November 2011

# THE SPECTROGRAM

Newsletter for the Society of Telescopy, Astronomy, and Radio

## Inside this Issue:

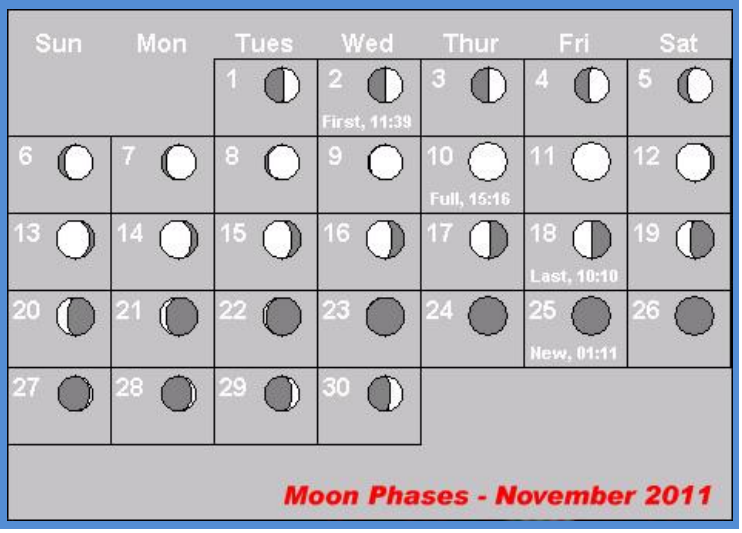


## November Meeting

The next meeting of S*T*A*R will be on Thursday, November 3, 2011. Dr William Gutsch will be our guest speaker. He will address the topic "Astro-archaeology". In this illustrated talk, we'll travel around the globe and back in time to see how many early peoples relied on the heavens and how, in turn, the heavens helped define their relationship to both the natural world and the realm of the supernatural. We will begin our journey in the Pre-Columbian Americas with the Anasazi, the Maya, Aztec, and Inca. We'll then cross the Atlantic to stop at Newgrange and Stonehenge, travel on to ancient Egypt, India, Cambodia, and China and finally cross the vast Pacific with the ancient Polynesians to discover islands in paradise.

## Calendar

- November 3rd, 2011 – Monthly meeting. Speaker : Dr William Gutsch
- November 22nd, 2011 - Astronomy Night at Mill Lake Elementary School in Monroe Township




## December Issue

**Please submit articles and contributions for the next *Spectrogram* by November 27th.** Please email to fowler@verizon.net.

# Star Parties:

Astronomy Night
November 22, 2011

Mill Lake Elementary School in Monroe Township is holding their annual Astronomy Night on Tuesday, November 22nd. They have asked if we could set up several telescopes for the students and parents. The school is located at 115 Monmouth Road, Monroe Township, NJ 08831.

We can arrive and set up in the rear of the school at 5:30. In the past there was pizza, subs and soda for the astronomers. The students will start to arrive at 6:00 and it should end about 9:00.

This event goes on rain or cloud. There are indoor stations where the students are engaged in hands-on activities supervised by the teachers. There will be a Starlab Planetarium and an exhibit of Moon rocks. There are about 180 students plus parents and siblings but they will come out to observe in class sized groups.

The last two years we were able to observe but the two previous years the skies were overcast and the astronomers did the observations through breaks in the clouds or came inside the gym and showed the students how their telescopes worked and viewed pictures of galaxies across the room.

Please post if you can help.
Please monitor "Events and Observation Plans" link on our web site for updates.

Russ Drum and Dennis O'Leary are contacts for the Club.

Memberships: ( )Individual....$25 ( ) Family...$35

Name_____

Address_____

City_____State___Zip_____

Phone_____

Email_____
Make checks payable to: S*T*A*R Astronomy Society, Inc. and mail to P.O. Box 863, Red Bank, NJ 07701

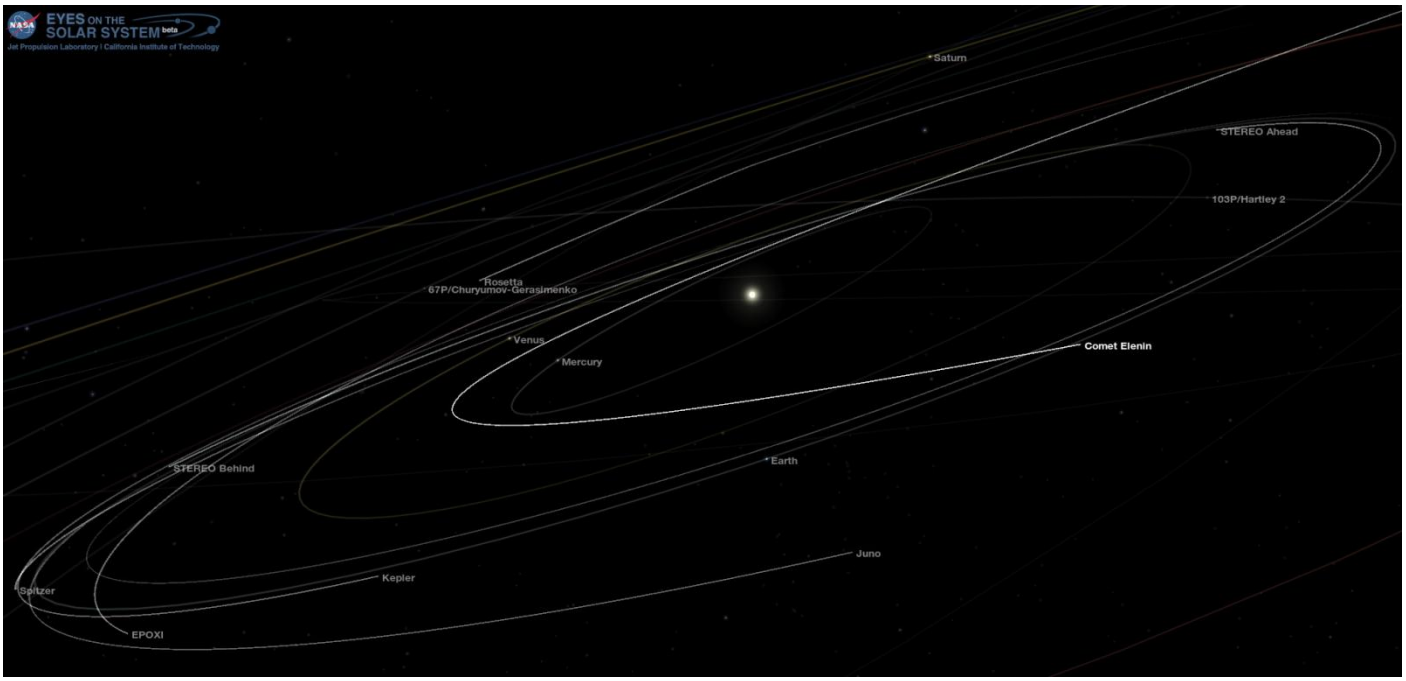
# Are you a S*T*A*R Member?

Meetings are the first Thursday of each month, except July and August, at 8:00 PM at the Monmouth Museum on the Brookdale Community College campus. Meetings generally consist of lectures and discussions by members or guest speakers on a variety of interesting astronomical topics. S*T*A*R is a member of United Astronomy Clubs of New Jersey (UACNJ), the Astronomical League (AL), and the International Dark Sky Association (IDA).

# NASA Says Comet Elenin Gone and Should Be Forgotten

Comet Elenin is no more.

Latest indications are this relatively small comet has broken into even smaller, even less significant, chunks of dust and ice. This trail of piffling particles will remain on the same path as the original comet, completing its unexceptional swing through the inner solar system this fall.




***Trajectory of comet Elenin. Image credit: NASA/JPL-Caltech***

"Elenin did as new comets passing close by the sun do about two percent of the time: It broke apart," said Don Yeomans of NASA's Near-Earth Object Program Office at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Elenin's remnants will also act as other broken-up comets act. They will trail along in a debris cloud that will follow a well-understood path out of the inner solar system. After that, we won't see the scraps of comet Elenin around these parts for almost 12 millennia."

Twelve millennia may be a long time to Earthlings, but for those frozen inhabitants of the outer solar system who make this commute, a dozen millennia give or take is a walk in the celestial park. Comet Elenin came as close as 45 million miles (72 million kilometers) to the sun, but it arrived from the outer solar system's Oort Cloud, which is so far away its outer edge is about a third of the way to the nearest star other than our sun.

For those broken up over the breakup of what was formerly about 1.2 miles (2 kilometers) of uninspiring dust and ice, remember what Yeomans said about comets coming close to the sun – they fall apart about two percent of the time.

"Comets are made up of ice, rock, dust and organic compounds and can be several miles in diameter, but they are fragile and loosely held together like dust balls," said Yeomans. "So it doesn't take much to get a comet to disintegrate, and with comets, once they break up, there is no hope of reconciliation."

Comet Elenin first came to light last December, when sunlight reflecting off the small comet was detected by Russian astronomer Leonid Elenin of Lyubertsy, Russia. Also known by its astronomical name, C/2010 X1, Elenin somehow quickly became something of a "cause célèbre" for a few Internet bloggers, who proclaimed this minor comet could/would/should be responsible for causing any number of disasters to befall our planet.

Internet posts began appearing, many with nebulous, hearsay observations and speculations about earthquakes and other disasters being due to Elenin's gravitational effects upon Earth. NASA's response to such wild speculations was then in turn speculated to be an attempt to hide the truth.

"I cannot begin to guess why this little comet became such a big Internet sensation," said Yeomans. "The scientific reality is this modest-sized icy dirtball's influence upon our planet is so incredibly minuscule that my subcompact automobile exerts a greater gravitational influence on Earth than the comet ever would. That includes the date it came closest to

Earth (Oct. 16), when the comet's remnants got no closer than about 22 million miles (35.4 million kilometers)."

Yeomans knows that while Elenin may be gone, there will always be Internet rumors that will attempt to conjure up some form of interplanetary bogeyman out of Elenin, or some equally obscure and scientifically uninteresting near-Earth object. Thinking of ways to make himself any more clear about the insignificance of this matter is somewhat challenging for a scientist who has dedicated his life to observing asteroids and comets and discovering their true nature and effects on our solar system.

"Perhaps a little homage to a classic Monty Python dead parrot sketch is in order," said Yeomans. "Comet Elenin has rung down the curtain and joined the choir invisible. This is an ex-comet."

NASA detects, tracks and characterizes asteroids and comets passing relatively close to Earth using both ground- and space-based telescopes. The Near-Earth Object Observations Program, commonly called "Spaceguard," discovers these objects, characterizes the physical nature of a subset of them, and predicts their paths to determine if any could be potentially hazardous to our planet. There are no known credible threats to date.

JPL manages the Near-Earth Object Program Office for NASA's Science Mission Directorate in Washington. JPL is a division of the California Institute of Technology in Pasadena.

More information about asteroids and near-Earth objects is at: http://www.jpl.nasa.gov/asteroidwatch , and on Twitter: @asteroidwatch .

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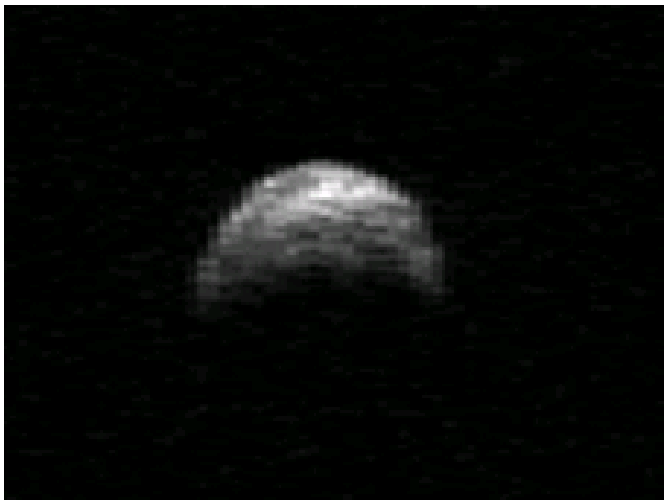
# NASA in Final Preparations for Nov. 8 Asteroid Flyby

NASA scientists will be tracking asteroid 2005 YU55 with antennas of the agency's Deep Space Network at Goldstone, Calif., as the space rock safely flies past Earth slightly closer than the moon's orbit on Nov. 8. Scientists are treating the flyby of the 1,300-foot-wide (400-meter) asteroid as a science target of opportunity – allowing instruments on "spacecraft Earth" to scan it during the close pass.

Tracking of the aircraft carrier-sized asteroid will begin at 9:30 a.m. local time (PDT) on Nov. 4, using the massive 70-meter (230-foot) Deep Space Network antenna, and last for about two hours. The asteroid will continue to be tracked by Goldstone for at least four hours each day from Nov. 6 through Nov. 10. Radar observations from the Arecibo Planetary Radar Facility in Puerto Rico will begin on Nov. 8, the same day the asteroid will make its closest approach to Earth at 3:28 p.m. PST.



***This radar image of asteroid 2005 YU55 was generated from data taken in April 2010 by the Arecibo Radar Telescope in Puerto Rico. Image credit: NASA/Cornell/Arecibo***

The trajectory of asteroid 2005 YU55 is well understood. At the point of closest approach, it will be no closer than 201,700 miles (324,600 kilometers) or 0.85 the distance from the moon to Earth. The gravitational influence of the asteroid will have no detectable effect on anything here on Earth, including our planet's tides or tectonic plates. Although 2005 YU55 is in an orbit that regularly brings it to the vicinity of Earth (and Venus and Mars), the 2011 encounter with Earth is the closest this space rock has come for at least the last 200 years.

During tracking, scientists will use the Goldstone and Arecibo antennas to bounce radio waves off the space rock. Radar echoes returned from 2005 YU55 will be collected and analyzed. NASA scientists hope to obtain images of the asteroid from Goldstone as fine as about 7 feet (2 meters) per pixel. This should reveal a wealth of detail about the asteroid's surface features, shape, dimensions and other physical properties (see "Radar Love" - http://www.jpl.nasa.gov/news/news.cfm?release=2006-00a).

Arecibo radar observations of asteroid 2005 YU55 made in 2010 show it to be approximately spherical in shape. It is slowly spinning, with a rotation period of about 18 hours. The asteroid's surface is darker than charcoal at optical wavelengths. Amateur astronomers who want to get a glimpse at YU55 will need a telescope with an aperture of 6 inches (15 centimeters) or larger.

The last time a space rock as big came as close to Earth was in 1976, although astronomers did not know about the flyby at the time. The next known approach of an asteroid this large will be in 2028.

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NASA's Jet Propulsion Laboratory manages the Near-Earth Object Program Office for NASA's Science Mission Directorate in Washington. JPL is a division of the California Institute of Technology in Pasadena.

More information about asteroids and near-Earth objects is at: http://www.jpl.nasa.gov/asteroidwatch.

More information about asteroid radar research is at: http://echo.jpl.nasa.gov/ .

More information about the Deep Space Network is at: http://deepspace.jpl.nasa.gov/dsn .

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# Beautiful Red Aurora

***An all-red aurora captured in Independence, Mo., on October 24, 2011. Image Courtesy of Tobias Billings***

A coronal mass ejection (CME) shot off the sun late in the evening of October 21 and hit Earth on October 24 at about 2 PM ET. The CME caused strong magnetic field fluctuations near Earth's surface – technically, this level of magnetic fluctuation rated a 7 out of 9 on what is called the "KP index" – that resulted in aurora that could be seen in the US as far south as Alabama. This image was captured in Independence, Mo. Such completely red aurora are not as common as green aurora, however they can happen during strong solar activity and they occur a little more often at low latitudes such as where this was taken.

The strength, speed, and mass of this CME also pushed the boundary of Earth's magnetic fields – a boundary known as the magnetopause – from its normal position at about 40,000 miles away from Earth in to about 26,000 miles. This is the area where spacecraft in geosynchronous orbit reside, so these spacecraft were briefly orbiting outside of Earth's normal environment, traveling through material and magnetic fields far different from usual.

***Another view of an all-red aurora captured in Independence, Mo., on October 24, 2011. Image Courtesy of Tobias Billings***

**What is a coronal mass ejection?**

For answers to these and other space weather questions, please visit the **Spaceweather Frequently Asked Questions** page.

***Karen C. Fox***
***NASA's Goddard Space Flight Center***

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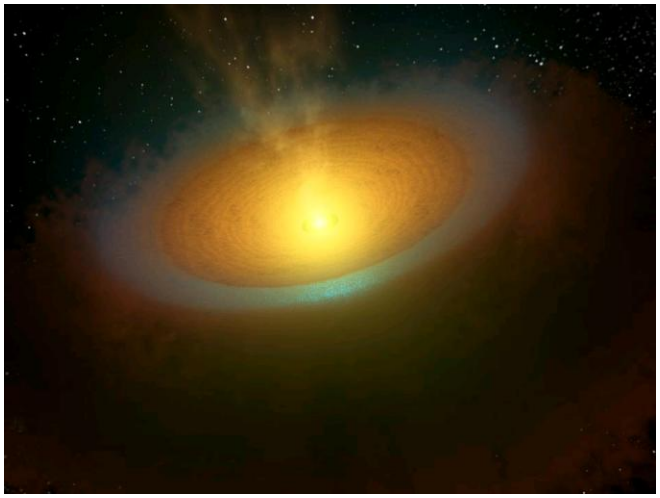
# Herschel Finds Oceans of Water in Disk of Nearby Star

PASADENA, Calif. -- Using data from the Herschel Space Observatory, astronomers have detected for the first time cold water vapor enveloping a dusty disk around a young star. The findings suggest that this disk, which is poised to develop into a solar system, contains great quantities of water, suggesting that water-covered planets like Earth may be common in the universe. Herschel is a European Space Agency mission with important NASA contributions.



***This artist's concept illustrates an icy planet-forming disk around a young star called TW Hydrae, located about 175 light-years away in the Hydra, or Sea Serpent, constellation. Astronomers using the Herschel Space Observatory detected copious amounts of cool water vapor, illustrated in blue, emanating from the star's planet-forming disk of dust and gas. The water vapor, which probably comes from icy grains in the disk, is located in the frigid outer regions of the star system, where comets will take shape. In our own solar system, comets are thought to have carried water to Earth, creating our oceans. A similar process might be taking place around TW Hydrae -- comets could, over the next several millions of years, transport water to young worlds. The Herschel results demonstrate that vast reservoirs of water are available around stars for creating these hypothetical water worlds. Herschel is a European Space Agency mission with significant NASA contributions. Launched in 2009, the spacecraft carries science instruments provided by consortia of European institutes. NASA's Herschel Project Office based at JPL contributed mission-enabling technology for two of Herschel's three science instruments. The NASA Herschel Science Center, part of the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena, supports the U.S. astronomical community. Caltech manages JPL for NASA. Image credit: NASA/JPL-Caltech***

Scientists previously found warm water vapor in planet-forming disks close to a central star. Evidence for vast quantities of water extending out into the cooler, far reaches of disks where comets take shape had not been seen until now. The more water available in disks for icy comets to form, the greater the chances that large amounts eventually will reach new planets through impacts.

"Our observations of this cold vapor indicate enough water exists in the disk to fill thousands of Earth oceans," said astronomer Michiel Hogerheijde of Leiden Observatory in The Netherlands. Hogerheijde is the lead author of a paper describing these findings in the Oct. 21 issue of the journal Science.

The star with this waterlogged disk, called TW Hydrae, is 10 million years old and located about 175 light-years away from Earth, in the constellation Hydra. The frigid, watery haze detected by Hogerheijde and his team is thought to originate from ice-coated grains of dust near the disk's surface. Ultraviolet light from the star causes some water molecules to break free of this ice, creating a thin layer of gas with a light signature detected by Herschel's Heterodyne Instrument for the Far-Infrared, or HIFI.

"These are the most sensitive HIFI observations to date," said Paul Goldsmith, NASA project scientist for the Herschel Space Observatory at the agency's Jet Propulsion Laboratory in Pasadena, Calif. "It is a testament to the instrument builders that such weak signals can be detected."

TW Hydrae is an orange dwarf star, somewhat smaller and cooler than our yellow-white sun. The giant disk of material that encircles the star has a size nearly 200 times the distance between Earth and the sun. Over the next few million years, astronomers believe matter within the disk will collide and grow into planets, asteroids and other cosmic bodies. Dust and ice particles will assemble as comets.

As the new solar system evolves, icy comets are likely to deposit much of the water they contain on freshly created worlds through impacts, giving rise to oceans. Astronomers believe TW Hydrae and its icy disk may be representative of many other young star systems, providing new insights on how planets with abundant water could form throughout the universe.

Herschel is a European Space Agency cornerstone mission launched in 2009, carrying science instruments provided by consortia of European institutes. NASA's Herschel Project Office based at JPL contributed mission-enabling technology for two of Herschel's three science instruments. The NASA Herschel Science Center, part of the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena, supports the U.S. astronomical community. Caltech manages JPL for NASA.

For NASA's Herschel website, visit:
http://www.nasa.gov/herschel and
http://www.herschel.caltech.edu .

For ESA's Herschel website, visit:
http://www.esa.int/SPECIALS/Herschel/index.html

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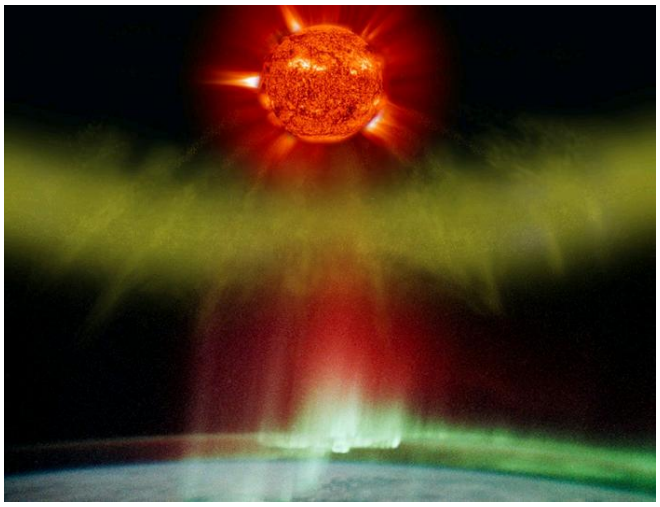
# Year of the Solar System Magnetospheres: Planetary Shields

Space is a challenging place. We think of it as mostly empty, but that is not completely true. The vast sea of space in our solar system is filled with powerful radiation and bombarded with high-speed atomic particles. In addition, the Sun generates a continuous stream of particles that we call the "solar wind." The high energy radiation, the high energy particles, and the solar wind could prove dangerous to life here on Earth's surface. Earth's planetary shield -- the Earth's magnetic field working together with our atmosphere -- protects us.

Every magnet generates a magnetic field. Several objects in our solar system also have their own massive magnetic fields: the Sun, Earth, Mercury, Jupiter, Saturn, Uranus, and Neptune. The magnetic field around a planet that extends into space is called a magnetosphere. The magnetospheres of the planets interact with the particles from the Sun -- the solar wind. Within the magnetosphere, charged particles spiraling along the Earth's magnetic field toward the poles create beautiful aurorae, the northern and southern lights, when they interact with our atmosphere.



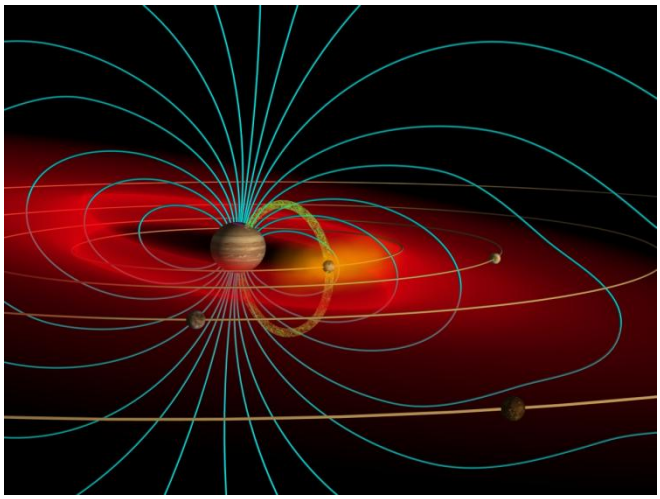
***This illustration of a cloud of particles blasted from the Sun and impacting Earth to create an aurora. Credit: SOHO mission, NASA.***

Magnetic fields can also create hazards. Magnetospheres trap high energy particles into radiation belts around planets. The distant gas giant planets do not need protection from the solar wind; instead, their powerful radiation belts create a serious hazard for spacecraft, as do our own Van Allen radiation belts here on Earth.

Earth's magnetosphere does more than shield us from the constant barrage of high-energy particles. It also protects our atmosphere and oceans from the solar wind, which would otherwise gradually erode them away into space. Mars' lack of a magnetosphere may be partly responsible for the thinness of its atmosphere and absent oceans. A magnetosphere on Venus could have prevented this planet's primordial water from escaping into space.

Given these critical roles, it is not surprising that several missions are actively investigating these planetary shields. The ongoing MESSENGER mission is mapping out Mercury's magnetic field, as is Cassini at Saturn, and Juno is on its way to do the same at Jupiter. The Solar Dynamics Observatory is also monitoring the Sun and its magnetic field to explore its impact on the near Earth space environment..

Join us this month to investigate magnetic fields and planetary magnetospheres, through a variety of activities and mission resources. We will also celebrate the launch of the Mars Science Laboratory on its way to deliver the rover Curiosity to the surface of the red planet!



***Jupiter's magnetic field interacts with its volcanic moon Io, spewing hot gas and dust into a doughnut-shaped cloud within Jupiter's magnetosphere.***

**November 2011 Celestial Events:** supplied by J. Randolph Walton (Randy)

| Day | Date | Time (EDT) | Event |
|---|---|---|---|
| Wed | 2 | 12:38 | **First Quarter Moon** |
| | | 13:47 | Moon rise |
| | | 23:00 | **Lunar X near crater Werner** |
| Thu | 3 | 23:00 | **Lunar Straight Wall visible** |
| Sat | 5 | 01:10 | Mars Rises |
| | | 05:45 | Saturn Rises |
| | | 06:45 | Jupiter Sets |
| | | 07:33 | Sunrise |
| | | 15:10 | Moon rise |
| | | 17:53 | Sunset |
| | | 18:45 | Mercury Sets |
| | | 18:56 | Venus Sets |
| | | 19:00 | **S Taurid meteors (ZHR=10)** |
| Sun | 6 | 02:00 | **Daylight Saving Time ends** |
| Thu | 10 | 15:16 | **Full Moon** |
| | | 16:35 | Moon rise |
| Sat | 12 | 00:05 | Mars Rises |
| | | 04:25 | Saturn Rises |
| | | 05:15 | Jupiter Sets |
| | | 06:41 | Sunrise |
| | | 16:46 | Sunset |
| | | 17:00 | **N Taurid meteors (ZHR=15)** |
| | | 17:47 | Mercury Sets |
| | | 17:57 | Venus Sets |
| | | 18:01 | Moon rise |
| Thu | 17 | 23:00 | **Leonid meteors (ZHR=15)** |
| | | 23:00 | Moon rise |
| Fri | 18 | 10:09 | **Last Quarter Moon** |
| | | 12:26 | Moon Set |
| Sat | 19 | 04:03 | Saturn Rises |
| | | 04:45 | Jupiter Sets |
| | | 12:57 | Moon Set |
| | | 16:41 | Sunset |
| | | 17:45 | Mercury Sets |
| | | 18:05 | Venus Sets |
| | | 23:50 | Mars Rises |
| Fri | 25 | 01:10 | **New Moon** |
| | | 01:20 | **Partial Solar Eclipse, not visible in NJ** |
| | | 07:22 | Moon rise |
| Sat | 26 | 03:40 | Saturn Rises |
| | | 04:20 | Jupiter Sets |
| | | 06:57 | Sunrise |
| | | 16:37 | Sunset |
| | | 17:30 | **Mercury Sets near Moon and Venus** |
| | | 18:07 | Moon Set |
| | | 18:10 | Venus Sets |
| | | 23:37 | Mars Rises |
| **Dec** | **2** | 04:52 | **First Quarter Moon** |

# In the Eyepiece

Here is a list of objects for this month. This is reproduced from www.skyhound.com with the kind permission of its creator and author of SkyTools Greg Crinklaw.

| Object(s) | Class | Con | RA | Dec | Mag |
|---|---|---|---|---|---|
| Iota Cas | Multiple Star | Cassiopeia | 02h29m04.0s | +67°24'09" | 4.5 |
| 6 Tri | Multiple Star | Triangulum | 02h12m22.3s | +30°18'11" | 4.9 |
| Almaak | Multiple Star | Andromeda | 02h03m53.9s | +42°19'47" | 2.1 |
| h and Chi Perseus | Open Clusters | Perseus | 02h19m01.8s | +57°08'47" | 4.3 |
| NGC 1097 | Galaxy | Fornax | 02h46m18.9s | -30°16'21" | 10.2 |
| M 103 | Open Cluster | Cassiopeia | 01h33m13.8s | +60°42'23" | 6.9 |
| Little Dumbbell (M76) | Planetary Nebula | Perseus | 01h42m19.3s | +51°34'30" | 12.2 |
| NGC 891 | Galaxy | Andromeda | 02h22m32.9s | +42°20'46" | 10.8 |
| NGC 1023 | Galaxy | Perseus | 02h40m27.7s | +39°04'04" | 10.2 |
| AGC 347 | Galaxy Group | Andromeda | 02h25m48.0s | +41°52'00" | -- |
| IC 1747 | Planetary Nebula | Cassiopeia | 01h57m35.8s | +63°19'19" | 13.6 |
| NGC 470 & 474 | Interacting Galaxy Pair | Pisces | 01h19m44.9s | +03°24'35" | 12.6 |
| NGC 925 | Galaxy | Triangulum | 02h27m16.8s | +33°34'45" | 10.9 |
| NGC 784 | Galaxy | Triangulum | 02h01m16.8s | +28°50'14" | 12.5 |