2 meteors per minute. They are one of only two annual meteor showers that are caused by an asteroid instead of a comet. The Geminids are caused by 3200 Phaethon, named after the driver and sun god of Helios's chariot.

All of these meteors will appear to emanate from the constellation of Gemini the Twins in the famous winter hexagon, just above Orion. It will be high in our eastern sky by 11 pm, but you will be able to see meteors anywhere in the whole sky all night long as well as the next night and even some on Saturday night the 12th. Just bundle up, find a good open sky by the ocean or a large field, and enjoy a great, quiet show brought to you by nature and our protecting and life-giving atmosphere. If you watch for at least one hour, you can even do a scientific meteor count for the International Meteor Organization.

A comet named Catalina, discovered by the Catalina Sky Survey in Arizona on Halloween night 2 years ago, just reached perihelion last month and will be climbing higher into our morning sky near all the planets all month long and into next month. This comet is zipping along at 100,000 miles per hour and is already sporting two tails, one of which is 500,000 miles long. It should become visible without binoculars early this month. See how soon you can spot it and photograph it along with all of our solar system neighbors in the morning sky.

Dec.2. On this day in 1974 Pioneer 11 flew by Jupiter. It is now passed the heliosphere.

Dec.3.Last quarter moon is at 2:40 a.m. EST.

Dec. 4. The moon passes just below Jupiter this morning.

Dec. 5. The moon passes near Mars this morning, one hour before sunrise.

Dec.7. The moon passes very close to Venus this morning and will occult the planet this afternoon, starting at 12:40 pm and ending one hour later.

Dec. 11. New moon is at 5:29 a.m. Annie Jump Canon was born on this day in 1863.

Dec. 13. The Geminid meteor shower peaks tonight and into the next night.

Dec. 14. Tycho Brahe was born on this day in 1546, three years after Copernicus died.

Dec. 17. On this day in 1903 the first powered flight was accomplished by Orville Wright. We flew all the way to the moon less than 66 years later.

Dec.18. First quarter moon is at 10:14 a.m.

Dec. 21. The winter solstice happens at 11:48 p.m., marking the longest night of the year.

Dec. 23. The Ursid meteor shower peaks, emanating from Ursa Minor near Polaris.

Dec. 25. Isaac Newton was born on this day in 1642. Full moon is at 6:11 a.m. This is also called the Long Night Moon or Moon Before Yule if it happens before Christmas.

Dec. 27. Johannes Kepler was born on this day in 1571. He discovered the three laws of planetary motion, one of which you can clearly see demonstrated in the shape of the sun's analemma. He worked closely with Tycho Brahe, who was the greatest observer in the world at that time.

Dec. 28. Arthur Eddington was born on this day in 1882. He led the solar eclipse tour in 1919 that was the first concrete proof of Einstein's General Theory of Relativity, which came out exactly 100 years ago in 1915.

Dec. 29. On this day in 1980, the very first space shuttle ever, STS-1, left the Vehicle Assembly Building and was rolled out to the launch pad in Cape Kennedy.

Moon Phases

Dec 3
Last Quarter

Dec 11
New

Dec 18
First Quarter

Dec 25
Full

Moon Data

Dec 4
Jupiter 1.8° north of Moon

Dec 5
Moon at apogee

Mars 0.1° north of Moon

Dec 7
Venus 0.7° south of Moon

Dec 17
Neptune 3° south of Moon

Dec 19
Uranus 1.2° north of Moon

Dec 21
Moon at perigee

Dec 23
Aldebaran 0.7° south of Moon

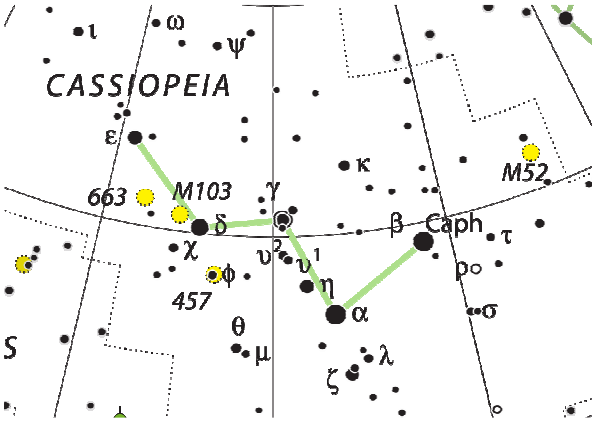
Sky Object of the Month – December 2015
Messier 52 – Open Cluster in Cassiopeia
by Glenn Chaple

If you're a fancier of open star clusters, Cassiopeia is the place to be. Among the best of the Queen's numerous open cluster offerings of is Messier 52.

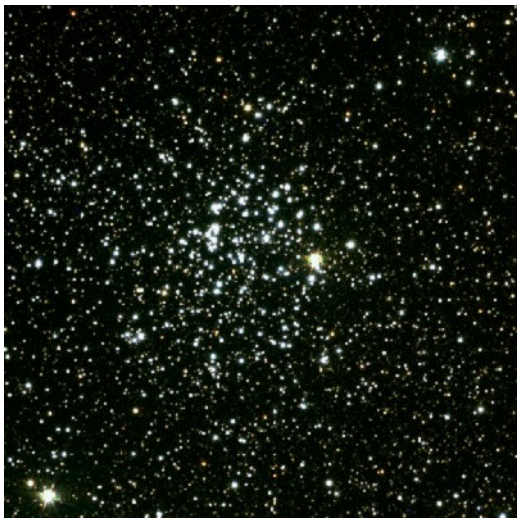
In binoculars and finderscopes, M52 appears as a fuzzy patch and remains mostly nebulous when viewed with small-aperture telescopes. My 3-inch f/10 reflector at 30X shows a triangular haze about 10 arc-minutes across and interspersed with a handful of tiny stellar specks. An 8th magnitude star located at the westernmost apex of the triangle gives M52 an appearance not unlike that of the "Wild Duck" Cluster, M11. The similarity isn't coincidental. Like M11, M52 is extremely rich and densely packed. Many dozens of stars, from magnitudes 9 to 13, greet the eye of anyone viewing M52 with a large scope and moderately high magnification. In all, the cluster contains about 200 stars.

You can find M52 by tracing an imaginary line from Shedir (alpha [α] Cassiopeiae) to Caph (beta [β] Cassiopeia) and extending it about 6 degrees beyond. M52 lies less than a degree south of the 5th magnitude star 4 Cassiopeiae and appears in the same low-power field.

M52 was discovered by Charles Messier on September 7, 1774. Its exact distance is uncertain, but a commonly-stated value of 5000 light years yields a true diameter of about 19 light years.



IAU/*Sky and Telescope*



freestarcharts.com

Principal Meteor Showers in 2015

January 4
Quadrantids

April 22
Lyrids

May 6
Eta Aquarids

July 30
Delta Aquarids

August 12
Perseids

October 9
Draconid

October 21
Orionids

November 9
Taurids

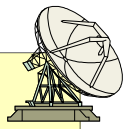
November 18
Leonids

November 26
Andromedids

December 14
Geminids

December 22
Ursids

Note: Dates are for maximum



Got any News?
Skylights welcomes your Input.

Here are some suggestions:

Book reviews -- Items for sale -- New equipment -- Ramblings -- Star parties -- Observing -- Photos.

The latest issue of the Space Place Newsletter: News and Notes for Formal and Informal Educators can be found at:

http://spaceplace.nasa.gov/educator-newsletter

Check out our great sites for kids:

The Space Place website (http://spaceplace.nasa.gov)

The *SciJinks Weather Laboratory* at http://**scijinks.gov**

NASA Climate Kids at http://**climate.nasa.gov/kids**

MEMBERSHIP DUES

Membership fees are for the calendar year beginning in January and ending in December. Dues (see page 9 for prices) are payable to the treasurer during the last quarter of each year (October- December) for the upcoming year. Checks should be made payable to the Astronomical Society of Northern New England (A.S.N.N.E). If you would like to mail in your dues, use the form on page 9.

Additional Notice

Dues have to be paid before the December meeting or the members cannot vote or run in the elections for officers for 2016. This is in the By-laws.

Our Solar System Is *Almost* Normal, But Not Quite

By Dr. Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

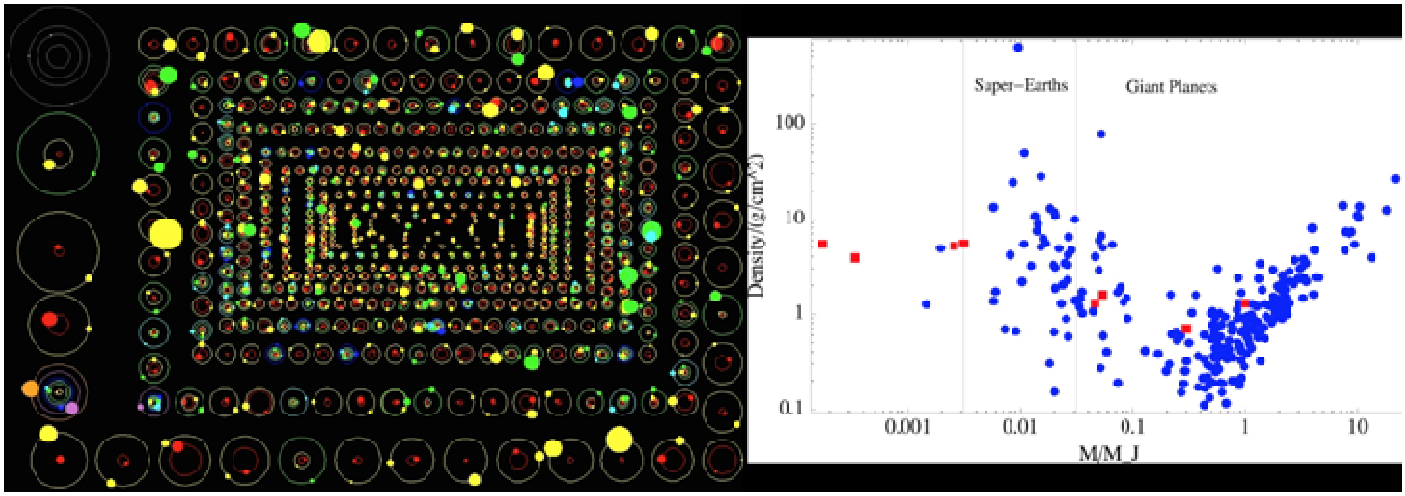
But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.

- All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.

- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!



Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) ApJ 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets.

Submitted by Peter Gillette

I recently set up my camera to do an all-night session, entirely on it's own. I had it running two-minute exposures on a time-lapse set-up, doing exposures every nine minutes. I haven't converted the set of images into an MPEG, or something like that, but, just holding down the review button on the camera turns the set into a movie, and its fantastic! With the camera set at its widest view, it still caught M31 and M33 and the Pleiades, along with two Taurid meteors. Here's one of the stills…

The Taurid is obvious, M31 is to its right, and M33 is up above, at the upper center , as a soft glow. Amazing, just how much star-trailing is obvious in just a two- minute exposure in a 28 mm lens!

Here's a shot I took a couple of nights ago. Four minutes, about 500mm FL, as I recall. A bit of cropping, a dash of contrast-enhance and brightness-drop, and voila!

FYI, here's the original...

Editor: I was out shopping with my Mom and as we were leaving the parking lot she noticed these beautiful and unique cloud patterns. I stopped and took this photo with my cell phone.

Close up.

Club Meeting & Star Party Dates

Date	Subject	Location
Dec 4 	**Christmas Party and Club Meeting.** **Pot Luck Supper 6:30 PM** **(6:00 PM set-up time)** Bring your favorite dish - salad - desert - or drink Discussion topics: Year in review and plans for 2016 plus our regular: Bernie Reim's "What's Up" Astro shorts	The New School, Kennebunk, Me.
Dec 11	Club/Public Star Party (check the club's list serve and or club's website for updates or cancellations).	Starfield Observatory, West Kennebunk, Me.

Directions to ASNNE event locations

Directions to The New School in Kennebunck [38 York Street (Rt1) Kennebunk, ME]

For directions to The New School you can use this link to the ASNNE NSN page and then click on "get directions" from the meeting location. Enter your starting location to generate a road map with complete directions. It works great. http://nightsky.jpl.nasa.gov/club-view.cfm?Club_ID=137

Directions to Starfield Observatory [Alewive Road, Kennebunk, ME]

From North:
Get off turnpike at exit 32, (Biddeford) turn right on Rt 111. Go 5 miles and turn left on Rt 35. Go 2 miles on Rt 35 over Kennebunk River to very sharp 90 degree left turn. The entrance to the Starfield Observatory site is at the telephone pole at the beginning of the large field on the left. Look for the ASNNE sign on the pole.

From South:
Get off the turnpike at exit 25 in Kennebunk. After toll both turn right on Rt 35. Go up over the turnpike and immediately turn right on Rt 35. About 4 miles along you will crest a hill and see a large field on your right. Continue until you reach the end of the field. Turn right into the Starfield Observatory site at the last telephone pole along the field. Look for the ASNNE sign on the pole. If you come to a very sharp 90 degree right turn you have just passed the field.

To join **ASNNE**, please fill out the below membership form. *Checks should be made payable to: Astronomical Society of Northern New England (A.S.N.N.E).* For more details, please visit our website: **http://www.asnne.org**

Astronomical Society of Northern New England
P.O. Box 1338
Kennebunk, ME 04043-1338

2016 Membership Registration Form

(Print, fill out and mail to address above)

Name(s for family): _____

Address: _____
City/State: _____ Zip code: _____

Telephone # _____

E-mail: _____

Membership (check one):
Individual $35 _____ Family $ 40 _____ Student under 21 years of age $10 _____ Donation_____

Total Enclosed_____

Tell us about yourself:
1. Experience level: Beginner____ Some Experience ____ Advanced_____

2. Do you own any equipment? (Y/N) And if so, what types?

_____
3. Do you have any special interests in Astronomy?

_____
4. What do you hope to gain by joining ASNNE?

_____
5. How could ASNNE best help you pursue your interest in Astronomy?

_____
6. ASNNE's principal mission is public education. We hold many star parties for schools and the general public for which we need volunteers for a variety of tasks, from operating telescopes to registering guests to parking cars. Would you be interested in helping?
Yes_____ No_____

7. ASNNE maintains a members-only section of its web site for names, addresses and interests of members as a way for members to contact each other. Your information will not be used for any other purpose. Can we add your information to that portion of our web site?

Yes_____ No_____