THE YOUNG ASTRONOMERS NEWSLETTER

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MAN-MADE GARBAGE

According to various services, more than 14,000 artificial objects are currently working or simply staying on the geostationary orbit. The number of smaller pieces exceeds hundreds of thousands, and to track them down from the Earth is practically impossible.

However, at the moment there are no projects which could prove helpful in cleaning space .The situation is becoming more and more urgent and necessary with every passing day - that is why all users of space need to step up the work in this field. Otherwise, people will be ousted from space by space garbage

and **COLLISION IN SPACE**

A small Russian spacecraft in orbit appears to have been struck by remnants of a destroyed Chinese satellite. It's just the second time that an artificial object has collided with an active spacecraft while in orbit.

The Chinese material is considered to be "space junk" left over from a Chinese spacecraft destroyed in a after exceeding its service life. The debris has posed a threat to satellites and crewed spacecraft ever since, according to Space.com.

THIRD CLOSEST STAR SYSTEM

A pair of newly discovered stars in the southern constellation **Vela** is the third-closest star system to the Sun - the closest star system discovered since 1916. Both stars are "brown dwarfs," stars too small in mass to ever become hot enough to ignite hydrogen fusion and become a "Sun".

As a result, they are very cool and dim, resembling a giant planet like Jupiter more than a bright star like the Sun.

STRANGE PLANETS

Project 1640 scientists have collected the first chemical fingerprints, or spectra, of a distant system's four red exoplanets, which orbit a star 128 light years away from Earth. These warm, red planets (HR 8799) are unlike any other known object in our universe. All four planets have different spectra, and all four are peculiar. They said that the spectra of these four worlds clearly show that they are far too toxic and hot to sustain life as we know it.

SIDING SPRING COMET

Comet 2013 A1 (*Siding Spring*) will make a very close approach to Mars in October 2014. The **Near-Earth Object Program Office** at NASA's Jet Propulsion Laboratory latest estimate has it passing about 31,000 miles from the Red Planet's surface.

SMALLEST SPACE TELESCOPE

The smallest astronomical satellite has been launched as part of a mission to prove that even a very small telescope can push the boundaries of astronomy. The satellite was designed in Canada, assembled in Austria, and launched in India as part of the **BRIght Target Explorer** (BRITE) mission. The nano-satellite is an eight-inch cube and weighs less than fourteen pounds. *The Hubble Space Telescope weighs 24.2 tons!*

URAL METEOR

Moscow scientists say the meteor that exploded over Russia in February probably broke off an asteroid and collided with another space body millions of years ago. "It was formed within an asteroid, separated from it, and then, tens of millions of years ago, it suffered a collision, receiving multiple cracks as a result."

YOUNG STAR FRAGMENTS FOUND

During an extensive X-ray survey of the Milky Way's central regions, NASA's *Swift* satellite uncovered the previously unknown remains of a shattered star. It is probably less than 2,500 years old, making it one of the 20 youngest remnants identified so far.

Astronomers estimate that a supernova explosion occurs once or twice a century in the Milky Way. The expanding blast wave and hot stellar debris slowly dissipate over hundreds of thousands of years, mixing with and becoming indistinguishable from interstellar gas.

GEOMAGNETIC STORM

Skies over North America turned green for St. Patrick's Day! A **Coronal Mass Ejection** from the Sun impacted Earth during the early hours of March 17th and sparked green and a myriad of other colored auroras in the United States at least as far south as Colorado.

CURIOSITY'S FIND

An analysis of a rock sample collected by the *Curiosity* rover shows ancient Mars could have supported living microbes. Scientists identified sulfur, nitrogen, hydrogen, oxygen, phosphorus and carbon in the powder Curiosity drilled out of a Gale Crater rock.

ANTARCTIC METEORITES

A team of scientists discovered a meteorite weighing 39 pounds embedded in the East Antarctic ice sheet, the largest such meteorite found in the region since 1988. They have discovered a total of 425 meteorites.

EARLIEST STARS

Herschel space observatory astronomers have found some of the youngest stars ever seen. Dense envelopes of gas and dust surround the fledging stars known as **protostars**, making their detection difficult.

The 15 newly observed **protostars** turned up by surprise in a survey of the biggest site of star formation near our solar system, located in the constellation Orion.

The discovery gives scientists a peek into one of the earliest and least understood phases of star formation. See: **http://www.nasa.gov/herschel**

"GOING TO MARS" ART CONTEST

NASA's next Mars mission is giving students and the public worldwide an opportunity to have a connection with space exploration through "**Going to Mars**".

It is part of the *MAVEN* mission (Mars Atmosphere and Volatile Evolution) -- an art contest for participants ages 5 to 17 - the chance to create artwork in support of a November 2013 launch of MAVEN. See:

http://lasp.colorado.edu/maven/goingtomars/art-contest/

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** ****

EarthKAM conducts four missions a year and the next one is planned for April. In January, more than 30,000 students around the world controlled a digital camera aboard the International Space Station to capture their images of almost any place on Earth. It as part of the **Earth Knowledge Acquired by Middle school students** mission. To register, see: **https://earthkam.ucsd.edu/register**

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ASTRONOMY DAY – APRIL 20TH

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PUZZLES

Find The Word

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

APRIL
CANADA
COMET
EARLY
EARTH
EIGHT
FIELD
FIRST
FLYBY
GIANT
LATEST
LYRIDS
MAVEN
METEOR
ORBIT
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SINCE
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Scrambled Astronomy:

SATELLITES

SCIANSI __ __ __ __ __ __ __

LIGAR __ __ __ __ __

UBHELB __ __ __ __ __ __

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(Answers below)

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

HH 151 in Taurus (The Bull) - **http://www.nasa.gov/mission_pages/hubble/science/hh151.html**
The Scorpion, NGC 6357 - **http://www.eso.org/public/news/eso1226/**
Space Invader - **http://www.nasa.gov/mission_pages/hubble/science/abell68.html**
Cassini's latest flyby of Rhea **- http://saturn.jpl.nasa.gov/news/cassinifeatures/feature20130311/**
SITE OF THE MONTH
Young Astronomer **- http://www.youngastronomer.org/**

****** APRIL MOON ******

Last Quarter 4/3 **New Moon:** 4/10 **First Quarter:** 4/18 **Full Moon**: 4/25
Apogee: 4/15 6:23 PM 252,518 mi, (404864 km) **Perigee**: 4/27 3:49 PM 225,102 mi. (362267 km)
** The **Full Moon** was called the Egg Moon ** **Best observing nights**: 4/2 – 4/17

****** PLANETS IN APRIL ******

VENUS appears very low in the west-northwest just after sunset on the 30th. **JUPITER** is in the western sky in evening twilight and sets three hours after the Sun by month's end. **MARS** is behind the Sun on the 17th (*suoerior conjunction)*. **MERCURY** is very low in the east just before sunrise during early April, and rising later each day. **SATURN** is rising in the east-southeast after the 18th and is in the southwest by morning. It reaches *opposition* on the 28th just before sunrise (opposite the Sun as seen from Earth).

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
LYRIDS	4/18 – 4/25	4/22	18	Northeast – near LYRA.

Lyrids tend to be bright and often leave trails. About 10-20 meteors per hour at peak can be expected. Plus, the Lyrids are known for uncommon surges that can sometimes bring the rate up to 100 per hour.The greatest number usually fall in the dark hours just before dawn. April has eight weak showers.

LOOK FOR: **>>>>> A big line-up** on April 13th – in the west: The "Bull's Horns" above Jupiter and the Moon. And just below, the bright star Aldebaran – "The Eye of The Bull". It is in the "Face of Taurus" in the Hyades Cluster, next to the Pleiades. On the 14th, the Moon is next to the Hyades.

For SciWorks Planetarium info and schedules, dial: 676-6730

PLUTO'S MOONS

The SETI online poll's winning names are **Vulcan** sent in by William Shatner of "Star Trek" fame and **Cerberus**. This result doesn't guarantee that **P4** and **P5** will actually get these names since the International Astronomical Union is responsible for naming the moons.

Pluto has five moons that astronomers currently know of. Scientists first caught sight of Pluto's largest moon **Charon** in 1978, but it was not until 2005 that astronomers discovered two other moons (**Nix** and **Hydra**) using the Hubble Space Telescope.

ASTEROID WITH A TAIL

Asteroids, unlike comets, are seldom seen sporting a tail as they orbit the Sun, but Spanish astronomers observed one of these rare exceptions.

Using a telescope in the Canary Islands, they spotted an asteroid dubbed **P/2012 F5** that displayed a trail like that of comets. Its emission of dust or gas may have been caused by internal rupture or collision with another asteroid. They estimate the asteroid has a radius of between 300 and 450 feet and the dust mass emitted is about half a million tons.

MARS COMET IN 2014

Comet C/2013 A1 (Siding Spring) is on its way to passing 23,000 to 60,000 miles above the surface of Mars in October 2014. The "minimum close-approach" distance is zero. Comets do not move smoothly on their tracks like ball bearings or planets. The gases that blow off their surfaces as the Sun warms them up and pushes them, changing their trajectories. This comet has a real if small chance of actually hitting Mars.

APOPHIS

The 1,066-foot asteroid **99942 Apophis** will safely fly by Earth in 2029 and 2036, but may strike our planet in 2068 - the impact odds being about 2.3 in a million.

The near-Earth asteroid has been the focus of considerable attention after it was discovered in December 2004 to have a significant probability of Earth impact in April 2029.

While the 2029 potential impact was later ruled out, the possibility of a potential impact in the years after 2029 continues to prove difficult to dismiss.

HERSCHEL

ESA's *Herschel* space observatory is expected to exhaust its supply of liquid helium coolant in the coming weeks after spending more than three exciting years studying the cool Universe.

Herschel was launched on 14 May 2009 and, with a main mirror 11.5 feet across, is the largest, most powerful infrared telescope ever flown in space. It has been able to study previously invisible cool regions of gas and dust in the cosmos, and providing new insights into the origin and evolution of stars and galaxies.

MERCURY'S *MESSENGER* DATA

NASA released a new data set collected during *MESSENGER*'s thirteenth through eighteenth month in orbit around Mercury.

Images and measurements are now available to the public for the third full Mercury solar day of MESSENGER orbital operations. The data is online at:

http://pds.nasa.gov/subscription_service/SS-20130308.html

THIRD VAN ALLEN BELT

NASA's *Van Allen Probes* mission has discovered a previously-unknown third radiation belt around Earth, revealing the existence of unexpected structures and processes within these hazardous regions of space. Previous observations of Earth's Van Allen belts have long documented two distinct regions of trapped radiation populated with charged particles.

IOWA METEORITE

Airborne surveys are providing an unprecedented look at a 470-million-year-old Iowa meteorite crater concealed by bedrock and sediment. The surveys were conducted around Decorah, Iowa, to map geologic structures and assess the mineral and water resources of the region.

Geologists examined water well drill-cuttings in 2008-09 and recognized a unique shale unit preserved beneath and near Decorah. The surveys showed a nearly circular region distinct from the surrounding area to a depth of several hundred feet.

A FORMING PLANET

An international team of astronomers using ESO's Very Large Telescope have obtained the first known direct observation of a forming planet still embedded in a thick disc of gas and dust.

The star, **HD 100546**, is a well-studied object, and it has already been suggested that a giant planet orbits it about six times further from the star than the Earth is from the Sun. The candidate planet would be a gas giant similar to Jupiter. If confirmed, this discovery will greatly improve our understanding of how planets form

RUSSIAN METEOR

Russian scientists discovered a meteorite fragment weighing more than two pounds, the largest so far from the meteor strike that hit the Urals region on February 15th. A total of more than 100 fragments have been found along a 30 mile trail under the meteor's flight path.

NASA estimates it was about 50 feet in diameter when it struck Earth's atmosphere, travelling several times the speed of sound, and exploded into a fireball brighter than the Sun.

VERY RARE SUPERNOVA TYPE

170 years ago, the star **Eta Carinae** belched out several Suns' worth of gas in an eruption that made it the second-brightest star after Sirius. But that was just a sample of when it eventually goes ***supernova***.

Based on the presence of helium and other features, **Eta Carinae** is classified as a very rare Type Ibn supernova - only the sixth such example found out of thousands of supernovae.

Although the origin of this supernova type is unclear, the most likely cause seems to be the explosion of a massive star that previously ejected massive amounts of helium gas.

MAGNA ON MERCURY ?

By analyzing Mercury's rocky surface, scientists have been able to partially reconstruct the planet's history over billions of years. Based on the chemical composition of rock features on the planet's surface, MIT scientists have proposed that Mercury may have harbored a large rolling ocean of magma very early in its history, shortly after its formation about 4.5 billion years ago.

DAWN

The *Dawn* spacecraft is continuing to forge through the main asteroid belt, gently thrusting with its ion propulsion system. As it gradually changes its orbit around the Sun, the distance to dwarf planet Ceres slowly shrinks.

Dawn will arrive there in 2015 to explore the largest body between the Sun and Neptune that has not yet been glimpsed by a visitor from Earth.

AIDA MISSION

ESA's proposed *Asteroid Impact and Deflection Assessment* mission now has a target: asteroid **Didymos**. The recent Russian meteor discovery and, on the same day, our planet's close encounter with an even larger chunk of celestial debris underlined the need to learn more about these high-speed space rocks. The international mission would intercept **Didymos** at the time of the asteroid's closest approach to within 70,000 miles of Earth in 2022. **Didymos** is a "binary'" with two asteroids orbiting each other.

THE EARLY MILKY WAY

Peering deep into the vast stellar halo that envelops our Milky Way galaxy, astronomers using the Hubble Space Telescope have uncovered tantalizing evidence for the possible existence of a shell of stars that are a relic of cannibalism by our Milky Way.

The unusual sideways motions of a small sample of stars located far from the galaxy's center is circumstantial evidence that the stars may be the remnants of a shredded galaxy that was gravitationally ripped apart by the Milky Way billions of years ago and support the idea that the Milky Way grew, in part, through the accumulation (accretion) of smaller galaxies.

WATER CHANNELS ON MARS

The *Mars Reconnaissance Orbiter* spacecraft has taken many images during the past few years that showed channels attributed to catastrophic flooding in the last 500 million years. Mars during this period had been considered cold and dry.

These channels are essential to understanding the extent to which recent hydrologic activity prevailed during such arid conditions. And also, whether the floods could have induced episodes of climate change. See:

http://photojournal.jpl.nasa.gov/catalog/PIA16767

COSMIC DISTANCES

A team of astronomers improved the measurement of the distance to our nearest neighbor galaxy and were able to refine the *Hubble Constant* that helps measure the expansion of the universe. They worked out the distance to the **Large Magellanic Cloud** by observing rare close pairs of stars - ***eclipsing binaries***.

WATER ON THE MOON

Trace elements of "water" have been detected within the crystalline structure of mineral samples from the Moon's highland upper crust that were obtained during the Apollo missions. The lunar highlands are thought to represent the original crust, crystallized from a magma ocean on a mostly molten early Moon.

The new findings indicate that the early Moon was wet and that water there was not substantially lost during the Moon's formation. Hydroxyl groups (OH) distributed within the mineral grain were measured.

AN OLD STAR

The **Methuselah star**, HD 140283, has been known for more than a century because of its fast motion across the sky, evidence that the star is a visitor to our neighborhood. Its orbit carries it down from the ancient halo of stars that encircle the Milky Way, and it will eventually slingshot back to the galactic halo.

Earlier estimates from observations placed the star as old as 16 billion years but astronomers have now arrived at an age of 14.5 billion years (older than the universe's calculated age of about 13.8 billion years).

MOON'S CRUST

Early in the Moon's history an ocean of molten rock covered its entire surface. As that lunar magma ocean cooled over millions of years, it formed Moon's crust and mantle.

But according to a new analysis by planetary scientists from Brown University, research shows that the impact event that formed the Orientale basin on the Moon's western edge and far side produced a sea of melted rock 220 miles across and at least six miles deep - enough to make up 5 percent of the Moon's crust.

STAR BURSTS

Scientists announced the most vigorous bursts of star birth took place much earlier than previously thought. They said that the **ALMA** (array) in Chile provided a "zoom lens" into the early universe and they were surprised at finding so many star-producing "dusty galaxies" at such a young time in the universe's development.

They said "With little more than a dozen antennas, we were able to make very detailed images of galaxies - and that was after just two minutes of observations per galaxy. When ALMA is completed, the observations we obtained for this first study are just going to be trivial."

ANDREA GHEZ

Andrea Ghez is an astronomer at the University of California, Los Angeles. She still feels the same fascination with black holes has led her into a pioneering, decades-long study that has proved the existence of the biggest black hole in our cosmic neighborhood: the 4.1-million-solar-mass behemoth that lies at the center of the Milky Way.

This work earned her a MacArthur "genius" award in 2008, and half of the **Crafoord** prize, astronomy's Nobel in 2012.

A RING GALAXY

Galaxies come in a wide range forms including elliptical blobs, swirling spiral arms, bulges, and disks. But **ring galaxies** are mysterious objects. They are thought to form when one galaxy slices through the disk of another, larger one.

All this commotion causes clouds of gas and dust to collapse. This triggers new periods of intense star formation in the outer ring which is full of hot, young, blue stars, and in regions that are actively giving rise to new stars. See: **http://www.nasa.gov/images/content/734286main_potw1310a.jpg**

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