

Skylights

Newsletter of the Astronomical Society of Northern New England



APR 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.

What's Up In April

By Bernie Reim

The month of April is named for aprilis, which means opening. That is what part of the northern hemisphere of the earth is starting to do this month. Our hemisphere has now tilted more towards the sun as the days will continue to get longer and longer until the summer solstice.

There are many interesting highlights to enjoy this month as our long, cold, and snowy winter finally begins to soften its grip on us and our part of the earth begins to reawaken once again in its endless cycles. There will be nice conjunctions of the moon with Venus, and then with Jupiter, a Mercury and Mars conjunction, Venus giving us a grand tour of the constellation of Taurus, the Lyrid Meteor Shower, and a total lunar eclipse.

That is quite a full month of exciting highlights, but every month has unique happenings that will never happen exactly the same way again. There are certainly patterns to observe, like the moon passing fairly close to each of the planets each month because they are all on the same path though the sky, called the ecliptic, and all the meteor showers occurring at the same time each year, and the saros cycles of similar characteristics of lunar and solar eclipses, but each individual event is always different and very interesting to watch, enjoy, and understand.

Brilliant Venus continues to brighten in our sky as it catches up with Earth in its faster orbit around the sun. It will start this month 78% illuminated by the sun, but it will be only 68% illuminated by the end of April. As our sister planet travels through Taurus this month, climbing a little higher each evening, it will nicely draw attention to some interesting features and lead you on an educational and enlightening tour of this familiar constellation. It will start with the Pleiades, also known as the seven sisters or Subaru in Japanese, an open cluster of about 500 stars located about 400 light years away and about 100 million years old, then the Hyades, and open cluster of about 200

hundred stars about 130 lights years away and about 600 million years old, or 8 times younger than our sun, and then the orange giant star called Aldebaran, which marks the fiery eye of Taurus the Bull. This orange, spectral type K5 star is about 65 light years away, twice as close as the Hyades that it seems to belong to, and fully 40 times the diameter of our sun. If you could place Aldebaran in our own sky, it would cover 20 degrees, or two fists at arm's length, and it would almost include the orbit of Mercury. Aldebaran means follower in Arabic, since it seems to be following the Pleiades, and it is one of the four royal stars of ancient Persia. The other three are Regulus, Antares, and Fomalhaut. They are all equally impressive and entirely unique. The first exoplanet directly visible in telescopes was discovered around Fomalhaut 7 years ago.

The Hyades star cluster is actually related to the Beehive cluster in Cancer, also known as M44. The motions of the stars in these two clusters can be traced back to a common origin in the sky, almost like tracing individual meteors back to one point during a shower, called the radiant. They have other factors in common, like age, metallicity (heavier elements present)

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What's Up "Continued from page 1"

and proper motion through our galaxy. The Hyades form a giant oblate spheroid in space, similar to the shape of the earth, most of which fits into a diameter of about 20 light years across.

As a nice bonus, the slender waxing crescent moon will also travel through Taurus, albeit at a much quicker pace, from the 19th through the 22nd, which is also Earth Day. Notice that Mars and Mercury will form a close conjunction very low in the western sky during that time 45 minutes after sunset.

Jupiter will end its retrograde motion towards the Beehive on April 8th, stopping five degrees short of this relative of the Hyades cluster. Then the King of the planets will resume its normal eastward or prograde motion in relation to the fixed background of stars for the next 8 months, heading back into Leo. Be aware that Jupiter is heading for a great conjunction with Venus on July 1st.

Saturn continues to rise a little earlier each evening and it will be rising by 9:30 by the end of April. It will reach opposition on May 22nd when it will rise exactly at sunset. Notice that the ringed planet is already in retrograde motion, having ended its direct motion on March 14, which was also the once in a century Pi day when the date and time reflects the first 10 digits of this irrational number, and Albert Einstein's birthday.

The Lyrid meteor shower peaks on the morning of Wednesday the 22nd. Caused by Comet Thatcher, which only orbits the sun once every 415 years, this shower is not usually too spectacular, only producing about 20 meteors per hour under good conditions. However, there are always exceptions and any reason is a good one for getting out under the stars to enjoy and try to understand their vast beauty and power.

The third total lunar eclipse of this very rare tetrad of four total lunar eclipses that also fall on important Jewish holidays will happen on Saturday morning, April 4th. This is only the eighth such tetrad in the past 2,000 years. We are not well placed here on the East coast to see much of this rare event, but we can catch a little of it just before the moon sets in the morning as the sun rises. It will only have entered the penumbral shadow at that point, so you will need binoculars to discern any change at all on the face of the moon. We

also missed the total solar eclipse that happened just a few hours before spring started. It occurred at a super moon and was very spectacular over the Faroe and Svalbard Islands, located halfway between Norway and the North Pole.

April 4. Full moon is at 8:05 a.m. EDT. This is also called the Grass, Egg, Pink, or Fish Moon. The total lunar eclipse will happen today just before sunrise.

April 8. Saturn will be close to the waning gibbous moon this morning.

April 10 to 12. Venus will be close to the Pleiades in Taurus.

April 11. Halley's Comet was closest to Earth on this day in 1986. Last quarter moon is at 11:44 pm.

April 12. Yuri Gagarin became the first human in space on this day in 1961.

April 16. Wilbur Wright was born on this day in 1867. It was only 66 years after the Wright Brother's made their first very tentative powered flight in 1903 that we traveled all the way to the moon.

April 18. New moon is today at 2:57 p.m.

April 19. Mercury and Mars are visible close together low on the western evening horizon. You may need binoculars to see them.

April 20. The slender waxing crescent moon joins Venus by the Pleiades this evening.

April 22. The Lyrid Meteor Shower peaks tonight.

April 23. Max Planck was born on this day in 1858. He was one of the founders of quantum mechanics that completely redefines what really happens at the very small scale of the universe. The shortest distance in the known universe is called the Planck length, which is 10 to the minus 35 meters. The shortest amount of time, 10 to the minus 43rd second, is called the Planck time. That is the time it takes light to travel the width of a proton. That is also as far back as any humans can possibly see after the instant on the Big Bang.

April 24. On this day in 1970 China becomes the 5th nation to launch a satellite.

April 25. The Hubble Space Telescope was deployed on this day in 1990. First quarter moon is at 7:55 p.m. EDT.

April 30. Mercury makes its best evening apparition of this year this week and next.

Moon Phases

Apr 4
Full

Apr 11
Last Quarter

Apr 18
New

Apr 25
First Quarter

Moon Data

Apr 1
Moon at apogee

Apr 8
Saturn 2° south
of Moon

Apr 15
Neptune 4° south
of Moon

Apr 16
Moon at perigee

Apr 21
Venus 7° north
of Moon

Aldebaran 0.9°
south of Moon

Apr 26
Jupiter 5° north
of Moon

Apr 28
Moon at apogee

Sky Object of the Month – April 2015 NGC 3115 – Lenticular (SO) Galaxy in Sextans by Glenn Chaple

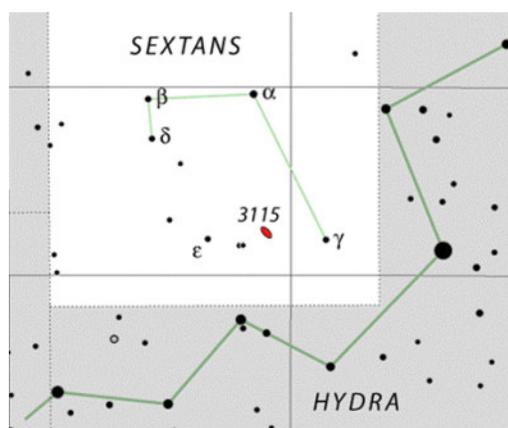
Some of the finest deep-sky objects are bypassed because they lie in star-poor regions of the sky. Such was the case with our February “Sky Object of the Month,” the planetary nebula NGC 1501 in Camelopardalis. It’s also the situation with NGC 3115 – a bright “shoulda-been-found-by-Messier” object in that eluded the French comet hunter’s eye and, therefore, his catalog. It was eventually discovered by William Herschel while surveying the obscure constellation Sextans in 1787.

At 9th magnitude, NGC 3115 is the brightest example of an S0 galaxy, one that bridges the galactic gap between ellipticals and spirals. Its 8’ by 3’ dimensions (about half that, visually) have earned it the nickname “Spindle Galaxy” (a monicker it shares with the galaxy NGC 5866). It’s also entry number 53 in the late Sir Patrick Moore’s Caldwell Catalog.

NGC 3115 is found at coordinates 15^h 06.5^m (R.A.) and +55° 45.8’ Decl.). Star-hoppers need to begin outside Sextans with Alphard (alpha Hydrae). A line traced from this 2nd magnitude star through 5th magnitude gamma Sextantis and extended about 20 percent (3 degrees) further will bring you to the general vicinity of NGC 3115. A low power search should sweep it up.

From dark-sky sites, NGC 3115 can be glimpsed with binoculars. I had no trouble picking it up in a 3-inch reflector at 30X, noting that it appeared “as a very oval, compact nebulosity surrounded by fainter nebulosity.” Except for sharply pointed ends and a stellar nucleus, NGC 3115 remains relatively featureless when viewed with medium to large-aperture scopes.

A fuzzy, elongated blob isn’t exactly something you’d want to show visitors at a public star party. Don’t let this nondescript appearance fool you. In 1992, astronomers discovered a beast lurking at the core of NGC 3115 - a monstrous black hole with the mass of **2 billion** suns!



www.constellation-guide.com



www.eyes4skies.de

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



New on the Space Place Web Site: Satellite Graveyard

Where do old satellites go to die? Countries and commercial ventures have been putting spacecraft in orbit around Earth since the late 1950s. There must be a lot of space junk out there. So what happens to them when they no longer work? Find out at <http://spaceplace.nasa.gov/spacecraft-graveyard>.



The latest issue of the **Space Place Newsletter: News and Notes for Formal and Informal Educators** can be found at: <http://spaceplace.nasa.gov/en/educators>.

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>

Our club has merchandise for sale at:

www.cafepress.com/asnne



All money raised goes to our operating fund.
Any design can be put on any item.



The Cold Never Bothered Me Anyway

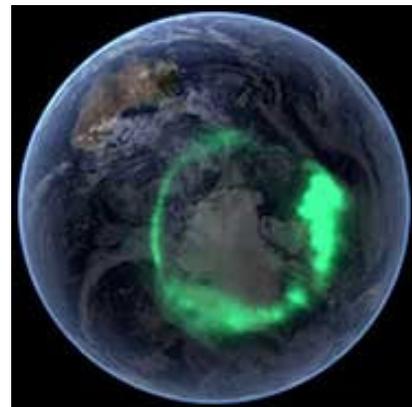
By Dr. Ethan Siegel

For those of us in the northern hemisphere, winter brings long, cold nights, which are often excellent for sky watchers (so long as there's a way to keep warm!) But there's often an added bonus that comes along when conditions are just right: the polar lights, or the Aurora Borealis around the North Pole. Here on our world, a brilliant green light often appears for observers at high northern latitudes, with occasional, dimmer reds and even blues lighting up a clear night.

We had always assumed that there was some connection between particles emitted from the Sun and the aurorae, as particularly intense displays were observed around three days after a solar storm occurred in the direction of Earth. Presumably, particles originating from the Sun—ionized electrons and atomic nuclei like protons and alpha particles—make up the vast majority of the solar wind and get funneled by the Earth's magnetic field into a circle around its magnetic poles. They're energetic enough to knock electrons off atoms and molecules at various layers in the upper atmosphere—particles like molecular nitrogen, oxygen and atomic hydrogen. And when the electrons fall back either onto the atoms or to lower energy levels, they emit light of varying but particular wavelengths—oxygen producing the most common green signature, with less common states of oxygen and hydrogen producing red and the occasional blue from nitrogen.

But it wasn't until the 2000s that this picture was directly confirmed! NASA's Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) satellite (which ceased operations in December 2005) was able to find out how the

magnetosphere responded to solar wind changes, how the plasmas were energized, transported and (in some cases) lost, and many more properties of our magnetosphere. Planets without significant magnetic fields such as Venus and Mars have much smaller, weaker aurorae than we do, and gas giant planets like Saturn have aurorae that primarily shine in the ultraviolet rather than the visible. Nevertheless, the aurorae are a spectacular sight in the evening, particularly for observers in Alaska, Canada and the Scandinavian countries. But when a solar storm comes our way, keep your eyes towards the north at night; the views will be well worth braving the cold!



Caption:

Auroral overlays from the IMAGE spacecraft.

Image credit: NASA Earth Observatory (Goddard Space Flight Center) / Blue Marble team.

[The University of California High-Performance AstroComputing Center](#)



Magnetically Levitating Black Holes

Lurking in the centers of most galaxies, including our own Milky Way, are supermassive black holes: monsters from several hundred thousand to several billion solar masses jammed into a volume equivalent to that of our solar system. Gas or stars drifting too close will find themselves caught in the grip of the powerful gravitational field, trapped in an inexorable death spiral ever faster and tighter down toward the black hole, until voraciously consumed in a last gasp of electromagnetic radiation. Right?

Not so fast. A new study of 76 supermassive black holes, combining analysis of observations with computer simulations, reveals that some galactic behemoths have magnetic fields powerful enough to counteract the enormous pull of their gravity—thereby allowing clouds of gas or other objects at the top of the magnetic fields to levitate temporarily in place above a supermassive black hole.

“This paper for the first time systematically measures the strength of magnetic fields near black holes,” said co-author Alexander Tchekhovskoy, a Lawrence Berkeley National Laboratory (LBNL) postdoctoral researcher who helped interpret observations within the context of computational models. “Now we have evidence from not just one or two, but from 76 black holes.”

Loud and twisted

Of interest are blazars: active galactic nuclei (AGNs) that beam extremely bright, energetic, collimated jets of gas at nearly the speed of light in the direction of the Earth. Such jets—which shoot out along the axis of rotation of a disk of gas accreting around a rotating black

hole—emit powerful radiation at radio wavelengths. Only about one in ten AGNs have powerful radio-emitting jets.

From such radio emission independently observed by other astronomers at different frequencies using very long baseline interferometry (VLBI) from a vast network radio telescopes separated by thousands of miles, the authors determined the strengths of magnetic fields threading through the jets and central black holes of 68 blazars and eight nearby radio galaxies. Included were such famous galaxies as the beautiful spiral Messier 81 in Ursa Major, Centaurus A (the radio galaxy nearest to our Milky Way), and Cygnus A (a famous radio galaxy discovered in 1939 by radio astronomy pioneer Grote Reber).

The coauthors compared the predictions of the computer simulations to the measured magnetic field strengths and found good agreement. The simulations revealed that the magnetic fields, which are twisted by the rotation of a supermassive black hole, are strong enough to counteract the pull of gravity and retard the infall of gas. The twist also transfers black hole rotational energy to electromagnetic energy of the jets, which carry it out as far as several light-years away.

A heavy fluid (accreting gas) placed on top of a light fluid (a magnetic field) is an unstable configuration because the two fluids naturally want to change places, Tchekhovskoy explains. However, for a few hours, “the gas is slowed down by the presence of magnetic fields and even sometimes briefly stopped,” he says, so that the gas “continuously trickles down to the black hole” instead of falling unobstructed.

“Continued on page 7”

Magnetically Levitating Black Holes

“Continued from page 6”

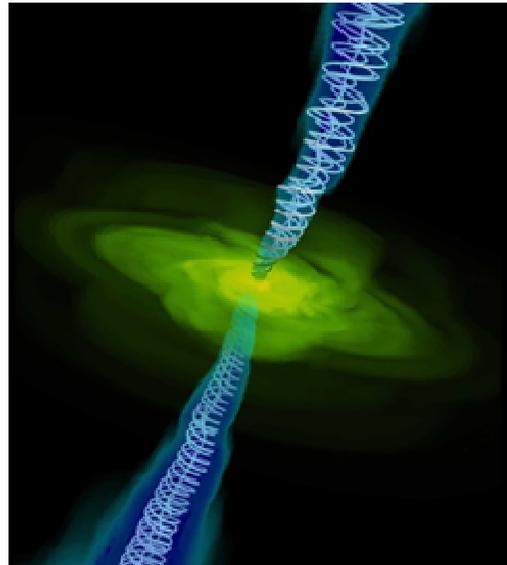
Back to the drawing board

Thus, “...the jet-launching regions of these radio-loud galaxies are threaded by dynamically important [magnetic] fields, which will affect the disk properties,” the authors conclude. “These fields obstruct gas infall, compress the accretion disk vertically, slow down the disk rotation by carrying away its angular momentum in an outflow, and determine the directionality of jets.”

Tchekhovskoy and his three coauthors from the Max Planck Institute for Radio Astronomy in Bonn, Germany, believe that the new results mean theorists must re-evaluate their understanding of how supermassive black holes behave. —*Trudy E. Bell, M.A.*

Further reading: The paper, “Dynamically important magnetic fields near accreting supermassive black holes,” by M. Zamaninasab, Eric Clausen-Brown, T. Savolainen, and Alexander Tchekhovskoy, published in *Nature* on June 5, 2014, is accessible from <http://www.nature.com/nature/journal/v510/n7503/full/nature13399.html> . A press release from LBNL is at <http://newscenter.lbl.gov/2014/06/04/black-holes/> and a release from the Max Planck Institute is at http://www.mpg.de/8256277/magnetic-fields_supermassive-black-holes.

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, and Los Alamos National Laboratory). UC-HIPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at <http://hipacc.ucsc.edu> .



A computer simulation shows gas (yellow) falling in the direction of a central black hole (too small to be seen). Twin jets (blue), strongly focused by spiral magnetic field lines, shoot out towards the top and bottom, perpendicular to the plane of the rotating accretion disk. Credit: Alexander Tchekhovskoy / LBNL

Club Meeting & Star Party Dates

Date	Subject	Location
April 3	<p>ASNNE Club Meeting:</p> <p>6:45-7:30PM: Joan's Beginner Astronomy Class (Public walk-ins welcome).</p> <p>7:30-9:30PM: Club Meeting</p> <p><u>Meeting Agenda</u></p> <p>Guest Speaker/Topic: Mars HiRise images in 3D (glasses provided)</p> <p>Bernie Reim - What's UP Astro Shorts: (news, stories, jokes, reports, questions, observations etc.) Where's Pluto - Update on the New Horizons Mission and "Planet" status.</p>	The New School, Kennebunk, Me.
April 17	Club/Public Star Party (<i>Visit website for updates and or cancellations</i>)	Starfield Observatory, West Kennebunk, Me.

Directions to ASNNE event locations

Directions to The New School in Kennebunk [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 [Alewife 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

2015 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 _____

