

THE YOUNG ASTRONOMERS NEWSLETTER

Volume 21 Number 10

STUDY + LEARN = POWER

September 2013

VOYAGER 1

Voyager 1 appears to have left our solar system and entered interstellar space. Carrying Earthly greetings on a gold plated phonograph record and still-operational scientific instruments, it has traveled farther from Earth than any other human-made object.

It has now begun the first exploration of our galaxy beyond the Sun's influence.

ASTEROID NEWS

~~ NASA wants to find an asteroid, capture it, bring it towards Earth and send it into an orbit around the Moon. This isn't a plot for a new Hollywood Blockbuster but an idea that they are seeking funding for. NASA recently announced development of a first-ever mission to identify, capture and relocate an asteroid for human exploration.

It is hoped that this venture will advance the knowledge of asteroids, and give us ways to defend Earth from asteroid crashes. This mission could start as soon as the early 2020s.

~~ In 2016, NASA will launch a robotic probe to one of the most potentially hazardous of the known near-Earth objects. The *OSIRIS-REx* mission to asteroid **Bennu** will be a pathfinder for future spacecraft designed to perform reconnaissance on any newly discovered threatening objects.

~~ Researchers in Scotland say they have identified 12 easily retrievable asteroids that could be moved close enough to Earth for them to be mined for valuable resources using existing spacecraft technology.

~~ NASA places a high priority on tracking asteroids and the United States has the most robust and productive survey and detection program for discovering near-Earth objects. To date, U.S. assets have discovered more than 98 percent of the known NEO's. Recently, more than 400 responses were received in response to a request for suggestions and ideas on the agency's plan for increasing the identification, tracking and exploration of asteroids.

MOST DISTANT STARS

Under today's light-polluted skies the most distant star that can be seen without any great difficulty is **Deneb** in the constellation of **Cygnus** the Swan. It is one of the three stars in the Summer Triangle high overhead. The furthest stellar object visible with the unaided eye is the **Andromeda Galaxy**.

And thanks to *Hubble* and other space telescopes, astronomers have discovered the most distant object 13.2 billion light years away when the Universe was still developing into the form we see today.

TUNKA OBSERVATORY

The world's biggest gamma ray detection array scientists are creating in a desolate site in Siberia will be at the forefront of international research into the secrets of the Universe.

The already impressive Tunka observatory will be considerably expanded, and will include some 1,000 detectors set across at least 10 sq km by the time the facility is complete in three years.

EXOPLANET TRANSIT IN XRAY

For the first time since exoplanets were discovered almost 20 years ago, X-ray observations have detected an exoplanet passing in front of its parent star.

The planet (**HD 189733b**) is a hot Jupiter - similar in size to Jupiter but in very close orbit once every 2.2 days. *NEOWISE* may reveal their secrets further. See:

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

FOR TEACHERS ~ The new issue of *The Universe in the Classroom* is at: <http://m1e.net/c?115666567-IN9ImN3qiCS9I%4033025682-7tianUfFZLa32>

HI-SEAS

The 120-day Hawaii *HI-SEAS* mission is nearing the end of its stay on the northern slope of Mauna Loa. Six people have been living in a space habitat located 8,000 feet above sea level, on a barren lava field that is as Mars-like an environment as you can find on Earth. They've acted as though they were the first human explorers on Mars, conducting science experiments and going out into the field dressed in simulated spacesuits. They made meals with food that could survive the long voyage to the Red Planet. See:

<http://www.theguardian.com/science/2013/aug/16/mars-hawaii-simulated-mission>

SUNDIVING COMET

A small comet plunged into the Sun on August 20th. Just before it arrived, the Sun expelled a huge Coronal Mass Ejection (CME). In the final frames of a *SOHO* movie, the comet can be seen furiously vaporizing. It did not emerge again from its flyby of the hot Sun.

With a diameter of perhaps a few tens of meters, this comet was clearly far too small to survive the intense bombardment of solar radiation. The CME came from an explosion on the far side of the Sun. Although the CME and the comet appear to intersect, there was probably no interaction between the two. See: <http://newswatch.nationalgeographic.com/2013/08/20/watch-sun-diving-comet-and-solar-explosion/>

A "NEW BORN'S" JETS

Astronomers using the Atacama Array (ALMA) in Chile have obtained a vivid close-up view of material streaming away from a newborn star. They discovered that its jets are more energetic than previously thought.

The very detailed new images have also revealed a previously unknown jet pointing in a totally different direction. Young stars are violent objects that eject material at speeds as high as one million kilometers per hour. See: <http://www.eso.org/public/news/eso1336/>

MARS' MOONS

New images of Mars' moons Phobos and Deimos have been obtained by the *Opportunity* rover. See:

<http://www.spxdaily.com/images-lg/mars-moons-phobos-deimos-first-time-lg.jpg>

SCIWORKS – planetarium schedules and Information, call 767-6730

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

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

KIROBO -- A small Japanese robot, *Kirobo*, that boasts the abilities to talk, recognize voice and emotions, as well as to learn, has been sent to the International Space Station in an historic attempt to befriend robots and humans.

The most amazing feature of *Kirobo* is its sophisticated voice-recognition, face-recognition and communication technology, which enables it to engage in a meaningful conversation with a human being – even to learn new terms and concepts. *Kirobo* is said to be able to speak Japanese, - so its main conversation partner will be Koichi Wakata, Japan's veteran astronaut.

Puzzles

Find The Word

A S L O P E J E C T
K S T R A T S O S S
N L S I M C M A T S
U A A E L E E A T O
T E E O T L R E K S
T M S M I S R O O L
S E I G E C I M I A
R N H N E R I C C N
I T S S E E G H H I
F I R S D D L E I F

ASSETS
CLOSE
COMET
DEIMOS
EJECT
EMERGE
FIELD
FINAL
FIRST
HISEAS

KOICHI
LEAST
LIGHT
MEALS
MINED
SECRETS
SLOPE
START
STILL
TUNKA

Scrambled Astronomy: THEY HAVE TAILS

SHEOR _ _ _ _ _
STOCME _ _ _ _ _
CEKAPOC _ _ _ _ _
GLAEE _ _ _ _ _
CARNE _ _ _ _ _

(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 Black Knight - <http://www.spxdaily.com/images-lg/black-knight-alien-artificial-satellite-lg.jpg>
The "Penguin and The Egg" - <http://www.flickr.com/photos/87325207@N07/9119830207/>
Pinwheel Galaxy - <http://spaceinimages.esa.int/Images/2013/06/M101>
The Odd Couple - <http://www.spxdaily.com/images-lg/glowing-clouds-gas-ngc-2014-red-ngc-2020-blue-lg.jpg>

SITE OF THE MONTH

Armagh Planetarium - <http://www.armaghplanet.com/>

***** SEPTEMBER MOON *****

New Moon: 9/5 First Quarter: 9/12 Full Moon: 9/19 Last Quarter: 9/27
Perigee: 9/15 2:35 PM 228,284 mi. (367387 km) Apogee: 9/27 2:18 PM 251,225 mi. (404308 km)
** The September Full Moon was called the **Harvest Moon**.

** Best observing nights: 9/1 – 9/11, 9/24 – 9/30 ** 9/22 Autumn Equinox – Fall begins

***** PLANETS IN SEPTEMBER *****

NEPTUNE is half-high in the SE after 9 PM for binoculars and telescopes. **VENUS** is near the western horizon in evening dusk. **Venus** and **SATURN** are a close pair and only 3.5° apart on the 18th. **MARS** is in the E one hour before sunrise during September. **JUPITER**, in the eastern morning sky, rises in the pre-dawn hours and earlier each night. **MERCURY** is in the WSW late this month. It is very close to the horizon at the lower right of Venus and Saturn. **URANUS** is in the SE in mid-evening and can be spotted with binoculars.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
ALPHA AURIGIDS	8/25 – 9/6	9/1	6 - 9	Low in the northeast. This shower had outbursts of over 30 in 1935, 1986, 1994, and a spectacular 130 per hour in 2007. September has one minor shower in the southern skies and three other showers with less than five per hour.

LOOK FOR: >>>> The **SUMMER TRIANGLE** – the three bright stars overhead: **Vega** in Lyra, **Deneb** in Cygnus, and **Altair** in Aquila towards the south. >>>> **LYRAE** – (With binoculars) – a small blue-white star northeast and close to bright Vega. It is a "double" but each of its two stars are "doubles" also! Its nickname is "The Double Double"-- as expected. >>>> **M57**– The **Ring Nebula** south of Vega. It is called the most beautiful planetary nebula and looks like a smoke ring in telescopes. >>>> **MARS** in the **BEEHIVE CLUSTER** before dawn in the east from the 7th to the 9th.

SUNSPOT ACTIVITY

A well-behaved Sun flips its north and south magnetic poles every 11 years but the Sun is acting strange. It typically puts on a pageant of magnetic activity but when it finally woke up (a year late), it gave the weakest performance in 100 years.

What's even weirder is that scientists, who aren't usually shy about tossing hypotheses about, are at a loss for a good explanation. Three scientists presented possible explanations but their results sparked a lively debate rather than a scientific consensus.

Some scientists think the 11-year cycle might be part of a larger one. Historical records show weak cycles at the turn of the 19th and 20th centuries, so it could be that the solar cycle tapers every 100 years or so in what's known as the **Gleissberg Cycle**.

In another, more catastrophic option: the sunspot cycle might die altogether. One team's data shows a clear trend: the magnetic field strength in sunspots is waning. If this trend continues, there will be almost no spots in Cycle 25, and we might be going into another **Maunder Minimum** -- the first Maunder Minimum occurred during the second half of the 17th century. Almost no spots were seen on the Sun during this time, which coincided with Europe's Little Ice Age.

TITAN'S WATER

One of the most shocking discoveries of the past 10 years is how much the landscape of Saturn's moon **Titan** resembles Earth. The surface of **Titan** is dotted with lakes and seas; it has river channels, islands, mud, rain clouds and maybe even rainbows.

The giant moon is undeniably wet but not with H₂O, -- water as we know it. With a surface temperature dipping 290 ° F below zero, Titan is far too cold for liquid water. Instead, researchers believe the **Titan's** fluid is an unknown mixture of methane, ethane, and other hard-to-freeze hydrocarbons.

And a planetary scientist at Cornell University wonders: "If Titan is really so wet, where are all the waves?" On Earth, bodies of water are rarely still. On Titan, the lakes are smooth, with no apparent wave action.

METEOR'S DUST PLUME

NASA's scientists witnessed a never-before-seen view of the atmospheric aftermath of the explosion when a meteor, or bolide, screamed into Russia's atmosphere at 41,600 mph. The explosion released hundreds of tons of dust in the stratosphere, allowing a satellite 3.5 hours later to make unprecedented measurements of how the material formed a thin but cohesive and persistent stratospheric dust belt.

CENTAURS

The true identity of centaurs, the small celestial bodies orbiting the Sun between Jupiter and Neptune, has been one of the enduring mysteries of astrophysics. Are they asteroids or comets?

A new study of *WISE* observations finds most **centaurs** are comets - roughly two-thirds of which come from the frigid outer reaches of our solar system. It is not clear whether the rest are asteroids. The centaur bodies have not lost their mystique entirely, but future research from *NEOWISE* may reveal their secrets further.

ISON

Spitzer space telescope images suggest carbon dioxide is slowly and steadily "fizzing" away from ISON, the so-called "soda-pop comet". It has a dust tail about 186,400 miles long. Like all comets, ISON is a dirty snowball made up of dust and frozen gases -- water, ammonia, methane and carbon dioxide. Warming up gradually as it approaches the Sun, the gases are heating up to the point of evaporation.

On November 28th, the comet will graze the Sun in one of the closest passes ever recorded for any comet, moving within 724,000 miles of the Sun.

Before the close encounter (and after, should *ISON* survive), the comet should be visible from Earth, possibly even in daylight.

See: <http://www.space.com/19973-comet-ison.html>

IRIS

On July 17th, the international team of scientists and engineers who supported and built NASA's Interface Region Imaging Spectrograph, or *IRIS*, lived through the moment when the door of the telescope opened to view the mysterious lowest layers of the Sun's atmosphere for the first time.

The results thus far are nothing short of amazing. The data is crisp and clear, showing unprecedented detail of this little-observed interface region. The *IRIS* images will help scientists track how magnetic energy contributes to heating in the Sun's atmosphere.

SOHO

The *Solar and Heliospheric Observatory*, *SOHO*, captured an image of a gigantic coronal hole hovering over the Sun's north pole on July 18th. Coronal holes are dark, low density regions of the Sun's outermost atmosphere, the corona.

They contain little solar material, have lower temperatures, and therefore, appear much darker than their surroundings.

While it's unclear what causes coronal holes, they are related to areas on the Sun where magnetic fields soar up but fail to loop back down to the surface as they do elsewhere. See: http://www.nasa.gov/sites/default/files/cor_hole284.jpg

ASTEROSEISMOLOGY

Scientists have adopted a new approach to characterize star-planet systems: **asteroseismology**, which identifies the internal properties of stars by measuring their surface oscillations - as seismologists' use of earthquake oscillations to examine the Earth's interior. They were able to make several assessments of a star's traits including its mass, radius, age, and-for the first time - internal rotation.

Unlike other methods, asteroseismology returns both the rotation period of the star and the inclination of the rotation axis to the line of sight.

KEPLER

The *Kepler Space Telescope* team is ending its attempts to restore the spacecraft to full working order and is considering what new science research it can carry out in its current condition. Kepler completed its prime mission in November 2012 and began a four-year extended mission. See: <http://go.nasa.gov/1a1UzaC>

THE BLACK KNIGHT

The Earth spins below, largely unaware of its unauthorized parasitic visitor. It is a mysterious object circling the Earth, of unknown (and possibly alien) origin - one story says it's up there right now, and has been for 13,000 years.

In fact, the "**Black Knight**" has been around for quite some time now. This piece of space junk (or, as nicknamed -- "An Artificial Satellite"), has caused major media interest since the late 50's and has become one of the most talked about objects in space. First thought to be a Russian spy satellite, the **Black Knight** has gripped the interest of millions worldwide.

Like so many stories of weird phenomena, the **Black Knight** satellite legend starts with Nicola Tesla. It's said that he picked up a repeating radio signal in 1899, that he believed was coming from space, and said so publicly at a conference. In the 1920s, amateur HAM radio operators were able to receive this same signal.

By 1960, both the United States and the Soviet Union had hardware in orbit. But on February 11, 1960, newspapers everywhere reported some alarming news: that somebody else also had something in orbit. A radar screen, designed by the US Navy to detect enemy spy satellites, had detected an unknown "something". It was described as a dark, tumbling object. It wasn't ours, and it wasn't the Soviets' either.

The next day, newspapers reported a bit more information. The mysterious object was orbiting at about 79 degrees off from the equator, not the 90 degrees of a proper polar orbit. Its orbit was also highly eccentric, with an apogee of 1,000 miles but a perigee of only 134 miles.

Is the **Black Knight** an extraterrestrial satellite sent to Earth to study the human race? Did the satellite attempt to communicate with the human race? Have we ignored attempted communications? One thing is for sure, The Black Knight remains as one of the most mysterious objects to orbit our planet. Is there a connection between this infamous space object and ancient mankind's achievements? See:

<http://www.spxdaily.com/images-lg/black-knight-alien-artificial-satellite-lg.jpg> and

<http://www.armaghplanet.com/blog/the-truth-about-the-black-knight-satellite-mystery.html>

QUASARS

Dartmouth astrophysicists have detailed discoveries based upon observations of 10 quasars, documenting the immense power of quasar radiation which reaches out for many thousands of light years to the limits of the quasar's galaxy.

The radiation covers the entire electromagnetic spectrum, from radio waves and microwaves at low-frequency through infrared, ultraviolet, and X-rays, and high-frequency gamma rays.

A black hole may grow by swallowing material from the surrounding interstellar gas, releasing energy in the process.

This leads to the creation of a quasar, emitting radiation that illuminates the gas present throughout the galaxy. A central black hole and its quasar can slow down star formation in the entire galaxy.

QUENCHED GALAXIES

When some galaxies have their star formation snuffed out, they become **Quenched galaxies**. In the distant past they appear to be much smaller than the quenched galaxies in today's Universe which has always puzzled astronomers.

Recently, a team of European astronomers used *Hubble* observations to find that a large number of larger galaxies switch off at later times, joining their smaller quenched siblings and giving the mistaken impression of individual galaxy growth over time.

MAGELLANIC STREAM

Astronomers have solved a 40-year mystery on the origin of the **Magellanic Stream**, a long ribbon of gas stretching nearly halfway around our Milky Way galaxy. The **Large** and **Small Magellanic Clouds**, two dwarf galaxies orbiting the Milky Way, are at the head of the gaseous stream.

New *Hubble* space telescope observations reveal most of the gas was stripped from the **Small Magellanic Cloud** about 2 billion years ago, and a second region of the stream originated more recently from the **Large Magellanic Cloud**.

Ultimately, the gaseous stream may rain down onto the Milky Way's disk, fueling the birth of new stars. This infusion of fresh gas is part of a process that triggers star formation in a galaxy.

REALLY BIG BUTTERFLY

The "wingspan" of the **Butterfly Nebula** stretches over 3 light-years. This gorgeous cloud of gas and dust is the remnants of a dying star about 4,000 light-years away from Earth. Hubble captured an image of the dusty butterfly and it's on the "Wallpaper" page at:

<http://hubblesite.org/gallery/wallpaper/pr2009025f/>

ANCIENT BEADS

Researchers have shown that ancient Egyptian "iron" beads were actually hammered from pieces of meteorites rather than iron ore, more than 5000 years ago. The objects predate the emergence of iron smelting by two millennia.

Carefully hammered into thin sheets before being rolled into tubes, - they were originally strung into a necklace with other exotic minerals such as gold and gemstones, revealing the high value of this exotic material in ancient times.

ORPHAN PLANETS

Swedish astronomers say they've discovered tiny, clouds in space that have the right characteristics to form planets without a parent star. The Rosette Nebula, a huge cloud of gas and dust, is home to more than a hundred of these tiny clouds that are very dense and compact.

Previous research suggested that there may be as many as 200 billion free-floating planets in the Milky Way galaxy. Most astronomers assume such "rogue planets," which don't orbit a star, must have been ejected from existing planetary systems.

The YOUNG ASTRONOMERS NEWSLETTER is distributed by the Forsyth Astronomical Society

:SREWSNA YMONORTSA DELBMARCS

ENARC ,ELGAE ,KCOCAEP ,STEMOC ,ESROH