

# THE YOUNG ASTRONOMERS NEWSLETTER

Volume 22 Number 5

**STUDY + LEARN = POWER**

April 2014

## HUGE YELLOW STAR

At 1,300 times larger than the Sun, astronomers have spotted the largest yellow star ever observed in our galaxy. Hypergiant star **HR 5171 A** is also in the top-10 of the largest stars known and is about one million times brighter than the Sun.

Because of its great distance of nearly 12,000 light-years from Earth, the object in the southern hemisphere constellation of **Centaurus** can just about be seen with the naked eye.

## ASTEROID SMASHES INTO THE MOON

A Spanish astronomer witnessed a refrigerator-sized asteroid smash into the Moon. The speed was so high that the rock turned molten on impact and vaporized, leaving a thermal glow visible from Earth as a flash. It left a 30-foot crater in the **Mare Nubium** in the Moon's pocked surface. It was the biggest lunar impact by a space rock ever recorded.

See: <http://youtu.be/perqv4qByal> (and)  
<http://youtu.be/zCFDkj2JtyA>.

## PLANET "X"

After the *WISE* space telescope searched hundreds of millions of objects across our sky, scientists have concluded that the **outer solar system** probably does not contain a large gas giant planet, or a small, companion star.

Researchers had theorized about a large celestial body suspected to lie somewhere beyond the orbit of Pluto, and dubbed it "Planet X". The body has garnered other nicknames, including "**Nemesis**" and "**Tyche**."

## ESA'S PLATO MISSION

The UK Space Agency will invest 25 million pounds in **ESA's PLATO** mission - the search for habitable planets orbiting alien stars. Planned for launch by 2024, the mission will see strong involvement from several UK institutes and UK space companies in a strong position to bid for industrial opportunities.

## "CONTACT BINARY" ASTEROID

A collage of radar images of near-Earth asteroid 2006 DP14 revealed that the asteroid is about 1,300 feet long, 660 feet wide, and looks like a big peanut. It is known as a "**contact binary**" because it has large lobes that appear to be in contact. See a video at:

<http://www.youtube.com/watch?v=6PU8obSU9Tc>

## MERGER OF DWARF GALAXIES

Researchers have detected a stream of stars in one of the swarm of more than twenty small satellite galaxies that surround the **Andromeda Galaxy**.

It is in a dwarf galaxy with a movement of its stars resulting from the remnant of a merger between two dwarf galaxies - mergers between galaxies of such low mass have not been observed before. These stars are rotating around the center of the galaxy.

## EXOPLANETS

### # DISCOVERIES

A team of astronomers from the UK and Chile discovered three planets classified as **habitable-zone super-Earths** among eight new planets discovered orbiting nearby red dwarf stars. Their study supports the theory that virtually all red dwarfs (at least three quarters of the stars in the Universe) have planets orbiting them. It also suggests that **habitable-zone super-Earth planets** orbit at least 25% of the red dwarfs in our solar system.

### # 715 NEW EXOPLANETS

NASA's Kepler mission announced the discovery of 715 new planets orbiting 305 stars. Nearly 95 percent of the planets are smaller than Neptune. Four of the planets are less than 2.5 times the size of Earth and orbit where the surface temperature of an orbiting planet may be suitable for liquid water. See:

<http://www.nasa.gov/ames/kepler/digital-press-kit-kepler-planet-bonanza>

## CLUSTER ABELL 3627

A new Hubble image shows **spiral galaxy ESO 137-001** framed against a bright background as it moves through the heart of galaxy cluster **Abell 3627**. This image captures the galaxy and its backdrop in stunning detail, and, intense blue streaks streaming outwards shining brightly in ultraviolet light.

These streaks are in fact hot, wispy streams of gas that are being torn away from the galaxy.

See: [http://scitechdaily.com/images/](http://scitechdaily.com/images/Hubble-Views-Spiral-Galaxy-ESO-137-001.jpg)

[Hubble-Views-Spiral-Galaxy-ESO-137-001.jpg](http://scitechdaily.com/images/Hubble-Views-Spiral-Galaxy-ESO-137-001.jpg)

## A "GLORY"

When traveling above the clouds, airplane passengers sometimes witness a "**glory**" moment - a ring-shaped rainbow (a "glory" or "gloriole"). For the first time on a planet other than Earth, researchers have images of a "**glory**" on Venus - the rainbow-like light on its cloud tops that helps to identify the components of the planet's acidic cloud cover. See:

<http://scitechdaily.com/images/Simulated-Views-of-Glory-on-Venus-and-Earth.jpg>

## CARBON MONOXIDE CLOUD

Astronomers exploring the disk of debris around **Beta Pictoris** have discovered a cloud of carbon monoxide located about 8 billion miles from the star.

This concentration of poisonous gas, usually destroyed by starlight, is being constantly replenished by ongoing rapid-fire collisions among a swarm of icy, comet-like bodies. Researchers say that in fact, to offset the destruction of carbon monoxide molecules a large comet must be getting completely destroyed every five minutes.

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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/](http://amazing-space.stsci.edu/tonights_sky/)  
and [http://hubblesite.org/explore\\_astronomy/tonights.sky](http://hubblesite.org/explore_astronomy/tonights.sky)

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

**FMA LIVE !**

NASA and Honeywell kicked off the 2014 tour of "FMA Live! Forces in Motion" with middle school students at Wunderlich Intermediate School in Houston. The program is designed to ignite students' interest in science, technology, engineering and math (STEM.) See: <http://www.fmalive.com> and <http://www.nasa.gov/education>

**Puzzles**

**FIND THE WORD**

|                     |       |         |
|---------------------|-------|---------|
| T H G I E D E E P S | ALCOR | PEANUT  |
| H H A S W O H S M G | ALIEN | RADAR   |
| I S R A N H E A R T | APRIL | SHOWS   |
| N R R E S M E A A T | COMET | SMASH   |
| G F I A E R S O W A | DWARF | SPEED   |
| I L M H T S A E S L | EIGHT | STREAMS |
| A S C S P E N D I C | GIANT | THING   |
| N T O L N T M R A O | GRASS | THREE   |
| T E E M Y T P O Y R | HEART | TWENTY  |
| O H T U N A E P C T | HELPS | TYCHE   |

**SCRAMBLED ASTRONOMY - Meteor Showers**

|          |       |
|----------|-------|
| DRINOOSI | _____ |
| DOTOBSI  | _____ |
| DNOSELI  | _____ |
| DRYLSI   | _____ |
| DRUSSI   | _____ |

(Answers on page 4)

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** \*\*\*\*\*

What's up there? - <http://www.learnwhatsup.com/astro/index1.shtml>  
Duke University teaching resources - <http://www.phy.duke.edu/~kolena/astroteach.html>  
Solar System Missions - <http://www.jpl.nasa.gov/solar-system/index.php>

**SITE OF THE MONTH**

Discover Astronomy - <http://www.astronomysource.com>

\*\*\*\*\* **MOON IN APRIL** \*\*\*\*\*

\*\*\*\*\* **Lunar Eclipse April 14 - 15 begins at 1:58 AM and ends 5:33 AM** \*\*\*\*\*

First Quarter: 4/7 Full Moon: 4/15 Last Quarter: 4/22 New Moon: 4/29

Apogee: 4/8 10:53 AM 251,345 mi. (404501 km) Perigee: 4/22 8:28 PM 227,238 mi. (365705 km)

\*\* The April Full Moon was called the **Egg Moon, Sprouting Grass Moon, Growing Moon, and Pink Moon.**

\*\* Best observing nights: 4/1 - 4/7; 4/22 - 4/30

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

**VENUS** is low in the ESE at dawn and is lower in the sky each night. **MARS** is on the eastern horizon in evening twilight and moves to the west by sunrise. Bright red Mars is opposite the Sun on the 8th and closest to Earth (in ten years) on the 15th. **JUPITER** is near the Gemini twins and sets about four hours after sunset. Gemini is in the SE at sunset and visible all night. **SATURN** rises in the east about three hours after sunset and earlier each night. **MERCURY** is at the lower left of Venus at the beginning of April - just above the horizon.

\*\*\*\*\* **METEOR SHOWERS** \*\*\*\*\*

| <u>NAME</u>   | <u>DATES</u> | <u>BEST NIGHT</u> | <u>PER HOUR</u> | <u>WHERE TO LOOK</u>  |
|---------------|--------------|-------------------|-----------------|---|
| <b>LYRIDS</b> | 4/16 - 4/25  | 4/22 - 4/23       | 20              | Low in the northeast. The Lyrids are produced by dust particles from Comet Thatcher (discovered in 1861) - the dust can leave long trails. The meteors radiate from the constellation <b>LYRA</b> area low in the northeast but can appear anywhere in the sky. April has eight minor showers with some activity every night. |

**LOOK FOR:** >>>> **THE BRIGHTEST STARS:** Big, yellow **Cappella** in the northwest- it is part of the **Auriga** pentagon. >>>> **Arcturus** - the bright orange star in the east in **Bootes**. >>>> **Sirius** in the southwest is the brightest star in the sky. >>>> **Spica** - the blue-white "gem" in the southeast. >>>> **Mizar** and **Alcor** form a "double star" at the bend in the Big Dipper's handle.

## WATER

# **WATER FOUND** - Water has been detected in the atmosphere of a planet outside our solar system with a new technique that could help researchers learn how many planets with water exist throughout the universe. The planet is massive as Jupiter and is orbiting the nearby star **tau Bootis**.

The new process detects infrared radiation in the atmospheres of these planets. Along with the more-powerful future telescopes the astronomers expect to be able to examine the atmospheres of planets which are much cooler and more distant from their host stars where liquid water is even more likely to exist.

# **WATER ON "SUPER-EARTHS"?** - A new study reveals that many of the "super-Earth" planets discovered in the last twenty years may have captured the equivalent of 100 to 1000 times the hydrogen in the Earth's oceans. But they only lose a few percent over their lifetime, making it almost impossible for life as we know it to exist.

A few are even in the 'habitable zone' where the temperature is just right for water to be in liquid form and so are prime targets in the search for life elsewhere in the universe.

Scientists find that planets that form from less massive cores can become benign habitats for life, but the larger objects end up as "mini-Neptunes" with thick atmospheres and probably stay sterile.

## LUMINOUS INFRARED GALAXIES

There is a class of galaxies called *luminous infrared galaxies* - galaxies that are incredibly bright in the infrared part of the spectrum.

In a new Hubble image of a galaxy known as **MCG-03-04-014**, the galaxy's status makes it part of an interesting astronomical question: starbursts versus monsters, a debate over how these galaxies are powered - a recent burst of star formation? - a fiercely powerful "monster" black hole lurking at their core? - or, a mix of the two? The answer is still unclear. See: <http://www.spxdaily.com/images-lg/hubble-luminous-infrared-galaxy-mcg-03-04-014-lg.jpg>

## DEADLY PULSARS

Black widow spiders and their Australian cousins, known as redbacks, are notorious for their unsettling tendency to kill and devour their male partners. Astronomers have noted similar behavior among two rare breeds of binary systems that contain rapidly spinning neutron stars, also known as *pulsars*.

The essential features of these **binaries** are that when they place a normal but very low-mass star in close proximity to a millisecond pulsar there are disastrous consequences for the star. *Pulsars* spin at astonishing speeds, up to 43,000 rpm, and more than 300 of these "millisecond pulsars" have been cataloged. See: <http://www.nasa.gov/content/goddard/with-a-deadly-embrace-spider-pulsars-consume-their-mates/#.UxUM5D1dXN0>

## GALAXYS IN STRINGS

Australian astronomers have found that galaxies in some vast empty regions of the Universe are actually aligned into delicate strings and are in what were previously thought to be extremely empty parts of space.

The Universe is full of vast collections of galaxies that are arranged into an intricate web of clusters and nodes connected by long strings.

This remarkably organized structure is often called the "cosmic web" with busy intersections of galaxies surrounding vast spaces, empty of anything visible to us on Earth.

These huge, empty regions are called voids, and for years, astronomers have been trying to understand the small population of galaxies that inhabit them. The astronomers have now found that the small numbers of galaxies inside these voids are arranged in a new way never seen before.

## GRAVITATIONAL LENSING

Recently, researchers revealed a patch of sky seen through a "lens" more than 500,000 light years wide.

The "lens" is actually a massive cluster of galaxies known as Abell 2744 where the mass of the cluster warps the fabric of space around it - now known as "gravitational lensing". Among the results was the discovery of one of the most distant galaxies ever seen - a star system 30 times smaller yet 10 times more active than our own Milky Way.

Bursting with newborn stars, the firebrand is giving astronomers a rare glimpse of a galaxy born not long after the Big Bang itself.

## DUST IN A GALAXY

An international team of astronomers has the most detailed view so far of the warm dust in the environment of a supermassive black hole in an active galaxy. It is the dense disk and a bright funnel at the center of the **Circinus** galaxy.

Their observations show that the dust directly illuminated by the central engine of the active galaxy is located in two distinct components: an inner warped disk and a surrounding larger distribution of dust.

## THE PROPLYDS

The Orion Nebula is home to hundreds of young stars and even younger protostars known as proplyds. Many of these emerging systems will go on to develop planets, while others will have their planet-forming dust and gas blasted away by the fierce ultraviolet radiation emitted by massive O-type stars that lurk nearby.

Researchers' data reveals that protostars within about 600 billion miles of an O-type star are doomed to have their cocoons of dust and gas stripped away in just a few millions years, much faster than planets are able to form.

See: <http://scitechdaily.com/astronomers-view-dense-disk-bright-funnel-center-circinus-galaxy/>

## CME'S

English researchers have studied the behavior of the Sun's coronal mass ejections, - CME's, explaining for the first time the details of how these huge eruptions behave as they fall back onto the Sun's surface.

They have discovered that CME's have a surprising twin in the tendrils of gas in the **Crab Nebula**. It is the remnant of a supernova which exploded in the 10th century.

Denser matter has started to fall back into the center of the nebula, exhibiting the same finger-like structures as the team observed in the Sun.

## EARTH'S MAGNETOSPHERE

Earth is protected from the constant streaming solar wind of radiation by the magnetosphere - a magnetic bubble. Venus, a barren, inhospitable planet with an atmosphere so dense spacecraft landing there are crushed within hours, has no such magnetic protection. That suggests Earth without its magnetic field might be as barren and lifeless as Venus.

## BOW SHOCKS

High speed roguish runaway stars can have a big impact on their surroundings as they plunge through their galaxy, creating arcs. A speedster star, **HD 2905** or **Cassiopeiae**, is a massive, hot supergiant with a streaky red glow of material in its path.

Such structures are called **bow shocks**, and often seen in front of the fastest, most massive stars. See:

[http://www.nasa.gov/sites/default/files/pia17843bowshock\\_0.jpg](http://www.nasa.gov/sites/default/files/pia17843bowshock_0.jpg)

## TO CAPTURE AN ASTEROID

NASA's mission to reel in an asteroid took an important step forward when the agency recently established a new "rapid response system" intended to pinpoint the most eligible targets for capture. The goal is to bring an asteroid into a stable lunar orbit to make a suitable landing destination for an astronaut.

The project would also permit scientists to experiment with various methods to move hazardous objects away from Earth. The first step, choosing the right asteroid to capture, is particularly hard considering that many asteroids are too big, while the unstable orbits of other rocks also makes them poor choices.

## SNAKE NEBULA

New images provide the most detailed view yet of stellar nurseries within the **Snake nebula** and offer new insights into how cosmic seeds can grow into massive stars. **The Snake nebula** is located near the constellation **Ophiuchus** and appears as a sinuous, dark tendril against a starry background.

A team studied two specific spots within the **Snake nebula** where they detected a total of 23 cosmic "seeds" - faintly glowing spots that will eventually birth one or a few stars. See:

<http://www.cfa.harvard.edu/sites/www.cfa.harvard.edu/files/images/pr/2014-04/1/hires.jpg>

## SN 2014J

**SN 2014J**, a bright supernova discovered only a few weeks ago is provoking new questions about the exploding stars that scientists use as their main yardstick for measuring the universe. It brightened faster than expected for a **Type Ia** supernova and exhibited the same unexpected, rapid brightening as another supernova discovered last year - **SN 2013dy**.

Scientists said: "- two of the three most recent and best-observed **Type Ia** supernovae are weird, with new clues to how stars explode." And: "Maybe what we think of as weird behavior is actually the new normal."

## ASTEROID BREAK-UP

The *Hubble Space Telescope* has recorded the never-before-seen amazing break-up of an asteroid into as many as 10 smaller pieces. Fragile comets, comprised of ice and dust, have been seen falling apart as they come near the Sun, but nothing like this has ever before been observed in the asteroid belt.

It is unlikely the asteroid is disintegrating because of a collision with another asteroid but the asteroid may be disintegrating due to sunlight causing the rotation rate of the asteroid to gradually increase.

Eventually, its component pieces succumb to centrifugal force and gently pull apart. The possibility of disruption in this manner has been discussed by scientists for several years, but never reliably observed. See: <http://www.nasa.gov/hubble> - "Latest Hubble Stories".

## BIG TELESCOPES

More than 400 years ago, Galileo turned a primitive spyglass toward the sky, and in just a few nights learned more about the unseen heavens than all of the scientists and philosophers before him, combined. Since then astronomers have been guided by a simple imperative: Make Bigger Telescopes. It makes you wonder, how big can a telescope get?

The University of Texas is planning to spend \$50 million to participate in building the **Giant Magellan Telescope**, which will be the world's largest telescope when it's completed in 2020. The telescope's seven mirrors will comprise about 3,900 square feet giving students, researchers and faculty the opportunity to make groundbreaking discoveries in astronomy.

The Giant Magellan Telescope will be built in Chile where the extremely dry climate is optimal for providing the sharpest images.

## MONKEY HEAD NEBULA

A *Hubble* **Monkey Head Nebula** image unveils a collection of carved knots of glowing gas and dust. See: [http://imgsrc.hubblesite.org/hu/db/images/hs-2014-18-a-small\\_web.jpg](http://imgsrc.hubblesite.org/hu/db/images/hs-2014-18-a-small_web.jpg)

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