

YOUNG ASTRONOMERS NEWSLETTER

Volume 21 Number 11

STUDY + LEARN = POWER

October 2013

COMET ISON

If the icy visitor from the outer solar system survives a close pass of the Sun on Thanksgiving Day, it could emerge as one of the brightest comets in years. On October 1st, the comet will pass within 657K miles from Mars and cross the "frost line," where solar heating is enough to start vaporizing Ison's 80 to 90% water ice. The comet could erupt in geysers of gas.

ISON should now be visible with small telescopes, -- and even binoculars by the end of October. It is low in the east before dawn.

BOYS AND GIRLS CLUBS

NASA has signed a **Space Act Agreement** with the Boys and Girls Club of America to bring "Science, Technology, Engineering and Mathematics" (STEM) program material into their activities to help inspire students nationwide

The BGCA has a youth participation of almost 4 million, many coming from underserved sectors of their communities. The STEM educational content is helping to cultivate a future technical workforce that is representative of our nation's diverse population.

More importantly, the various materials can motivate many young people to strive for higher education levels. See: <http://www.bgca.org>

PHA'S

Potentially Hazardous Asteroids (PHAs) are space rocks larger than approximately 100 meters that can come closer to Earth than 0.05 AU (4.6 million miles).

None of the known PHAs is on a collision course with our planet, although astronomers are finding new ones all the time. On September 12th, there were 1424 potentially hazardous asteroids.

STUDENTS SEE "FMA LIVE!"

On September 16th, students at Hardy Middle School in Washington, D.C. started off their school year with the **FMA Live! Forces in Motion** show.

Using live actors, hip-hop dance, music videos, interactive scientific demonstrations and video interviews with scientists and engineers from JPL, the **FMA Live!** teaches Newton's Three Laws of Motion and Universal Laws of Gravity. See: <http://www.fmalive.com>

DEEP IMPACT MISSION ENDS

After almost 9 years in space and the return of approximately 500,000 images of celestial objects, NASA's *Deep Impact* mission has ended. The JPL project team was unable to communicate with the spacecraft for over a month.

On July 3, 2005, the spacecraft deployed an **impactor** into the path of comet causing material from below the comet's surface to be blasted out into space where it was examined by telescopes and the flyby spacecraft. See: <http://www.nasa.gov/deepimpact>

MOBILE ASTRONOMY APPS

Some great Android and iPhone apps for all stargazers are at: <http://www.messages2oagle.com/mobileappsstargazers.php>

ABELL 1689

A new image from *Hubble* is one of the best ever views of the massive galaxy cluster **Abell 1689**, and shows the phenomenon of **gravitational lensing** with unprecedented clarity. This cluster acts like a cosmic lens, magnifying the light from objects lying behind it and making it possible for astronomers to explore incredibly distant regions of space.

Abell 1689 hosts the largest population of globular clusters ever found. The Milky Way is home to about 150 of these old clumps of stars, and astronomers estimate that **Abell 1689** could possibly contain over 160,000 globulars overall. Click the image at:

<http://www.spacetelescope.org/news/heic1317/>

RED NUGGETS

Unusually small galaxies densely packed with red stars in the distant, young universe have been named "red nuggets." This, not only because they are small and red but also their existence challenged current theories of galaxy formation, making them precious in astronomers' eyes. Although no "red nuggets" were seen nearby, new research shows that newfound compact galaxies could represent a missing link between distant "red nuggets" and nearby elliptical galaxies.

COMA CLUSTER

A team of astronomers has discovered enormous arms of hot gas in the **Coma** cluster of galaxies. A new composite image shows how the cluster has grown through mergers of smaller groups and clusters of galaxies to become one of the largest structures in the Universe. **Coma** is an unusual galaxy cluster because it contains two giant elliptical galaxies near its center. See:

<http://www.chandra.si.edu/photo/2013/coma/>

ORION'S BETELGEUSE

Red giant Betelgeuse is near the end of its life. Someday, probably within the next million years or so, it'll explode, becoming a supernova shining about as bright as the moon in our sky. And new observations show that it's weirder than previously thought. There are two hot spots of unknown origin in the atmosphere and it has an enormous arch of gas towering 4 billion miles high -- almost the size of Neptune's orbit!

HABITABLE EARTH

According to astrobiologists at the UK's University of East Anglia, habitable conditions on Earth will be possible for at least another 1.75 billion years based on our distance from the Sun and temperatures at which it is possible for the planet to have liquid water. After this point, Earth will be in the 'hot zone' of the sun, with temperatures so high that the seas would evaporate.

CATANIA OBSERVATORY

Daily solar observations have been made at the Catania Astrophysical Observatory in Italy since 1880. Their sunspot drawings help define SOHO images and NOAA/SWPC data. See: <http://www.oact.inaf.it/sun/>

SCIWORKS – planetarium schedules and Information, call 767-6730

The Sky Tonight? <http://www.skymaps.com/downloads.html>
<http://www.skymaps.com/downloads.html>
http://amazing-space.stsci.edu/tonights_sky/

**** **Astronomy Picture of The Day** - <http://apod.nasa.gov/apod/astropix.html> ****

KIROBO

The pint-sized android has uttered the first robotic words in space. The wide-eyed and bootie-wearing "Kirobo" - roughly the size of a chihuahua -- broadcast a message from inside the International Space Station, greeting citizens of Earth. "Good morning to everyone on Earth. This is Kirobo. I am the world's first talking robot astronaut. Nice to meet you," it said in Japanese. Kirobo is programmed to keep records of its conversations with Koichi Wakata, the first Japanese astronaut to command the ISS. Kirobo is part of a study aimed at seeing how a non-human companion can provide emotional support for people isolated over long periods. See:

<http://www.spxdaily.com/images-1g/robot-kirobo-1g.jpg>

PUZZLES

Find The Word

H C B S R O T C A Y	ABELL	HALLEY
A O M R O B O T B B	ACTORS	HARDY
L M H E A N G R E E	BASED	LEAST
L E A S T L A L L I	BEING	METERS
E T E A A E O M L N	BELOW	NORTH
Y D I R N W R S E G	CLOSE	OUTER
D N E O E E C S N I	COMET	ROBOT
R A R N T H O I D A	CONTAIN	SOLAR
A T D U E L T S E N	GIANT	START
H S O N C S T A R T	GLARE	THERE

Scrambled Astronomy:

WOMEN IN THE SKY

OPDRNAA	_____
LIEAR	_____
OJNU	_____
OPBEEH	_____
RITAPO	_____

(Answers below)

The YOUNG ASTRONOMERS NEWSLETTER is on the Internet at:

<http://www.fas37.org> (FAS) and <http://204.200.153.100/pwood/sfair/yan.html> (The Summit School)

***** INTERNET SITES *****

The Pelican Nebula, IC5070 - http://www.astroeder.com/deepsky/350D/ic5070/ic5070_eder_en.htm
 Mini-starburst - http://www.cfa.harvard.edu/news/2013/pr201315_images.html

SITE OF THE MONTH

Down Under Observatory - <http://www.downunderobservatory.com/>

***** OCTOBER MOON *****

New Moon: 10/4 **First Quarter:** 10/11 **Full Moon:** 10/18 **Last Quarter:** 10/26

Perigee: 10/10 7:07 PM 229,790 mi. (369811 km) **Apogee:** 10/25 10:26 AM 251,382 mi. (404560 km)

** The **October Full Moon** was called the **Hunter's Moon**.

** **Best observing nights:** 10/1 – 10/11, 10/25 – 10/31

***** PLANETS IN OCTOBER *****

NEPTUNE is a blue-gray dot still half-high in the SE evening sky for binoculars and telescopes. **VENUS** is near the western horizon after sunset and seems to be growing larger. **MARS** rises in the E about three hours before sunrise. **JUPITER** is in the SE after midnight and earlier each evening. Both **MERCURY** and **SATURN** are low in the W after sunset and lost in the Sun's glare by the 20th. On the 3rd, **URANUS** is at its brightest after sunset in the E, and in the W before sunrise.

***** METEOR SHOWERS *****

<u>NAME</u>	<u>DATES</u>	<u>BEST NIGHTS</u>	<u>PER HOUR</u>	<u>WHERE TO LOOK</u>
ORIONIDS	10/15 – 10/29	10/20 – 10/22	20	Low in the north. The Orionid

meteor shower is the second of two showers that occur each year as a result of Earth passing through dust released by Halley's Comet, -- first is the Eta Aquarids. October has eight minor showers and one daylight shower.

LOOK FOR: >>>> A close trio of **Saturn**, **Mercury**, and the **Moon** in the WSW on the 6th. >>>> **Venus** and red giant **Antares** only 1.5° apart in the SW on the 16th. >>>> **Mars** and **Regulus** are only 0.9° apart in the east before sunrise in the 15th. >>>> **Algol**, the "Ghoul" – it "winks" at us about every 12 days which early Arabian astronomers thought was "spooky". It is in the hand of Perseus, half-high in the ENE.

GALAXY FLARE-UP

The center of the Milky Way galaxy is a chaos of fast-whirling stars, all orbiting around a massive black hole that is 4 million times the mass of the Sun. Astronomers have spotted a giant blob of gas being ripped apart as it plunges towards the black hole where, in a few months, it will begin to be eaten up by the black hole.

As the gas accelerates to terrific speeds, it will collide with other incoming matter, heating up and radiating energy at a ferocious rate. The entire process could last a year or more and may become "the event of a lifetime". There was a similar flare-up 100 years ago that created a burst of light as bright as a million Suns with echoes still bouncing around in the galaxy center.

LADEE

NASA's newest robotic explorer, the *LADEE* spacecraft, rocketed into space on September 6th but quickly ran into equipment trouble. While NASA assured everyone that the lunar probe was safe and on a perfect track for the Moon, officials acknowledged the problem needs to be resolved in the next two to three weeks.

Unlike the quick three-day Apollo flights to the Moon, *LADEE* will need a full month to reach Earth's closest neighbor and is expected to arrive on October 6th.

WISE

The NASA WISE spacecraft discovered and characterized tens of thousands of asteroids throughout the solar system before being placed in hibernation. But it has now been returned to service for three more years with the goal of discovering "near-Earth objects" (NEOs) that can be found orbiting within 28 million miles from Earth's path around the Sun.

NASA anticipates WISE will discover at least 150 previously unknown NEOs and characterize the properties of about 2,000 others. See:

<http://www.nasa.gov/wise>

FERMI

During its five-year primary mission, the *Fermi Gamma-ray Space Telescope* has given astronomers an increasingly detailed portrait of the universe's most extraordinary phenomena, from giant black holes in the hearts of distant galaxies to thunderstorms on Earth.

Fermi has now entered an extended phase of its mission -- a deeper insight into many high-energy processes, from rapidly rotating neutron stars (pulsars) within our own galaxy, to jets powered by supermassive black holes in far-away young galaxies. See:

<http://go.nasa.gov/1f2vYAm>

M87

From more than 13 years of *Hubble Space Telescope* observations, astronomers have assembled a series of time-lapse movies showing a jet of superheated gas -- 5,000 light-years long -- as it is ejected from a supermassive black hole sitting in the center of a giant galaxy named **M87**. The galaxy's monster black hole is several billion times more massive than the Sun. The *Hubble* data has provided information on why the **M87** jet is composed of a long string of gas blobs which appear to brighten and dim over time. See:

<http://www.nasa.gov/hubble> and
<http://hubblesite.org/news/2013/32>

KILANOVAS

Astronomers say the Hubble Space Telescope has detected a Gamma-ray burst from an explosive event they have named a "**Kilonova**".

A **nova** is where some material falls onto the surface of a compact star which makes it 10-100% brighter for a short time - but the star isn't really affected.

A **supernova** is the end of life of a large star where it runs out of fuel in the core and there is no reaction to support the rest of the star. The entire star collapses and creates more energy in a few minutes than the star generated in the 10bn years of its life. There is only a small bit of the star left afterward as a neutron star

A **kilonova** is a new type of stellar explosion produced from the merger of two compact objects, most likely neutron stars. They are about 1,000 times brighter than a nova but are 1/10th to 1/100th the brightness of a typical supernova.

LAZARUS COMETS

Astronomers in Columbia said the vast cemetery of comets that lies in the asteroid belt between Mars and Jupiter has some being revived by energy from the Sun after millions of years of dormancy. They also said that all are not "dead rocks" but are dormant comets that may yet come back to life if the energy increases by a few per cent. "**Lazarus comets**" are returning to life after being dormant for thousands or even millions of years.

Dubbed "dirty snowballs" by US astronomer Fred Whipple These in 1949 for their loose assembly of primeval dust and ice, comets are traditionally thought to come from two locations -- the Kuiper Belt and the Oort Cloud -- that lie at extreme distances from the Sun.

KEPLER 78B

A small "fireball" exoplanet -- **Kepler 78b**, has a one-year orbit of 8.5 hours, one of the shortest orbital periods ever detected. The planet is so close to its star scientists have estimated that its surface temperatures may be more than 5,000° Fahrenheit. In such a scorching environment, the top layer of the planet is likely completely melted, creating a massive, roiling ocean of lava. What's most exciting to scientists is that they were able to detect light emitted by the planet - the first time that researchers have been able to do so for an exoplanet as small as **Kepler 78b**.

MARS' METHANE

Hopes of finding life on Mars suffered a setback after new findings from the *Curiosity* rover detected only trace amounts of methane gas in its atmosphere. In the past decade, scientists have reported large "plumes" of methane in the Martian atmosphere -- findings that have remained controversial because they were made on the basis of observations from Earth or an orbiting satellite.

Researchers said in March 2003 that they had found a cloud near the Martian equator containing some 19,000 tons of methane, considered a key indicator of microbial life.

However, analysis of data from *Curiosity's* onboard instruments shows only trace amounts of methane in Mars's atmosphere, greatly reducing chances that Martian soil contains living microbes or organic fossil materials that would produce the gas.

BUTTERFLY NEBULAE

Scientists found that butterfly-shaped nebulae in the bulge of the Milky Way tend to be mysteriously aligned - a surprising result given their different histories and varied properties. The final stages of life for a star like our Sun result in the star puffing its outer layers out into the surrounding space forming **planetary nebulae** in a wide range of beautiful and striking shapes. See:

<http://www.spxdaily.com/images-1g/>

bipolar-planetary-nebula-pn-hb-12-hubble-12-1g.jpg

BROWN DWARFS

U.S. astronomers say brown dwarfs, sometimes called failed stars, are the coldest known free-floating celestial bodies but are warmer than previously thought. To be so relatively cool after billions of years means that these objects can only have about 5 to 20 times the mass of Jupiter, the researchers said, and unlike our sun their only source of energy is from their gravitational contraction -- which depends directly on their mass.

NuSTAR

NASA says its "black-hole-hunting" *NuSTAR* spacecraft has "bagged" its first 10 supermassive black holes, the first of hundreds expected in a 2-year mission. *The Nuclear Spectroscopic Telescope Array*, sporting a mast the length of a school bus, is the first telescope capable of focusing the highest-energy X-ray light into detailed pictures.

Supermassive black holes surrounded by thick disks of gas lie at the hearts of distant galaxies between 0.3 billion and 11.4 billion light-years from Earth.

WATER ON THE MOON

Lunar research has yielded evidence of water locked in mineral grains on the surface of the Moon from an unknown source deep beneath the surface. Compared to its surroundings, scientists found that the central portion of a crater contains a significant amount of **hydroxyl** - a molecule consisting of one oxygen atom and one hydrogen atom -- evidence that the rocks in the crater contain water that originated beneath the lunar surface

TROJANS

Canadian astronomers report they've discovered the first **Trojan asteroid** in the orbit of Uranus. "Trojans" are a class of asteroids that share orbits with planets They said they believe asteroid **2011 QF99** is part of a larger-than-expected population of transient objects temporarily trapped by the gravitational pull of the Solar System's giant planets. **QF99** is a temporary Trojan, the Canadian astronomers said, captured by Uranus and likely to escape the planet's gravitation in about a million years.

QUEBEC ASTEROID

An asteroid impact occurred about 12,900 years ago in Quebec and is being linked to a dramatic global climate shift. It marks an abrupt global change to a colder, dryer climate with far-reaching effects on both animals and humans. In North America, the big animals all vanished, including mastodons, camels, giant ground sloths and saber-toothed cats.

Their human hunters, known to archaeologists as the Clovis people, set aside their heavy-duty spears and turned to a hunter-gatherer subsistence diet of roots, berries and smaller game.

DOUGHTON PARK

Observing at Doughton Park in Laurel Springs is considered to be the best in North Carolina. Summer months are comfortable, but mountain weather can be unpredictable. The main observing area is closed at the end of October usually through April but permission may be possible for observing during closed months. See: http://www.observingsites.com/ds_nc.htm

THE SUN'S TWIN

An international team of astronomers used ESO's Very Large Telescope to identify and study the oldest solar twin known to date. Located 250 light-years from Earth, the star **HIP 102152** is more like the Sun than any other solar twin - except that it is nearly four billion years older. This gives us an unprecedented chance to see how the Sun will look when it ages and also provides an important first clear link between a star's age and its lithium content.

In addition, it suggests that **HIP 102152** may be host to rocky terrestrial planets. A final twist in the story is that HIP 102152 has an unusual chemical composition pattern that is subtly different to most other solar twins, but similar to the Sun. They both show a deficiency of the elements that are abundant in meteorites and Earth.

WE BE MARTIANS?

New evidence has emerged which supports the long-debated theory that life on Earth may have started on Mars. Geochemists said that an oxidized mineral form of the element molybdenum, which may have been crucial to the origin of life, could only have been available on the surface of Mars and not on Earth.

Recent studies show that these conditions, suitable for the origin of life, may still exist on Mars. This form of molybdenum couldn't have been available on Earth at the time life first began, because three billion years ago the surface of the Earth had very little oxygen, but Mars did.

It's yet another piece of evidence which makes it more likely life came to Earth on a Martian meteorite, rather than starting on this planet.

INDIA'S MARS MISSION

Indian officials have confirmed a November launch date for the country's first mission to Mars which will explore the existence of life and the possibility of sustaining life. The *Mangalyaan Mars* probe will travel 299 days in space before reaching the Red Planet in September 2014. A successful launch would make India the sixth country to initiate a mission to Mars.

DON QUIXOTE

A large **near-Earth object** that for 30 years has been assumed to be an asteroid is an active comet according to an international team of astronomers. Known as **3552 Don Quixote**, it is the third-largest near-Earth object, most of which are rocky bodies or asteroids that orbit the Sun in the vicinity of Earth, but **3552 Don Quixote** likely contains water ice and rocks.

The YOUNG ASTRONOMERS NEWSLETTER is distributed by the Forsyth Astronomical Society.

:SREWSNA YMONORTSA DELBMACS
AITROP ,EBEHP ,ONUJ ,LEIRA ,ARODNAP