THE YOUNG ASTRONOMERS NEWSLETTER

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ANOTHER "SOLAR SYSTEM"?

Scientists in Chile have discovered a new solar system that is strikingly similar to our own, even with what has been dubbed as **a "twin" Jupiter that revolves around a Sun-like star**. The "twin" Jupiter has a similar mass to the one in our solar system and also has a similar orbit around the Sun-like star - **HIP 11915**. The solar system is located in the **Cetus** constellation, and has spurred speculation that researchers might have unearthed a whole new side to the Milky Way.

WHITE SPOTS ON CERES

The source and identity of the mysterious white spots spotted on the surface of Ceres is unknown and the theory that they are water ice may not be correct. The general consensus in the *Dawn* mission's team is that water is definitely a factor on Ceres, but that the spots are more likely to be just highly reflective salt.

FIREBALL

A bright fiery fireball with a long following of bright colors was seen streaking across the night sky in Atlanta and throughout the Southeast in the early hours of June 28th. NASA officials confirmed the mysterious fireball as space junk. See: **http://t.co/FreI19Pt5M**

LARGE SOLAR FLARE

The Sun emitted a mid-level solar flare, an M7.9-class on June 25th. *NASA's Solar Dynamics Observatory*, which watches the Sun constantly, captured an image of the event.

See: **http://scitechdaily.com/images/M7-9-Class-Solar-Flare.jpg**

FUTURE SPACE TRAVEL

Some researchers suggest a solar, laser or microwave sail. An interstellar craft that surfed on the Sun's photons or on a beam shot from Earth orbit wouldn't have to carry a propulsion source with it. But to propel a large probe, humanity would need an extraordinarily large orbiting laser, and possibly a sail the size of Texas.

Traveling to other star systems is a big dream, but achieving it may require going **ultrasmall**. Blasting tiny, waferlike sailing spacecraft with powerful lasers could slash interstellar flight times from thousands of years to mere decades, one researcher says.

VOLUNTEERS NEEDED

NASA's **Mars Reconnaissance Orbiter** team members are soliciting help from the public to analyze exotic features near the south pole of Mars.

Volunteers are using their own computers to help the team identify specific areas for even more detailed examination with the orbiter's HiRISE camera. See:

http://terrains.planetfour.org

KEPLER-452b

On July 23rrd, NASA scientists announced the discovery of **Kepler-452b**, an alien world that possesses more Earth-like traits than any exoplanet discovered before. It is approximately 60 percent bigger than Earth and likely 5 times more massive.

This means that the surface gravity on **Kepler-452b** would be twice that of Earth's. Such worlds are of interest to astronomers because they might be small and cool enough to host liquid water on their surface - and might therefore be hospitable to life.

NASA's science chief John Grunsfeld called the new world "Earth 2.0" and the "closest so far" to our home .It is around 1,400 light years away from Earth.

ALIEN LIFE

Famed physicist Stephen Hawking has helped launch a major new initiative called **Breakthrough Listen**. It will be the most powerful search ever initiated for signs of intelligent life elsewhere in the universe. But Hawking thinks it's likely that such creatures would try to destroy humanity and fears that an advanced alien civilization would have no problem wiping out the human race..

Astrophysicist Martin Rees countered Hawking's fears, noting that an advanced civilization "may know we're here already."

VESTA

Studies of materials on the surface of **Vesta** offer new evidence that the giant asteroid is the source of basaltic meteorites supporting current models of solar system evolution and terrestrial planet formation.

The solar system originated from a molecular cloud that collapsed to form the Sun and a rotating disk of gas and dust from which the planets grew. **Vesta** is thought to be a planetary "embryo," a leftover planetary building block that survived more or less intact to the present day. Because it underwent magmatic processes, similar to the inner planets, **Vesta** is also regarded as "the smallest terrestrial planet."

STARS' "END OF LIFE"

Giant stars die a violent death. After a life of several million years, they collapse into themselves and then explode in a supernova. Recent work led by Michigan State University may bring some answers to the astronomical question of how these stars explode.

The team developed a three-dimensional model of a giant star's last moments and said: ""This is something that has never been done before and is a significant step toward understanding how these stars blow up". The ongoing problem is that, until now, researchers have only been able to do this in one-dimension while Nature, of course, is three-dimensional.

SCIWORKS – For information and Planetarium schedules, call 767-6730

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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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ALSO >>> "More stars are indeed visible with the unaided eye from the southern hemisphere, but not because more stars exist in that direction of the universe. The reason is that the South Pole is oriented toward the center of the Milky Way, our own galaxy. It's easier to see those relatively nearby stars than stars that are farther away!" *Savant/Parade*

Puzzles

FIND THE WORD

C H I L E A I D D N	ABOUT	GRAIN
N O R H T N W A A S	ALIEN	GREEN
E S L U N A R M T D	AWASH	LUNAR
I L O O R S C O O E	BLACK	NASAS
L B I F R A P N S N	CHILE	PACMAN
A L C H P S E G S S	COLORS	RINGS
W A S A W E N R E E	COMET	SPOTS
A C T I R I R E M N	CRASH	STSCI
S K S G R A I N I E	DENSE	SWISS
H S A R C O M E T D	DWARF	TIMES

SCRAMBLED ASTRONOMY

HOME ITEMS

UNCAFER __ __ __ __ __ __ __

BLEAT __ __ __ __ __

OLCKC __ __ __ __ __

LEASE __ __ __ __ __

CALES __ __ __ __

(Answers below)

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The four-page 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 * * * * * *

Cosmic sparklers - **http://scitechdaily.com/images/New-Chandra-Image-of-Star-Cluster-NGC-1333.jpg**
Nix and Hydra**.- http://news.yahoo.com/photos-pluto-moons-nix-hydra-show-best-views-183841573.html**
BBC's Explore The Universe - **http://www.bbc.co.uk/science/space/universe**
SITE OF THE MONTH
Discover the universe **- http://www.astronomysource.com**

* * * * * * MOON IN AUGUST * * * * * *

Last Quarter: 8/7 **New Moon**: 8/14 **First Quarter**: 8/22 **Full Moon**: 8/29

Perigee: 8/2 6:05 AM 225,041 mi. (362,168 km)
Apogee: 8/17 10:45 PM 252,182 mi. (405,876 km)
Perigee: 8/30 11:29 AM 222,649 mi. (358,319 km)

****** The August Full Moon was called the the Green Corn and Grain Moons.

* * * * * * PLANETS IN AUGUST * * * * * *

JUPITER and **VENUS** are now in the Sun's glare and cannot be seen during August. Venus is between Earth and the Sun on the 15th, and Jupiter is behind the Sun on the 29th. **MARS** rises in the eastern sky about an hour before sunrise and difficult to observe. **SATURN** is in the southern evening sky. **MERCURY** is very low in the western evening sky in the middle of August through early September.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
PERSEIDS	7/17 – 8/25	8/12	90	Low in the northeast.

The **Perseid** meteor shower is usually considered to be among the best of the annual meteor displays thanks to its high rates. Lucky observers can sometimes see up to 90 meteors an hour during the shower. Last summer, the Moon was at a brilliant waning gibbous phase and presented a major nuisance for those who wanted a dark sky to watch the shower. But in 2015, the Moon will be a couple of days before new and will not rise until just before daybreak, leaving much of the night dark for observing.

LOOK FOR: >>>>> SIRIUS, the Dog Star, rising on August 14th in the ESE marks the start of "The Dog Days of Summer". **>>>>> MERCURY** and **JUPITER**, just after sunset on the 6th, very low in the WNW with Regulus. **>>>>>** The **SUMMER TRIANGLE** of **Vega**, **Altair** and **Deneb** overhead.

COMET "67P"

1] Using the high-resolution science camera on board ESA's ***Rosetta*** spacecraft, scientists have identified more than a hundred patches of water ice on the surface of comet 67P/Churyumov-Gerasimenko.

2] When *Rosetta* spacecraft first began orbiting comet 67P/Churyumov-Gerasimenko in August 2014, scientists began to wonder about several surprisingly deep, almost perfectly circular pits on the comet's surface. Now, a new study suggests that these pits are sinkholes, formed when ices beneath the comet's surface sublimate or turn directly to gas. The pits are large, ranging from tens of feet in diameter up to several hundred feet across. The team noted two distinct types of pits: deep ones with steep sides and shallower pits that more closely resemble those seen on other comets.

See: **http://sci.esa.int/jump.cfm?oid=56082**

3] Several features being explored by the *Philae* lander indicate it could be home to alien life, according to two astronomers. While the comet has a black crust darkening much of its surface, astronomers have spotted evidence that **67P** has an underlying icy structure, including icy seas and craters containing frozen lakes with organic debris.

4] Astronomers proposed a novel explanation for the strange appearance "67P" - the comet carrying the *Philae* lander through outer space: **alien microscopic life**! Many of the frozen surface features include a black crust over lakes of ice, flat-bottomed craters and mega-boulders scattered on the surface, were "consistent" with the presence of microbes. They pointed to Rosetta's detection of complex organic material, which gave the comet its surprisingly super-dark and low-reflecting surface, as "evidence for life.

"Micro-organisms could use liquid water to colonize the comet -- infiltrating cracks in the ice and 'snow' during warmer periods when the cosmic wanderer is nearer the Sun."

5] How did the regions on Comet 67P/Churyumov–Gerasimenko get all those beautiful Egyptian names? A Rosetta scientist recently discussed how those divine labels were chosen.

When the Western world began unearthing ancient Egyptian cities and decoding the remnants of those cultures, once-hidden histories were illuminated for a new group of people. Now, scientists are trying to excavate an object of even greater antiquity: a comet traveling around our Sun. *Philae* has been orbiting 67P for nearly a year, and with images sent back to Earth from the spacecraft, scientists are becoming intimately familiar with the comet's surface, which they have divided into 19 separate parts and named after Egyptian gods.

See: **http://www.space.com/29980-rosetta-comet-67p-egyptian-gods-names.html**

DIDYMOON

Telescopes around the globe recently observed the paired **Didymos** asteroids. The 800 meter-diameter main body is orbited by the 170 meter moon **Didymoon**. The NASA-led **Double Asteroid Redirection Test** (**DART**) will crash into **Didymoon i**n late 2022 as ESA's **Asteroid Impact Mission** (AIM) looks on.

HUGE RINGS FOUND

Astronomers used the *Chandra X-ray Observatory* in the discovery of the largest and brightest set of rings from X-ray light echoes ever observed. The extraordinary rings, produced by an intense flare from a neutron star, appear as circles around **Circinus X-1**, a double star system.

The neutron star is the dense remnant of a massive star pulverized in a supernova explosion and is shrouded by thick clouds of interstellar gas and dust.

See: **http://www.nasa.gov/chandra**

ESA'S ASTEROID THREAT RESPONSE

Of the more than 600,000 known asteroids in our Solar System, more than 12,000 are classified as NEOs (Near Earth Objects) because their orbits bring them relatively close to our path.

Every year, more than 1000 new NEOs are discovered. Most of them are some tens of meters size and have the potential to cause damage on the ground. Sooner or later, one may hit Earth.

Delegates from six ESA Member states have met to discuss asteroids - and to exercise the reactions that each would foresee in the event of a real near-Earth object, or NEO, threat.

BEHEMOTH

Astronomers using NASA's *Hubble Space Telesco*pe have discovered an immense cloud of hydrogen dubbed "**The Behemoth**" bleeding from **GJ 436b**, considered to be a "**Warm Neptune**" planet orbiting a nearby star.

The enormous, comet-like feature is about 50 times the size of the parent star. The hydrogen is evaporating from the planet, due to extreme radiation from the star.

See: **http://sci.esa.int/jump.cfm?oid=56089**

GALAXY MERGER

Astronomers expect that galaxies grow by swallowing smaller galaxies. But the evidence is usually not easy to see because stars in the infalling galaxy merge with similar stars of the bigger galaxy leaving no trace. **Messier 87** at the center of the **Virgo Cluster** of galaxies is a vast ball of stars with a total mass more than a billion times that of the Sun.

A team of astronomers looked at the light distribution in the outer parts of **Messier 87** and found evidence of extra light coming from the stars in the galaxy that had been pulled in and disrupted. This has added younger, bluer stars to **Messier 87** so it was probably a star-forming spiral galaxy before its merger.

GAIA

The European Space Agency's *Gaia* is a five-year project to measure and map the Milky Way. It promises to give astronomers a precise, detailed, and three-dimensional view of our galaxy.

The project will generate more than a **petabyte** of data on the makeup, position, motion, and other characteristics of a billion stars.

GAIA arrived at a point in space .9 million miles from Earth where it will look for planets by detecting "tiny wobbles" in a host star's position, exploding stars, failed stars known as brown dwarfs, asteroids, comets, and "Planet X," a hypothetical solar system tenth planet.

BLACK HOLE ACTIVITY

1] ESA's ***INTEGRAL*** satellite has been observing an exceptional outburst of high-energy light produced by a black hole in **V404 Cygni**. Before spiraling into the black hole, material from the star flows towards the black hole and gathers in a disc where it is heated up and shining brightly at optical, ultraviolet and X-ray wavelengths.

The behavior is extraordinary with its repeated bright flashes of light on time scales shorter than an hour, something rarely seen in other black hole systems

2] Using ***NuSTAR***, astronomers clearly identified five supermassive black holes that were previously elusive because of their surrounding cocoons of material.

Some of the "biggest and baddest" black holes are buried under thick blankets of gas and dust. These monsters are actively devouring material, but their hidden nature makes observing them a challenge.

While hidden from view from most other telescopes, ***NuSTAR*** can spot them by detecting the highest-energy X-rays, which can penetrate through the enshrouding gas and dust.

3] Researchers in Japan and Russia have found evidence that ultra-luminous X-ray sources (ULXs) in nearby galaxies are created by strong outflows as unexpectedly high rates of matter falls onto their black holes. The unsolved key question about these objects asks: what is the mass of the black hole in these bright objects? ULXs are typically more than a hundred times more luminous than known black hole binaries in the Milky Way,

4] A team of scientists has discovered a black hole in the early universe that grew much faster than its host galaxy. The result: a gigantic black hole within a normal-size galaxy. In most observations of black holes, they and their host galaxies expand at the same rate. This black hole, located in the galaxy **CID-947**, is among the most massive black holes ever found. It measures nearly **7 billion solar masses** (a solar mass is equivalent to the mass of our Sun).

See: **http://scitechdaily.com/images/Massive-Black-Hole-Outgrows-Its-Galaxy-CID-947.jpg**

5] Supermassive black holes pull in gas with great force from their surroundings. As the gas rotates around the black hole, it becomes progressively hotter through friction and begins to radiate and form the brightest objects in the universe -- **active galactic nuclei** (AGN).

They often shine brighter than the hundreds of billions of stars in their galaxy. Researchers say that these AGN are not lit up permanently but Instead, resemble a flickering lamp that switches on and off' every couple of hundred thousand years

ELEPHANT TRUNK NEBULA

Galaxy **C1396** and its **Elephant Trunk Nebula** in the constellation of **Cepheus** is a region rich in interstellar dust and ionized hydrogen. *Spitzer*'s sensitive infrared detectors have unveiled the brilliant hidden interior of this opaque cloud of gas and dust and have revealed, for the first time, a glowing stellar nursery with never-before-seen young stars and stars still in the process of formation. See: **http://www.jpl.nasa.gov/spaceimages/details.php?id=PIA04935**

FORMATION OF PLANETS

For the first time a team of researchers has discovered of a ring of rocks circling a very young star believed to be a crucial link in formation of planets. Since the 1990s, astronomers have found both disks of gas and dust, and nearly 2000 fully formed planets, but the intermediate stages of formation are harder to detect.

Planets are thought to form from the dust and gas that encircles young stars in a disk. Over time, dust particles stick together, until they build up bigger clumps. Eventually, these have enough mass that gravity becomes significant, and over millions of years the clumps crash together to make planets and moons.

"PAC-MAN" MISSION

Low Earth orbit is littered with space debris -- but if the latest Swiss mission is successful, space will be less crowded by at least one satellite. Switzerland's **EPFL Center for Space Engineering** is partnering with **Swiss Space Systems** (S3) to launch a "**Pac-Man**" probe as part of their **CleanSpace One** mission. The probe will be outfitted with a conical net that will capture a small **SwissCube** satellite before they burn up in Earth's atmosphere.

THE *DRACO 6* BINARY

An international team of researchers, with the assistance of amateur astronomers, has discovered a unique binary star system where one star completely eclipses the other. It is a type of two-star system known as a **Cataclysmic Variable**, where one super dense white dwarf star is stealing gas from its companion star, effectively cannibalizing' it.

The system, named **Gaia14aae**, is in the **Draco** constellation and was discovered in 2014 when it suddenly became five times brighter over the course of a single day. See: **http://www.cam.ac.uk/research/news/gaia-satellite-and-amateur-astronomers-spot-one-in-a-billion-star#sthash.z4xeyTgw.dpuf**

UNUSUAL GRB

ESO's La Silla and Paranal Observatories have demonstrated for the first time a link between a very long-lasting burst of gamma rays and an unusually bright supernova explosion.

The supernova following the burst **GRB 111209A** was not driven by radioactive decay, as expected, but was instead powered by the decaying super-strong magnetic fields around a magnetar.

CURIOSITY DISCOVERY

After almost three years on Mars, NASA's *Curiosity Mars Rover* continues to amaze. *Curiosity* has discovered a target unlike anything it has studied before – bedrock with surprisingly high levels of silica.

Silica is a rock-forming compound containing silicon and oxygen, commonly found on Earth as quartz. The area is downhill from a contact zone the rover has been studying. High levels of silica in the rock could indicate ideal conditions for preserving ancient organic material.

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