THE YOUNG ASTRONOMERS NEWSLETTER

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DWARF PLANET BEYOND PLUTO

A new discovery is already causing scientists to reconsider everything they know about our solar system.

Astronomers believe they have discovered a dwarf planet beyond Pluto 7 billion miles from Earth and in the outer regions of space, Scientists long believed it is populated by nothing more than floating chunks of matter, until they discovered a dwarf planet in 2003 -- **Sedna**.

The newly found dwarf planet is currently named **VP 113**. At 280 miles across (and with a temperature of minus 430 Fahrenheit), **VP 113** is approximately half the size of **Sedna**, and a fraction of Earth's 7,900 mile diameter.

Experts now suspect that there may be tens of thousands of similar objects, though they would not speculate if future discoveries will prove as large as **Sedna** or **VP 113**.

SUNSPOTS

The number of spot areas on the Sun (Sunspots) peak about every eleven years – a Solar Cycle. **Solar Cycle 24** is the 24th since 1755, when recording of solar sunspot activity began.

The most recent span of "Lows" was in August 2008 with no spots during the entire month, and ten months of 2009 with 19 to 30 days with no spots. Since then, activity increased in a series of waves with peaks in April and November of each year.

In 2014, sunspot "Highs" were Jan - 245, Feb - 259, Mar - 191, and on April 17tth - 296. Then dropping rapidly down to 34 on the 26th! See:

http://www.swpc.noaa.gov/ *and*
http://sohowww.nascom.nasa.gov/data/realtime/hmi_igr/512/

SUPER- BRIGHT STARS

Much like an environment influences people, cosmic communities affect even giant dazzling stars: Peering deep into the Milky Way galaxy's center from a high-flying observatory, Cornell astronomers have discovered a pair of identical, rare stars whose diverging dusty and gaseous garb are strictly influenced by an intrusive cluster of neighbors.

They are scarce, short-lived, hyperbright stars called **luminous blue variables** - a million times brighter than our own sun - inhabit the center of the Milky Way galaxy, 25,000 light years from Earth.

RUSSIA ON THE MOON

Russia plans to organize a permanent base on the Moon and launch three lunar spacecraft - two to surface and one to orbit - by the end of the decade. The surface missions will include an orbiter to monitor the Moon in 2018 and a polar lander with a drill to search for water ice in 2019. By 2040, Russia also plans to create a lunar base for long-term missions.

LADEE

The *LADEE* lunar exploring spacecraft slammed into the Moon at a speed of 3,600 miles per hour on April 17th. It's a question of whether *LADEE* made a localized crater or scattered debris over a flat area.

A NEW SATURN MOON?

Astronomers at Queen Mary University of London spotted the formation of a small icy object within the rings of Saturn that may be a new moon, and may also provide clues to the formation of the planet's other moons. *Cassini* images show disturbances at the very edge of Saturn's outermost large, bright ring. It is too small to see in the images so far.

A GALAXY'S FLASH OF LIGHT

Scientists noticed that some galaxies that previously looked inactive would suddenly light up at their very center.

Now they have identified those as galaxies where a central black hole just disrupted and 'ate' a star. A star orbiting too close to the event horizon of the galaxy's central supermassive black hole is torn apart by the force of gravity, heating up its gas and sending out a beacon to the far reaches of the universe.

KEPLER 186f

The first Earth-size planet orbiting a star in the "habitable zone" has been discovered. **Kepler-186f** confirms that planets the size of Earth exist in the habitable zone of stars other than our star – the Sun. Planets previously found in the habitable zone are all at least 40 percent larger than Earth. **Kepler-186f** resides in the **Kepler-186** system, about 500 light-years from Earth in the constellation Cygnus.

BLACK HOLE PAIR

XMM-Newton observers found the first pair of supermassive black holes observed in a **normal galaxy** (no longer producing stars). Black holes are much easier to locate in newer active galaxies which are constantly eating up gas clouds and star matter, and giving off detectable X-rays. Eventually, the two black holes will merge and the result will be a massive burst of energy and the strongest source of gravitational waves the universe will have ever seen.

AMATEUR ASTRONOMERS

For example, amateur astronomers and astro-photographers combined their optical data with the data from some of the world's most sophisticated space telescopes to reveal new images of galaxies **M101, M81, M51,** and **Centaurus A**, and **M51.** Long before the term "citizen science" was coined, the field of astronomy has benefited from countless men and women who study the sky in their spare time. See:
http://chandra.harvard.edu/blog/node/497

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SCIWORKS – For information and planetarium schedules call 767-6730

The Sky Tonight? **http://www.skymaps.com/downloads.html** *and also*
http://amazing-space.stsci.edu/tonights_sky/
and **http://hubblesite.org/explore_astronomy/tonights.sky**
*** * * *** ***Astronomy Picture of The Day*** - **http://apod.nasa.gov/apod/astropix.html** *** * * ***

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RADIATION SHIELD COMPETITION --- ** Five (out of 46 teams of high school student engineers have made it to the final round in a competition to build and test designs for radiation shields for NASA's new ***Orion* spacecraft. The competition is part of the **Exploration Design Challenge** developed by NASA, Lockheed Martin, and the National Institute of Aerospace. See: **http://new.livestream.com/viewnow/NASAEDC**

*** * * * * *** ***MAY 10TH IS ASTRONOMY DAY*** *** * * * * ***

Puzzles

Find The Word

R	I	N	G	S	M	A	L	L	N	BEACON	MILES
N	F	S	T	E	E	T	O	O	E	BEGAN	NEWER
O	A	O	R	D	S	R	C	T	W	BRIEF	ORION
S	P	G	R	A	E	A	I	T	E	CENTER	PLACE
S	E	I	E	C	E	M	M	E	R	CLOSE	RINGS
E	L	L	A	B	E	Y	O	N	S	DRILL	SERIES
L	O	L	A	S	R	N	O	C	C	ENTIRE	SMALL
I	P	L	O	E	R	I	T	N	E	FORCE	SPOTS
M	A	L	B	T	R	E	E	E	S	LEAST	WOMEN
N	C	N	W	O	M	E	N	F	R	MERGE	YEARS

Scrambled Astronomy

PEOPLE IN THE SKY

PRUESES __ __ __ __ __ __ __

RACERH __ __ __ __ __ __

UPLOXL __ __ __ __ __ __ __

TROCSA __ __ __ __ __ __

EDONI __ __ __ __ __

(Answers below)

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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)*

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

For a regular "read" see Science and Space in the future - **http://www.energy-daily.com/**
Near-perfect spiral galaxy – **http://www.spacetelescope.org/static/archives/images/screen/potw1413a.jpg**
Planet orbit charts and more – **http://www.pa.msu.edu/Abrams/msta/**
SITE OF THE MONTH
The Space Place - **http://www.astronomysource.com**

* * * * * * MOON IN MAY * * * * * *

First Quarter: 5/7 **Full Moon**: 5/14 **Last Quarter:** 5/21 **New Moon:** 5/28
Apogee: 5/6 10:53 AM 251,231 mi. (404318 km) **Perigee**: 5/18 8:28 PM 228,104 mi. (367098 km)
****** The **May** Full Moon was called the **Flower Moon, Milk Moon**, and **Full Corn Planting Moon**
**** Best observing nights:** 5/1 – 5/5; 5/19 – 5/31

* * * * * * PLANETS IN MAY * * * * * *

VENUS is low in the east at dawn and makes a spectacular pair with the Moon on the 25th before sunrise.
MARS is in the western sky after sunset and just below a Virgo double star on the 10th.
JUPITER is in the early evening sky and moves from W to WNW during May.
SATURN is very bright in the NW, opposite the Sun (*opposition*) on the 10th, and in the SW before dawn.
MERCURY sets in the WNW as evening twilight begins. Mercury's best week of the year starts 5/18.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
ETA AQUARIDS	4/19 – 5/28	5/6- 5/7	60	Northeast but can appear anywhere.

***** POSSIBLE OUTBURST***** 5/24, early morning hours. Earth passes through a debris field from comet LINEAR with brief, intense bursts of meteors up to hundreds per hour. May be the most active in more than a decade.

LOOK FOR: >>>>> JUPITER and its four moons and cloud belt, **>>>>> SATURN** - the rings are now tilted to 22°. **>>>>> HERCULES** is rising in the northeast and looking like a butterfly. With binoculars and midway on the top left wing is **M13**, the home to as many as a million stars. With a large telescope, It is like looking at "a vision of diamond dust sprinkled on a black velvet cushion." (*The Star Guide)*

RADIATION BELT

Physicists have discovered a new structure in Earth's inner radiation belt. It is a zebra-striped structure of highly energized electrons that could endanger humans in space and also damage low-earth navigation and communication satellites.

And surprisingly, the new structure is produced not by solar activity but by Earth's slow rotation.

NGC 5793

A new Hubble image is centered on **NGC 5793**, a spiral galaxy in **Libra** that has two particularly striking features: a beautiful dust lane and an intensely bright center. It is of great interest to astronomers because it appears to house "**masers**" which emit microwave radiation. See: **http://www.spxdaily.com/images-lg/hubble-ngc-5793-spiral-galaxy-lg.jpg**

CHARIKLO

A surprise discovery shows that the remote asteroid **Chariklo** is surrounded by two dense and narrow rings of ice particles, making it the smallest object yet discovered to have rings. It is now one of five bodies in the Solar System with rings. See:

http://www.eso.org/public/usa/news/eso1410/

BINARY SYSTEMS

New research shows that moons in close binary solar systems have a better chance of hosting life than those in single-star systems. Binary stars dampen each other's solar radiation and stellar winds, thereby creating a more hospitable environment for life and increasing the habitable zone around such solar systems.

Violent and active young stars spin rapidly, emitting radiation and stellar winds that could interfere with the habitability of planets and moons nearby.

THE MOON

A new study in the journal Nature said the Moon was formed about 95 million years after the birth of our Solar System, in a collision that also settled the structure of Earth as we know it.

The crash between an early, proto-Earth and a Mars-sized object that dislodged what would become the Moon, happened some 4.470 billion years ago..

SATELLITE LAUNCHES

Planet Labs has announced that it has confirmed launches for more than 100 satellites over the next 12 months in their "save the planet" program. The satellites will launch on rockets from the USA and Russia and will allow Planet Labs to image the whole earth every 24 hours.

UNUSUAL DEBRIS FIELD

As a supernova debris field expands, it carries the material it encounters along with it. A supernova remnant (**G352**) has swept up a huge amount of material equal to about 45 times the mass of the Sun.

Its high level of X-ray emission may indicate that a special type of evolution has occurred in which the massive star that exploded to create **G352** interacted with a large amount of dense surrounding material.

EXOPLANET'S WATER VAPOR

Research scientists have detected water vapor in the atmosphere of a planet outside our solar system. The team applied a sophisticated Doppler technique to the infrared to directly detect the planet and demonstrate the presence of water in its atmosphere.

The planet, named **tau Boo b**, orbits the nearby star **tau Bootis** and belongs to the class of exotic planets called "**hot Jupiters**". Unlike our Jupiter, which is fairly cold and has an orbital period of about 12 years, **tau Boo b** orbits its star every 3.3 days and is heated to extreme temperatures by its proximity to the star. Under these conditions, water will only exist as high temperature steam.

ROSETTA

After a wake-up call on January 14th, *Rosetta* awoke from more than 30 months of hibernation. The orbiter's scientific imaging system, **OSIRIS**, is again providing the researchers with images. *Rosetta's* ***Philae*** lander was also activated.

The images of comet **67P/Churyumov-Gerasimenko** are tiny and very faint but provide insights into a new world: Future shots will help to assess the comet's activity by its brightness; and later, the comets shape.

In November, the ***Philae*** lander is due to descend to the comet, probe the comet's surface, and analyze its dusty ice.

COMET PASSES NEAR MARS

Comet C/2013 A1 passed within 84,000 miles of Mars on the 19th. An image shows the comet after the hazy glow of the coma was removed. Scientists say that they need to determine whether, and to what degree, dust grains in the coma of the comet will impact Mars and spacecraft in the vicinity of Mars**.**

See: http://www.nasa.gov/hubble

ABELL 33

Small, very dense, white dwarfs slowly cool down over billions of years and throw their atmospheres out into the space to create ***planetary nebulae***. An ESO *Very Large Telescope* image shows the perfectly round planetary nebula **Abell 33**. Being perfectly round is uncommon for these objects - they usually display irregular shapes.

Plus the strikingly bright star located along the rim of the nebula creates "a sparkling diamond ring" See:

http://www.eso.org/public/images/eso1412a/

IMPACT DATA

Asteroid and comet impacts can cause widespread ecological havoc, killing off plants and animals on regional or even global scales. Brown University research shows that impacts can also preserve the signatures of ancient life at the time of an impact in fragments of leaves and preserved organic compounds lodged inside glass created by a several ancient impacts. The material could provide a snapshot of environmental conditions at the time of those impacts

MASSIVE GALAXY CLUSTERS

Galaxy Clusters are large groups of galaxies bound together by gravity, and are some of the most massive structures in the Universe A *Hubble* image reveals one of these clusters **MACS J0454.1-0300**, with bright spots that are each a galaxy and a home to many millions, or even billions, of stars.

Clusters like this are so massive that their gravity can even change the behavior of space around them, bending the path of light as it travels through them, sometimes amplifying it and acting like a cosmic magnifying glass.

Hubble's **Frontier Fields** program will use this lensing effect which to explore very distant objects. See: **http://www.spacetelescope.org/static/archives/images/screen/potw1412a.jpg**

WATER

A gas and dust cloud collapses to form a star. Amid a whirling disc of debris, little bits of rock coated with liquid water and ice begin to stick together. It is in this stage of a star's formation that astronomers hope to learn how water cycles through a solar system.

And this is also the period when some of the least evidence is available to study. Yet our understanding of water's origins on planets is limited because the science is so new.

If water is created prior to stellar birth, then all planetary systems will be born with abundant water, giving rise to what could be life-friendly conditions throughout the universe. However, if this water is sometimes destroyed as the disc is formed then water would not be as common in the cosmos.

(Suggested reading: On the web, search WATER UNIVERSE.)

WHITE DWARF CONTAMINATION

It has been known that many hot white dwarfs' atmospheres of pure hydrogen or helium, are contaminated by other elements - like carbon, silicon and iron from unknown sources.

What were not known, however, was the origins of these elements, known in astronomical terms as metals. The decades old space mystery has now been solved by an international team of astronomers investigating hot, young, white dwarfs --- the super-dense remains of Sun-like stars that ran out of fuel and collapsed to about the size of the Earth.

They found that these stars are swallowing up the "left overs" from planetary systems. Perhaps more detailed follow-up work will be able to tell us about the composition of rocky planets orbiting other stars.

MOONS IN BINARY SYSTEMS

New research has shown that moons in close extrasolar binary solar systems have a better chance of hosting life than those in single-star systems. Binary stars dampen each other's solar radiation and stellar winds, thereby creating a more hospitable environment for life and increasing the habitable zone around such solar systems.

ENCELADUS

The *Cassini* spacecraft and *Deep Space Network* have uncovered evidence that Saturn's moon **Enceladus** harbors a large underground ocean of liquid water. The moon is a potential home to extraterrestrial microbes.

Researchers theorized the presence of an interior reservoir of water in 2005 when Cassini discovered water vapor and ice spewing from vents near the moon's south pole.

There is no certainty the subsurface ocean supplies the water plume spraying out of surface fractures near the south pole of Enceladus, but scientists reason it is a real possibility.

CLUSTER "EL GORDO"

The *Hubble Space Telescope* has weighed the largest known galaxy cluster in the distant universe (**ACT-CL J0102-4915**) and found it definitely lives up to its nickname -- **El Gordo** (Spanish for "the fat one").

By measuring how much the cluster's gravity warps images of galaxies in the distant background, a team of astronomers has calculated the cluster's mass to be as much as 3 million billion times the mass of our sun and roughly 43 percent more massive than earlier estimates. See: **http://www.nasa.gov/hubble**

NGC 1316 WITH A HISTORY

Several clues in the structure of **NGC 1316** reveal that its past was turbulent and that it may have swallowed a dust-rich spiral galaxy about three billion years ago. It has some unusual dust lanes embedded within a much larger envelope of stars and a population of unusually small globular star clusters.

There are very faint "tidal tails", wisps and shells of stars that have been torn from their original locations and flung into intergalactic space. These features are produced by complex gravitational effects on the orbits of stars when another galaxy comes too close and point to a violent past during which **NGC 1316** annexed other galaxies.

It also suggests that the disruptive behavior is continuing. See: **http://scitechdaily.com/new-eso-image-ngc-1316-ngc-1317/**

THE MILKY WAY BLACK HOLE

Black holes feed on gas and dust all the time, but astronomers rarely get to see mealtime in action.

Right now a doomed gas cloud is edging ever closer to the supermassive black hole at the center of our Milky Way galaxy. Northwestern University's Daryl Haggard has been closely watching the cloud and the black hole as part of a study that should eventually help solve one of the outstanding questions surrounding black holes: How exactly do they achieve such supermassive proportions?

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