THE YOUNG ASTRONOMERS NEWSLETTER

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JUPITER'S RED SPOT

Jupiter's monster storm, the Great Red Spot, was once so large that three Earths would fit inside it. But new Hubble measurements reveal that the largest storm in our solar system has downsized significantly. The red spot has been raging for at least a hundred years and is the width of Earth.

What is happening? One possibility is that some unknown activity in the planet's atmosphere may be draining energy, weakening the storm, causing it to shrink. See: http://hubblesite.org/newscenter/archive/releases/2014/24

CALGARY METEORITE CRATER ?

The discovery of an ancient ring-like structure in southern Alberta suggests the area was struck by a meteorite large enough to leave a 4.8 mile-wide crater with an explosion strong enough to destroy present-day Calgary.

Time and glaciers have buried and eroded much of the evidence, making it impossible at this point to say with full certainty the ring-like structure was caused by a meteorite impact, but that's what seismic and geological evidence strongly suggests.

AUSTRALIAN FIREBALL ?

Residents of northeastern Australia have reported seeing a flaming object plummeting to Earth but the incident remains a mystery as no evidence of a crash has been found. Queensland state police said they received several reports on May 15th about a burning object falling from the sky and possibly hitting the ground near Townsville.

HIGH SCHOOL TEAM SELECTED

After a year-long competition among high school teams across the country, Team ARES, from the Governor's School for Science and Technology in Hampton, Va., was selected as the winner of the high school portion of the Exploration Design Challenge. The EDC was developed to engage students in science, technology, engineering and math (STEM) by inviting them to help tackle one of the most significant dangers of human space flight -- radiation exposure. See: http://www.nasa.gov/education/edc

KEPLER UPDATE

The Kepler spacecraft was launched in 2009 to search for Earth-like planets orbiting distant stars, but has been in limited operation for almost a year. With a temporary fix, research scientists at NASA's Ames Research Center can now begin their next mission.

Kepler has detected more than 3,800 potential exoplanets and 960 of these have been confirmed. More than half of all known alien planets have been discovered by Kepler. The mission has substantial quantities of data on the ground yet to be fully analyzed, and the string of scientific discoveries is expected to continue for years to come.

MARS CRATER

A new mosaic from ESA's Mars Express shows a swirling field of dark dunes cascading into sunken pits within the 67-mile wide Rabe impact crater. The region is 320 km to the west of the large Hellas impact basin, about halfway between the planet's equator and south pole. See: http://www.spxdaily.com/images-lg/mars-rabe-impact-crater-intricately-shaped-dune-field-lg.jpg

DRAGON CAPSULE

SpaceX's unmanned Dragon capsule landed safely in the Pacific Ocean off Mexico's coast May 18th hours after undocking from the International Space Station. The capsule carried more than 3,500 pounds of science samples. It was taken by boat to a port near Los Angeles where it will be prepared for a return journey to SpaceX's test facility in McGregor, Texas, for processing.

SUPERNOVA EXPLOSIONS

Exploding supernovae are a phenomenon that is still not fully understood. The trouble is that the state of nuclear matter in stars cannot be reproduced on Earth. A new model of supernovae is represented as dynamical systems subject to a loss of stability, just before they explode. Because similar stability losses also occur in dynamical systems in nature, this model could be used to predict natural catastrophes before they happen.

MARS SEED EXPERIMENT

The first Mars seed germination experiment will be attached to the outer surface of the new rover that will be launched in mid-2020 and land in early 2021. A "greenhouse" will be fully sealed, and the experiment will be conducted in the following way: Earth air, water and 200 seeds of Arabidopsis will be tightly sealed inside the cube. This herb is unpretentious and has long been used by scientists.

"SPACE FENCE"

The US Pentagon plans to award a massive contract for a project to design and construct Space Fence, a radar system that will eventually be able to track large bodies of space matter and to identify space debris before it becomes a threat to Earth.

RUSSIAN ROCKET FAILED

A Russian rocket carrying a communications satellite fell back to Earth minutes after lift-off on May 18th. Later, several objects crashed to the ground in China's northeastern province of Heilongjiang bordering Russia's far-east, and were determined to be "space debris".

Chinese authorities are working to further identify the debris material and its source.

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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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TEACHERS' SPECIAL - IGNITING STUDENTS' PASSION FOR SCIENCE

"Environmental scientists connect with community colleges and diverse communities to engage in STEM topics." See: **http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=131436&WT.mc_id=USNSF_1**

Puzzles

Find The Word

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T S A O C I A S O M    ALIEN   MOSAIC
E R P R E A P A N O    ALTAIR  MOVES
A D A A O I S S U V    AWARD   OUTER
M A R C C V D T H E    CASTOR  POUNDS
S T A A K E E O O S    DENEB   ROVER
H F L L W R N R N R    EARTH   SPACE
T E T A I A E M E N    FENCE   SPICA
N N A R N E B L Y L    HONEY   STORM
O C I G S D N U O P    LARGE   TEAMS
M E R E T A R C O M    MONTH   TRACK
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Scrambled Astronomy

SPACE TELESCOPES

CANHADR __ __ __ __ __ __

PERKEL __ __ __ __ __ __

SNISICA __ __ __ __ __ __ __

LUHELB __ __ __ __ __ __

INIGME __ __ __ __ __ __

(Answers on page 4)

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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 * * * * * *

New Orion Nebula image**: http://scitechdaily.com/images/Hubbles-Best-View-of-the-Orion-Nebula.jpg**
Bizarre Hexagon on Saturn **- http://www.jpl.nasa.gov/news/news.php?release=2007-034**

SITE OF THE MONTH

Sea and Sky - **http://www.seasky.org/about.html**

* * * * * * MOON IN JUNE * * * * * *

First Quarter: 6/5 Full Moon: 6/13 Last Quarter: 6/19 New Moon: 6/27

Apogee: 6/2 11:26 PM 252,249 mi. (404955 km) ****** The **June Full Moon** was called the **Strawberry**
Perigee: 6/14 10:35 PM 224,974 mi. (362061 km) **Moon**, **Full Rose Moon**, and **Full Honey Moon**.
Apogee: 6/30 2:11 PM 252,234 mi. (405931 km) ****** **Best observing nights**: 6/1 – 6/5; 6/18 – 6/30

* * * * * * PLANETS IN JUNE * * * * * *

VENUS is in the east in morning twilight and near the Pleiades all month.
MARS is in the west after sunset, and moving closer to bright Spica at its left all month.
JUPITER in the west sets 3 hours after the Sun, and 1 hour at month's end.
SATURN is big and bright in the SE in evening twilight and visible all night.
MERCURY is in the WNW after sunset and moves into the Sun's glare by the 2nd week.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
JUNE LYRIDS	6/20 – 6/21	6/15 - 6/16	8	East northeast, about half-way up.The parent body producing the meteor stream has not been definitively identified. Most of the meteors are blue-white and 1/3 leave long trains. June is another slow month for meteors, but things begin picking up as we get into July. June has 11 minor showers and 3 during daylight hours.

LOOK FOR: **>>>>> SUMMER TRIANGLE** overhead – **Altair, Deneb, and Vega. >>>>> MOON** and **MARS** *conjunction* on June 7th when they are less than 2° apart. **>>>>>** (Telescope) **Asteroids Vesta** and **Ceres** are within 1° from June 21 to July 17 in the SW. They about 9° below Mars and Spica, and in *conjunction* on July 5th. **>>>>>** Last of the winter stars, **Castor** and **Pollux**, are at the upper right of Jupiter. **>>>>> ALDEBARAN**, the eye of Taurus the Bull, emerges just below Venus at month's end.

COLDEST BROWN DWARF

The *WISE* and *Spitzer Space Telescope* have discovered what appears to be the coldest "brown dwarf" known and the fourth closest system to our sun. The closest system is Alpha Centauri, at about 4 light-years away.

This “dwarf” is a dim, star-like body that, surprisingly, is as frosty as Earth's North Pole. Cool objects like brown dwarfs can be invisible when viewed by visible-light telescopes, but their thermal glow however feeble, stands out in infrared light. See: **http://www.nasa.gov/wise** for more details.

ASTEROID IMAGES

The ***Curiosity*** rover has captured asteroid images from the surface of Mars featuring **Ceres** and **Vesta**, two of the largest asteroids in the asteroid belt between Mars and Jupiter. Curiosity had aimed its cameras at the Red Planet's two moons, not hunt for asteroids whizzing by, The ***Dawn*** spacecraft orbited the 350-mile-wide **Vesta** asteroid in 2011 and 2012, and will orbit the 590-mile-wide **Ceres** in 2015.

IGM IMAGES

Caltech astronomers have taken unprecedented images of the intergalactic medium (IGM)-the diffuse gas that connects galaxies throughout the universe. They describe the diffuse gas of the IGM as "dim matter," to distinguish it from the bright matter of stars and galaxies, and the dark matter and energy that compose most of the universe.

GRB’S

About once per day, a short, very bright flash of the most energetic form of light (**gamma-ray)** is detected by satellites. These flashes or **GRB**s occur when a massive star collapses at the end of its life.

Scientists have discovered that **GRB**s behave differently than previously thought, changing the theoretical understandings of the afterglows of GBRs.

NEAR-EARTH ASTEROID

A 25-foot asteroid passed between Earth and the Moon during the May 4th weekend, coming within 186,000 miles of Earth's surface. (*On an average, the Moon's orbit is 238,855 miles from Earth.)*

Dubbed 2014 HL129 by astronomers, the asteroid was discovered just several days earlier by scientists at the Steward Observatory in Arizona.

NEW CLUSTER BASICS

Using ***Chandra*** and infrared telescope data, astronomers have made an important advance in the understanding of how clusters of stars come into being.

The data shows early notions of how star clusters are formed cannot be correct and suggests something else is happening. Researchers studied two clusters where sun-like stars currently are forming - **NGC 2024** in the ***Flame Nebula***, and the ***Orion Nebula Cluster***. From this study, they discovered the stars on the outskirts of the clusters actually are the oldest. See: **http://www.chandra.harvard.edu/press/**

SEGUE 1

New work from a team of scientists analyzing the chemical elements in the faintest known galaxy -- **Segue 1**, determined that it is effectively a fossil galaxy left over from the early universe. **Segue 1** is the least chemically evolved galaxy known. After the initial few supernova explosions, it appears that only a single generation of new stars were formed. Then for the last 13 billion years the galaxy has not been creating stars.

BIOSIGNATURE DATA

A new study from the University of Toronto Scarborough suggests the search for life on planets outside our solar system may be more difficult than previously thought.

They discovered that a lifeless planet with a lifeless moon can mimic the same results as a planet with a **biosignature** -- the presence of multiple chemicals such as methane and oxygen in an exoplanet's atmosphere is considered an example of a **biosignature**, or evidence of past or present life.

The current method used to detect “biosignatures” on exoplanets can produce a false positive result.

EJECTED STAR CLUSTER

Globular clusters are relics of the early universe that usually contain thousands of stars crammed into a ball a few dozen light-years across. The Milky Way galaxy is home to about 150 globular clusters but the giant elliptical galaxy **M87**, in contrast, holds thousands.

And now it has thrown an entire star cluster toward Earth at more than two million miles per hour. The newly discovered cluster, which astronomers named **HVGC-1**, is now on a fast journey to nowhere, -- to drift through the void between the galaxies for all time.

SPEEDY STAR

A University of Utah-led team discovered a “**hypervelocity star**” that is racing through space at more than 1 million mph.

In the past decade, astronomers have found about 20 of these odd stars. Hypervelocity stars appear to be remaining pairs of binary stars that once orbited each other and got too close to the supermassive black hole at the galaxy’s center. Intense gravity from the black hole captures one star so it orbits the hole closely, and slingshots the other on a trajectory headed beyond the galaxy.

ASTEROID CAPTURE PLAN

NASA researchers are developing a plan hopes to physically place astronauts on an asteroid for the first time, but also to “catch” a space object and place it in the orbit of the Moon. The project is not scheduled to be complete until the 2020s although prospective astronauts are already preparing for the low gravity mission by training underwater - the most similar circumstances scientists can simulate on Earth. They have also finished a replica of the Orion spacecraft, which will transport astronauts to the asteroid.

ROSETTA

The target of ESA's ***Rosetta*** mission has started to reveal its true personality as a comet, with its dusty veil clearly developing over the last six weeks.

A sequence of images of comet **67P/Churyumov-Gerasimenko** was taken as the gap between the spacecraft and comet closed from around 3 million to 2 million miles. It is still more than 370 million miles from the Sun and its surface has already started to warm causing surface ices to sublimate and gas to escape from its rock-ice nucleus. The solar wind will eventually cause some of the material to stream out in a long tail. See: **http://sci.esa.int/rosetta/**

MASSIVE NEW STAR CLUSTERS

Recent *Spitzer* observations revealed clusters of massive new stars in star-forming regions **W5-east, S235, S252, S254-S258** and **NGC7538**. Scientists found that massive young stars form preferentially in filamentary rather than spherical structures that subsequently fragment, probably due to turbulence effects. See: **http://scitechdaily.com/spitzer-reveals-clusters-massive-new-stars/**

MOON IN THE FUTURE ?

In a draft concept of a Russian lunar program, it envisages the "creation of a lunar testing ground and a base for extraction of natural resources."

Russia's strategic goals in space exploration were linked to a broader presence on low Earth orbits, colonization of the Moon and launching exploration of Mars and other objects of the Solar System.

It is needed to explore the Moon dynamically, the project authors recommended, because "leading space powers will explore and assign for themselves lunar territories suitable to provide future opportunities of practical use in the next 20-30 years."

"The Moon is a first step on the way to the deep space."

A MARS GREENHOUSE

NASA researchers have proposed depositing a small greenhouse on Mars when the next rover bound for the Red Planet is expected to land in 2021. Experimenting with plant life is another step in the process of establishing human colonization of Mars.

THE SOLAR WIND AND LIGHTNING

Scientists have discovered new evidence to suggest that lightning on Earth is triggered not only by cosmic rays from space, but also by energetic particles from the Sun.

University of Reading researchers found a link between increased thunderstorm activity on Earth and streams of high-energy particles accelerated by the solar wind, offering compelling evidence that particles from space help trigger lightning bolts.

Although the exact mechanism that causes these changes remains unknown, the researchers propose that the electrical properties of the air are somehow altered as the incoming charged particles from the solar wind collide with the atmosphere.

SPACE DEBRIS

According to a senior Chinese official, China has made remarkable progress in controlling and reducing the impact of space debris on exploration and will strengthen cooperation with other nations. “Cutting-edge” technologies were adopted to prevent *Long March* rocket parts from exploding in space after they sent satellites or spacecraft into orbit, thus avoiding generating new debris.

Space debris includes everything from spent rocket stages and old satellites to fragments from disintegration, erosion and collisions. As of September last year, more than 500,000 pieces of debris were tracked as they orbited Earth.

They travel up to 28,000 km/h, fast enough for a relatively small piece of debris to damage a satellite or a spacecraft, according to NASA. There are also millions of pieces so small they can't be tracked.

VISIBLE GAS GIANT

A gas giant has been added to the short list of exoplanets discovered through direct observation and imaging. It is located around **GU Psc**, a star in the constellation ***Pisces***. **GU Psc b** is about 2,000 times the Earth-Sun distance from its star, a record among exoplanets.

Given this distance, it takes approximately 80,000 Earth years for **GU Psc b** to make a complete orbit around its star!

MAGNETAR PARTNER

A team of European astronomers using ESO's **Very Large Telescope** (VLT) believe they've found the partner star of a ***magnetar*** for the first time. ***Magnetars*** are the bizarre super-dense remnants of supernova explosions and the strongest magnets known in the Universe - millions of times more powerful than the strongest magnets on Earth.

When a massive star collapses under its own gravity during a supernova explosion it forms either a neutron star or black hole.

Magnetars are an unusual and very exotic form of ***neutron star***. Like all of these strange objects they are tiny and extraordinarily dense - a teaspoon of neutron star material would have a mass of about a billion tons and extremely powerful magnetic fields.

Astronomers proposed a solution to this mystery. They suggested that the magnetar formed through the interactions of two very massive stars orbiting one another in a compact binary system and one might have been kicked out of orbit by the supernova explosion that formed the magnetar.

One star, known as **Westerlund 1-5 [2**], was found to be doing just that.

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