

# THE YOUNG ASTRONOMERS NEWSLETTER

Volume 22 Number 11

STUDY + LEARN = POWER

October 2014

## ASTRONOMY DAY II - OCTOBER 4TH

A bi-annual event ... this year's theme is: "Bringing Astronomy To The People."

### ROSETTA: COMETWATCH UPDATE

*Rosetta* scientists discovered the comet's surface so far shows no large water-ice patches. The team expected to see ice patches on the comet's surface because it is too far away for the sun's warmth to turn its water into vapor. *Rosetta* carries a lander, *Philae*, which will drop to the comet's surface in November 2014.

*Rosetta*'s NAVCAM images are ongoing. The camera is crucial for navigating around the comet, and also provides the probe's current data.

See: <http://sci.esa.int/rosetta/54523-cometwatch-daily-navcam-images/>

### MARS WATER

A tiny fragment of Martian meteorite 1.3 billion years old is helping to make the case for the possibility of life on Mars, say scientists. In finding a 'cell-like' structure, investigators now know that it once held water. It came about as a result of collaboration between Greece and UK scientists

### A BIG BLACK HOLE

Astronomers using *Hubble* data and ground observation have found an unlikely object in an improbable place -- a monster black hole lurking inside one of the tiniest galaxies ever known.

The black hole is five times the mass of the one at the center of the Milky Way galaxy and is inside one of the densest galaxies known -- the **M60-UCD1** dwarf galaxy. It crams 140 million stars within a diameter of only 1/500th of the Milky Way..

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

### MAVEN

On Sept. 21st, the *MAVEN* spacecraft completed 10 months of travel and entered orbit around MARS wrapping up an interplanetary journey of 442 million miles (711 million km).

*MAVEN* is designed to investigate Mars and provide a new perspective on the planet and the history of the Martian climate, liquid water and planetary habitability by microbes.

### "ULTRA-LONG" GRB'S

An international team of astronomers has provided a simple explanation for mysterious "ultra-long" gamma-ray bursts -- a very rare form of the most powerful explosions in the universe.

They said that their analysis reveals that these rare gamma-ray bursts, which can last for hours, can be explained as standard explosions occurring in a region with a low density of matter that is located behind a cloud of dust when viewed from Earth.

### METEORITES

Some meteorites produce a fireball, a sonic boom, and havoc on the ground but many plummet to Earth unseen. Scientists explained how they are expanding automated camera networks that monitor meteorites' initial fiery descent allowing hunters to narrow their search to patches as small as a square kilometer.

### EXOPLANET FOUND

Astronomers headed by Dr. Sean Brittain of Clemson University have discovered evidence of a huge extrasolar planet. It is known as a so-called **Herbig Be star** and also as **KR Muscae**.

They had set out to study the protoplanetary disk around the star and discovered an "extra" source of gaseous emission that could not be explained. They were able to show that a massive planet is orbiting around the star, **HD 100546**. It would be a gas giant at least three times the mass of Jupiter.

### HOW GALAXIES GROW

Scientists at the University of Western Australia examined more than 22,000 galaxies and found that while dwarf galaxies are efficient at creating stars from gas. Giant galaxies are much less efficient and, instead, expand by snacking on their neighbors.

They said: "All galaxies start off small and grow by collecting gas and quite efficiently turning it into stars. Occasionally they get completely cannibalized by some much larger galaxy", and: "Our Milky Way Galaxy hasn't merged with another large galaxy for a long time but you can still see remnants of all the old galaxies we've cannibalized."

The Milky Way Galaxy is going to eat two nearby dwarf galaxies, the Large and **Small Magellanic Clouds** in about 5 billion years. And the nearby **Andromeda Galaxy** will eat it a billion years later.

### PLUTO A PLANET OR NOT?

The Harvard-Smithsonian Center for Astrophysics held a new debate to discuss the planetary status of Pluto. After the experts made their best case, the audience got to vote on what a planet is or isn't and whether Pluto is in or out. The results are in and Pluto IS a planet. The IAU is next to weigh in.

### LOWE'S AD

Even Lowe's gets in the act. A recent full-page ad for their re-opening of the Bermuda Run store had this message: "THIS WEEK OUR ASTRONOMERS PREDICT MEATIER SHOWERS". Love it!

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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> \*\*\*

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## ECLIPSES

There will be a **Total Eclipse of the Moon** on October 8th. East Coast observers will see the Moon set just before "totality". The Moon may look orange-red as it sets --- *maybe pumpkin?*

A **Partial Solar Eclipse** occurs late in the day on October 23rd, but is best seen from West Coast areas. For a summary of Lunar and Solar eclipses (with a lot of data), see: <http://eclipse.gsfc.nasa.gov/eclipse.html>

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## Puzzles

### Find The Word

S F M D H F I E R Y	AHEAD	LARGE
M R H L O E N T K E	BLACK	LOWES
A A D U O L C L S A	CAMERA	MILKY
R W N O V R I A O R	CLOUD	PLACE
C D A C E M K R L S	COULD	POWER
L S A T S L C G A P	CRAMS	SOLAR
O O T E E G A E R O	DWARF	STARS
D R W O H R L O O W	FIERY	STORE
C A M E R A B B L E	FOUND	WATER
S R A T S E D N E R	HOOVES	YEARS

### Scrambled Astronomy

	BIRDS IN SPACE
ROCW	___ ___ ___
CARNE	___ ___ ___
VEDO	___ ___ ___
GALEE	___ ___ ___
NASW	___ ___ ___

(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 \*\*\*\*\*

One near and one far? - <http://scitechdaily.com/images/Hubble-Views-a-Cosmic-Optical-Illusion.jpg>  
*(How many galaxies do you see?)*

A "Smiley" at sunset - <http://www.astronoo.com/images/mois/smiley-lune-venus-jupiter.jpg>  
Rosette Nebula - <http://www.astronoo.com/images/mois/nebuleuse-de-la-rosette-poussieres.jpg>

### SITE OF THE MONTH

Mount Wilson Observatory – <http://www.mtwilson.edu>

### \*\*\*\*\* MOON IN OCTOBER \*\*\*\*\*

**First Quarter:** 10/1    **Full Moon:** 10/8    **Last Quarter:** 10/15    **New Moon:** 10/23    **First Quarter:** 10/30  
**Perigee:** 10/6 5:42 AM 225,236 mi.. (362480 km)    **Apogee:** 10/18 2:06 AM 251,591 mi. (404897 km)  
\*\* The **October Full Moon** was called the **Full Hunter's Moon**.    \*\* **Best observing nights:** 10/15 – 10/31

### \*\*\*\*\* PLANETS IN OCTOBER \*\*\*\*\*

**VENUS** is behind the Sun on the 25th (*superior conjunction*) and will return in our skies in December.  
**JUPITER** is in the eastern sky before sunrise. **MERCURY** passes in front of the Sun on the 16th (*inferior conjunction*) and is in the ESE late in this month. **MARS** is low in the SW at dusk and about three hours after sunset all month. **SATURN** is low in the WSW and sets about two hours after sunset all month. It is only 1° from the Moon on the 25th. **NEPTUNE** – A faint, bluish disc south of Pegasus (with telescopes and binoculars.)

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

<u>NAME</u>	<u>DATES</u>	<u>BEST NIGHT</u>	<u>PER HOUR</u>	<u>WHERE TO LOOK</u>
<b>DRACONIDS</b>	10/6 – 10/10	10/8 – 10/9	10	Northwest. Poor viewing due to the Full Moon. Draconids are produced by dust grains from <b>Comet Giacobini-Zinner</b> discovered in 1900.
<b>ORIONIDS</b>	10/2 – 11/7	10/21 – 10/22	20	Low in the East. Orionids are dust grains from Comet Halley and may appear anywhere in the sky.

There are six minor showers this month also --- very little activity with a few sporadics.

**LOOK FOR:** >>>> **The Big Dipper** -- low in the North and lower each evening. >>>> The **BIG** square of **Pegasus** overhead. >>>> Red supergiant **Antares** low in the southwest setting soon after twilight. >>>> Ptolemy's Dolphin -- the very small **DELPHINIUS** constellation, high and to the west of the hooves of Pegasus.

## START OF PLANET FORMATION

Theories predict that rocky planets like Earth start out as microscopic bits of dust tinier than a grain of sand. Astronomers have now discovered that filaments of star-forming gas near the Orion Nebula may be brimming with pebble-size particles -- planetary building blocks 100 to 1,000 times larger than the dust grains typically found around protostars. If confirmed, these dense ribbons of rocky material may well represent a new, mid-size class of interstellar particles that could help jump-start planet formation that will likely evolve into a new star cluster.

### EARLY GROWTH OF A GIANT

Astronomers have uncovered for the first time the earliest stages of a massive galaxy forming in the young Universe. The discovery was made by combining observations from the *Hubble*, *Spitzer*, and *Herschel* space observatories, and **W.M. Keck Observatory** in Hawaii. See:

<http://sci.esa.int/jump.cfm?oid=54558>,

<http://www.nasa.gov/spitzer>, and

<http://www.nasa.gov/hubble>

### NEW DUST CLOUD

The *Spitzer Space Telescope* has spotted an eruption of huge amount of dust around a young star, possibly the result of a smashup between large asteroids. Astronomers said: "We think two big asteroids crashed into each other, creating a huge cloud of grains the size of very fine sand, which are now smashing themselves into smithereens and slowly leaking away from the star."

A very thick cloud of dusty debris that now orbits the star can eventually lead to the formation of planets. See: <http://www.nasa.gov/spitzer>

### ETA CARINAE

The **Eta Carinae** star system contains one of the biggest and brightest stars in our galaxy, weighing at least 90 times the mass of the Sun. It is also extremely volatile and is expected to have at least one supernova explosion in the future. It was one of the first objects observed by the **Chandra X-ray Observatory**. See: <http://www.spxdaily.com/images-lg/chandra-eta-carinae-x-rays-lg.jpg>

### TITAN'S LAKES

Cassini data shows hundreds of hydrocarbon lakes and seas spread across the icy surface of Saturn's moon Titan, mostly in its polar regions. Most of the liquid in the lakes is thought to be replenished by rainfall from clouds in the moon's atmosphere but the cycling of liquid is still not well understood.

### CHINA'S NEW MOON MISSION

Later this year, China plans to launch a spacecraft to the Moon and back. The mission was expected to fly around the Moon on a "free-return" trajectory, but recent reports claim that the spacecraft will actually enter orbit around the Moon. Then the spacecraft will fly back to Earth, and the *Shenzhou* replica capsule will make a soft landing in China.

## WHITE DWARF FINDING

Astronomers have demonstrated beyond doubt that dead stars known as white dwarfs can reignite and explode as supernovae. The unique signature of gamma rays from the radioactive nuclei created in a **Type Ia** explosion was captured for the first time.

The **Type Ia** supernovae have been long suspected of being the result of a white dwarf star blowing up after interaction with a companion star.

See: <http://sci.esa.int/jump.cfm?oid=54567>

### COSMIC EXPLOSION

Astronomers have discovered a companion star to a rare type of supernova, confirming a long-held theory that the supernova, **SN 1993J**, occurred inside a binary system where two interacting stars caused a cosmic explosion.

They said: "This is like a crime scene, and we finally identified the robber, --.The companion star stole a bunch of hydrogen before the primary star exploded." Astronomers estimate a supernova occurs once every second somewhere in the universe, yet they don't fully understand how stars explode.

### "LOCAL BUBBLE"

"The Local Bubble" is a peanut-shaped blob of gas about 300 light years long filled with almost nothing. Gas inside the bubble is very thin and very hot - a sharp departure from ordinary interstellar material. The Local Bubble was discovered as optical and radio astronomers looked for interstellar gas but couldn't find much in Earth's neighborhood.

When x-ray astronomers were getting their first look at the sky it revealed a million-degree x-ray glow coming from all directions. It all added up to Earth being inside a bubble of hot gas blown by exploding stars. See: <https://www.youtube.com/watch?v=OPxgBPKwYc0&feature=youtu.be>

### COLLISION OF GALAXIES

An international team of astronomers obtained the best view yet of a collision between two galaxies when the Universe was only half its current age. Each year they turn more than 400 solar masses of gas into new stars.

New studies have shown that this object looks surprisingly like the "nearby" pair of colliding galaxies collectively known as the **Antennae** which is the closest ongoing merger of two spiral galaxies.

See: <http://images.sciencedaily.com/2014/08/140826141130-large.jpg>

### IC 559

Far beyond the stars in the constellation of **Leo** (The Lion) is Irregular galaxy **IC 559**. It may look like a sparse cloud, but it is in fact full of gas and dust which is spawning new stars.

Discovered in 1893, **IC 559** does not conform to a regular shape and is classified as an irregular galaxy with some evidence for a spiral structure.

See: <http://scitechdaily.com/images/New-Hubble-Image-of-Irregular-Galaxy-IC-559.jpg>

## LANIAKEA

Astronomers said they have mapped the galaxy supercluster of which our Solar System forms a tiny part, and named the mighty mass **Laniakea**, or "immense heaven" in the language of Hawaii. It comprises some 100,000 galaxies with about a hundred million billion Suns.

The biggest problem was to resolve a phenomenon called the **Great Attractor**, -- a flat-bottomed gravitational "valley" within the supercluster. It has complicated the bid to define this supercluster for decades. It muddles calculations about the motion of galaxies because many are drawn into its "valley" in the same way that water flows downhill.

See: <http://www.youtube.com/watch?v=qqAy3BF0M2M&feature=youtu.be>

[v=qqAy3BF0M2M&feature=youtu.be](http://www.youtube.com/watch?v=qqAy3BF0M2M&feature=youtu.be)

## NICARAGUA'S METEORITE

A small space rock exploded outside the capital of Nicaragua on September 6th. Locals said they heard a large blast and officials found a crater, 40 feet wide and 16 feet deep, near Managua's airport.

In the previous week, NASA confirmed that a "small asteroid, designated 2014 RC" would "pass very close to Earth" over the weekend. It now appears the hole in the woods outside Managua is the result of a small piece of rock that broke off from 2014 RC. Officials in Nicaragua haven't been able to confirm whether the meteorite exploded on impact or plunged into the ground intact. No one was hurt during the collision.

## FROZEN WATER ICE CLOUDS FOUND

A team of Carnegie scientists at the Las Campanas Observatory in Chile has discovered the first evidence of water ice clouds on an object outside of our Solar System.

Until now, water ice clouds had only been found on the gas giant planets (Jupiter, Saturn, Uranus, and Neptune). The object, named **W0855**, was first seen by the *WISE* mission and it was not known if it could be detected by Earth-based facilities.

**W0855** is the coldest brown dwarf ever characterized. A comparison of the team's near-infrared images of **W0855** with models for predicting the atmospheric content of brown dwarfs showed evidence of frozen clouds of sulfide and water.

## GAIA

**Gaia** is an ESA mission to survey one billion stars in our Galaxy and local galactic neighborhood in order to build the most precise 3D map of the Milky Way and answer questions about its origin and evolution.

**Gaia** will discover thousands of transient sources of other kinds – stellar explosions, flares from young stars coming to life, outbursts caused by black holes as it disrupts and devours a nearby star, and possibly some entirely new phenomena never seen before.

**Gaia** repeatedly scans the entire sky, so that each of the roughly one billion stars in its final catalog will be examined an average of 70 times in five years.

## SN 2011DH COMPANION STAR

A team at the University of Tokyo has found evidence of a hot binary companion star to a yellow supergiant star, which had become a bright supernova. The existence of the companion star had been predicted by the same team on the basis of numerical calculations.

But according to the standard theory applicable to isolated stars, only red supergiants or hot and blue stars are able to become supernovae --- the **SN 2011dh** in the Whirlpool Galaxy. See:

<http://www.ipmu.jp/node/1537> and

<http://www.spxdaily.com/images-ig/m51-galaxy-before-after-eruption-sn-2011dh-ig.jpg>

## "FLY-EYE TELESCOPE"

Spotting Earth-threatening asteroids and comets is not an easy task. Based on the fact that Insects can look in many directions at once and as part of the global effort to hunt out risky objects ESA is developing an automated telescope for nightly sky surveys - the "Fly-eye telescope".

It splits an image into 16 smaller subimages to expand the field of view, similar to the technique exploited by a fly's compound eye. If the prototype confirms the expected performance, it will pave the way to an operational network of telescopes.

## M 54

More than 150 globular star clusters orbit the Milky Way galaxy. One of these, along with several others in the constellation of **Sagittarius** (The Archer), was found in the late eighteenth century by the French comet hunter Charles Messier and given the designation **Messier 54** (M54) In 1994 it was discovered that it was actually associated with a separate galaxy - the **Sagittarius Dwarf Galaxy**.

## EXTREME EXOPLANET

A new discovery shows how a massive planet may be causing the star it orbits to act much older than it actually is. **WASP-18b** is an extreme exoplanet. It is one of the most massive hot Jupiters known and one of the closest to its host star which is about 100 times less active than it should be.

## PULSAR

The Milky Way galaxy is littered with the still-sizzling remains of exploded stars. When the most massive stars explode as supernovas, they sometimes glow ferociously with gamma rays.

The *NuSTAR* observatory's high-energy X-ray eyes peered into a site of powerful gamma rays and confirmed the source - **a spinning, dead star called a pulsar**. But many primary sources of observed gamma rays remain unknown.

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**The YOUNG ASTRONOMERS NEWSLETTER is distributed by the Forsyth Astronomical Society**

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