

# YOUNG ASTRONOMERS NEWSLETTER

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**STUDY + LEARN = POWER**

August 2010

## ONE BIG STAR

A star is located inside the Tarantula Nebula is the most massive star ever found. It had a birth mass of as much as 320 times that of the Sun and is now about 265 solar masses.

These super heavyweight stars are extremely rare, forming solely within the densest star clusters. Stars between about 8 and 150 solar masses explode as supernovae at the end of their short lives, leaving behind exotic remnants of either a neutron star or a black hole.

## OTHER MASSIVE STARS

Astronomers have obtained the first image of a dusty disc closely encircling a massive baby star. This is direct evidence that massive stars form in the same way as their smaller brethren. About twenty times the mass of the Sun and five times its radius, the young star, which is still surrounded by its pre-natal cocoon, is located in the constellation Centaurus.

### NGC 2467

The star-forming region **NGC 2467** is a vast cloud of gas - mostly hydrogen - that serves as an incubator for new stars. Strangely shaped dust clouds, resembling spilled liquids, are silhouetted against a colorful background of glowing gas in a new Hubble image.

Some of these youthful stars have emerged from dense clouds where they were born and now shine brightly, hot and blue, but many others remain hidden. See:

<http://www.spacedaily.com/images-lg/star-forming-region-ngc-2467-lg.jpg>

### TYCHO'S SUPERNOVA

Tycho's Supernova, SN 1572, is a remnant of a star explosion that was named after the astronomer Tycho Brahe although he was not the only person to observe and record it. When first seen in November 1572, it was as bright as Venus and visible in the daytime. Over the next two years, the supernova dimmed until it could no longer be seen with the naked eye.

When the star exploded, it sent out a blast wave into the surrounding material, scooping up interstellar dust and gas like a snowplow. An expanding shock wave traveled into the surroundings and a reverse shock was driven back in toward the remnants of the star. See:

[http://www.nasa.gov/images/content/468521main\\_image\\_1713\\_946-710.jpg](http://www.nasa.gov/images/content/468521main_image_1713_946-710.jpg)infrared light. Image

### QUASAR SURPRISE

According to Einstein's theory, if a large mass (such as a big galaxy or a cluster of galaxies) is placed along the line of sight to a distant galaxy, the part of the light that comes from the galaxy will split. Because of this, an observer on Earth will see two or more close images of the now-magnified background galaxy.

This is called a "gravitational lens". Astronomers have now discovered the first known case of a quasar acting as a gravitational lens.

## SOLAR SYSTEM MODEL

Over the past two hundred years, a standard model used our own solar system as a guide. But recent discoveries of planetary systems around other stars included gas giant planets in close orbit around their stars, some in radically different planes of rotation and some in reverse orbit opposite the rotation of the star.

### SATURN'S MOONLETS

*Cassini* scientists have stalked a new class of moons in Saturn's outermost ring that create distinctive propeller-shaped gaps in the ring material. It also marks the first time scientists have been able to track the orbits of individual objects in a debris disk.

They first discovered the double-armed propeller features in 2006 in an area now known as the "propeller belts" in the middle of the ring. The moonlets (smaller than known moons, but larger than the particles in the rings) clear the space immediately around them. And they are estimated to number in the millions, but are not large enough to clear out their entire path around Saturn, as do the moons Pan and Daphnis.

### NEW TELESCOPE

The University of Chicago has joined the effort to build the world's largest telescope. The Giant Magellan Telescope in Chile is expected to eclipse the image quality of the Hubble Space Telescope as the quest into the deepest mysteries of our universe continues.

### CURIOSITY

The planned *Curiosity* rover will give adventure fans worldwide an unprecedented sense of riding a spacecraft to a landing on Mars. The rover's imager will start recording high-resolution video about two minutes before landing in August 2012. Initial frames will glimpse the heat shield falling away from beneath the rover,

### SALT-EATING BACTERIA

Only a few miles inland from the Bahamas' sparkling coral reefs, the island boasts dozens of submerged caves, "blue holes," some of them hidden in what look like island swimming holes linked to the ocean.

In the caves, freshwater caps cover heavier saltwater layers, sometimes filled with clouds of poisonous hydrogen sulfide released by salt-eating microbes. They are specialized "chemosynthetic" bacteria that live without oxygen and feast on chemical reactions possible "only in the caves on Earth". (?) *Could the same or similar bacteria exist on Mars and the solar system's moons and planets?*

### TUNNELS ON THE MOON?

Photos of the Moon's surface show huge pits (some of them hundreds of feet deep) that may be openings to underground tunnels formed by rivers of lava.

Scientists said: "They could be entrances to a geologic wonderland. We believe the giant holes are skylights that formed when the ceilings of underground lava tubes collapsed." - they could be passages and living spaces."

## Puzzles

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

BLACK PILOT  
BLAST QUEST  
BRAHE ROVER  
COCOON SERVE  
COVER SHINE  
EXOTIC TASTE  
FOUND TEAPOT  
MASSES TRACK  
OCEAN TYCHO  
PEAKS VIDEO

### LUNAR ADVENTURE VIDEO GAME

NASA has given gamers a taste of lunar adventure with release of *Moonbase Alpha*, an online video game. It has single and multiplayer options that allow participants to step into the role of an exploration team member in a futuristic 3-D lunar settlement. Players must work to restore critical systems and oxygen flow after a meteor strike cripples a solar array and life support equipment. See: <http://www.nasa.gov/moonbasealpha>

### STUDENT EXPERIMENTS FOR THE ISS

NASA has selected experiments designed by students for astronauts to perform on the International Space Station this summer. NASA selected the experiments from 132 received for the **New Kids in Micro-g!** program. The apparatus for the experiments used the same materials as a tool kit previously provided to astronauts and as commonly used in classrooms for science demonstrations. This is the pilot year for the program; a student experiment design challenge geared toward grades five through eight. Its purpose is to give students a hands-on opportunity to design experiments or simple demonstrations for testing both in the classroom and in the station's microgravity environment.

## Scrambled Astronomy - Constellations

REACTR \_\_\_\_\_ MNARO \_\_\_\_\_ ICPTRO \_\_\_\_\_  
CNUATA \_\_\_\_\_ CNRAIA \_\_\_\_\_ (Answers on page 4)

### \*\*\*\*\* INTERNET SITES \*\*\*\*\*

- e Markarian's Chain - a string of galaxies that forms part of the Virgo Cluster.  
[http://www.astronomy.com/asy/image.ashx?img=markarian\\_485\\_pod070910.jpg&w=500](http://www.astronomy.com/asy/image.ashx?img=markarian_485_pod070910.jpg&w=500)
- e Black hole blows a big bubble - [http://www.nasa.gov/images/content/468316main\\_ngc7793\\_665.jpg](http://www.nasa.gov/images/content/468316main_ngc7793_665.jpg)

### \*\*\*\*\* AUGUST MOON \*\*\*\*\*

Last Quarter: 8/2    New Moon: 8/9    First Quarter: 8/16    Full Moon: 8/24  
Perigee: 8/10 1:57 PM 222,362 mi. (357857 km)    e *The August Full Moon was called the Grain Moon, Apogee 8/25 1:52 PM 252,518 mi. (406389 km) Green Corn Moon, and the Full Sturgeon Moon (for the Best observing nights: 8/2 - 8/16 large fish in the Great Lakes).*

### \*\*\*\*\* PLANETS IN AUGUST \*\*\*\*\*

**VENUS** is low in the west/southwest at dusk and sets less than 2 hours after the Sun. **MARS, Venus** and **Saturn** form a close group all month and form a trio within a 4.8° field on the 7th. It is to the left of Saturn all month. **SATURN** is bright in the west sinking lower each evening. **JUPITER** is rising in the east about 2.3 hours after sunset and is in the south by dawn. **MERCURY** moves lower in the west during the first two weeks. **URANUS** is again a binocular sight to the west of Jupiter- all month.

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

NAME	DATES	BEST NIGHT	PER HOUR	PEAKS	WHERE TO LOOK
PERSEIDS	7/23 - 8/22	8/12 - 8/13	60	After midnight	Northeast. The Perseids is one of the best meteor showers to observe, producing as many as 60 meteors per hour at their peak. This year's shower peaks on the night of August 12 and the morning of the 13th, but you may be able to see some meteors any time from July 23 - August 22. The radiant point for this shower will be in the constellation Perseus. The thin, crescent moon will be out of the way early, setting the stage for a potentially spectacular show starting in late evening.

**LOOK FOR:** >>>>> A close group of **Venus, Mars** and **Spica** in the west/southwest on the 27th after sunset and, **Spica** just to the upper left of Venus in the west/southwest. >>>>> **Teapot** in Sagittarius 8/15 - 8/21 about 1 1/2 hours after sunset in the south. >>>>> **Jupiter** rising a few minutes before **Saturn** sets (one hour after sunset). >>>>> **Triple conjunction with the Moon** on 8/13 - Venus, Mars and Saturn. Look in the west just after sunset.

## BLACK HOLE IN A BINARY

For decades, X-ray astronomers have studied the complex behavior of binary systems pairing a normal star with a black hole. In these systems, gas from the normal star streams toward the black hole and forms a disk around it. Friction within the disk heats the gas to millions of degrees - hot enough to produce X-rays.

At the disk's inner edge, near the black hole, strong magnetic fields eject some of the gas into oppositely directed, dual jets that blast outward at about half the speed of light. The astronomers have now determined that most of the X-rays come from the jets.

### NGC 3603

A young, glittering collection of stars looks like an aerial fireworks burst. The clouds of interstellar gas and dust surround the cluster: and are the raw materials for new star formation. The nebula, located in the constellation **Carina**, contains a central cluster of huge, hot stars, called **NGC 3603** that is not as peaceful as it looks.

Ultraviolet radiation and violent stellar winds have blown out an enormous cavity in the gas and dust enveloping the cluster, providing an unobstructed view. Star clusters like **NGC 3603** provide important clues to understanding the origin of massive star formation in the early, distant universe. See: [http://www.nasa.gov/multimedia/imagegallery/image\\_feature\\_1707.html](http://www.nasa.gov/multimedia/imagegallery/image_feature_1707.html)

### NEWBORN STARS DISCOVERED

A wave of massive star formation appears poised to begin within a mysterious, dark cloud in the Milky Way. The Spitzer Space Telescope has revealed a secluded birthplace for stars within a wispy, dark cloud that is part of the larger, parent nebula known as **M17**, a vast region of our galaxy with a bright, central star cluster.

The greater concentration of gas and dust in the arm is mashing material together, triggering a round of massive star formation that moves through this cloud, causing a chain reaction. See: <http://www.spacedaily.com/images-1g/m17-swex-star-factory-1g.jpg>

### ROSETTA FLIES BY ASTEROID LUTETIA

The *Rosetta* flew 1,964 miles from asteroid **Lutetia** at its closest approach, returning a stream of scientific data for analysis.

The rock - some 75 miles in its longest dimension - is the biggest asteroid yet visited by a satellite. **Lutetia** is irregular in shape, and has a surface marked by a number of wide impact craters and puzzling grooves. It was discovered in 1852 by Hermann Goldschmidt and named for the pre-Roman town on the site of today's Paris. See: <http://i.space.com/images/asteroid-lutetia-photo-100710-02.jpg>

### UNUSUAL EXTRASOLAR PLANET

A team of European astronomers used a completely new transit technique to find an exotic extrasolar planet. The same approach is sensitive enough to find planets as small as Earth in orbit around other stars. They detected a planet 15 times the mass of Earth in the system **WASP-3** in the constellation **Lyra**. Transits occur when a planet is moving in front of the star it orbits, temporarily blocking some of the light from the star. The gravity of additional smaller planets will tug on the larger object, causing deviations in the regular cycle of transits.

## MESSENGER FINDS MORE ABOUT MERCURY

See: <http://www.nasa.gov/messenger>  
**PLANCK'S NEW IMAGE**

The *Planck* mission has delivered its first all-sky image. It not only provides new insight into the way stars and galaxies form, but also tell us how the universe itself came to life after the Big Bang.

Immediately striking are the streamers of cold dust reaching above and below the Milky Way lying across the center of the image. This galactic web is where new stars are being formed, and *Planck* has found many locations where individual stars are edging toward birth or just beginning their cycle of development.

*Planck* continues to map the universe. By the end of its mission in 2012, it will have completed four all-sky scans.

### "FAR-OUT" SPACECRAFT

#### SPACECRAFT DISTANCE FROM THE SUN

Pioneer 10	9,308 billion miles		
Pioneer 11	7,475	"	"
Voyager 1	8,446	"	"
Voyager 2	10,427	"	"
New Horizons	1,496	"	"

### MOLECULE IDENTIFIED

A team of scientists has succeeded in identifying one of the most complex organic molecules yet found in the material between the stars, the so-called "interstellar medium".

The discovery of **anthracene** could help resolve a decades-old astrophysical mystery concerning the production of organic molecules in space

### SWIFT BLACKED OUT

A blast of the brightest X-rays ever detected from beyond the Milky Way temporarily blinded the X-ray eye on the *Swift* space observatory in June. The X-rays traveled through space for 5-billion years before slamming into and overwhelming Swift's X-ray Telescope.

The blindingly bright blast came from a gamma-ray burst, a violent eruption of energy from the explosion of a massive star morphing into a new black hole. The burst was so bright that data-analysis software shut down when it first erupted.

### WISE SURVEY MISSION

The *Wide-field Infrared Survey Explorer* (WISE), completed its first survey of the entire sky on July 17th. The mission has generated more than one million images of everything from asteroids to distant galaxies. To view the new image and earlier-released WISE images, see:

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

### SUPER HOT PLANET WITH A TAIL

Astronomers have confirmed the existence of a "baked" object that could be called a "cometary planet." The giant gas planet, named HD 209458b, is orbiting so close to its star that its heated atmosphere is escaping into space.

*Hubble* observations suggest powerful stellar winds are sweeping the cast-off atmospheric material behind the scorched planet into a comet-like tail.

Since 2003 scientists have theorized the lost mass is being pushed back into a tail, and they had even calculated what it looks like. The roasted planet zips around its star in a short 3.5 days. See:

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

## SOLAR MUSIC

Musical sounds created by longitudinal vibrations within the Sun's atmosphere, have been recorded and accurately studied for the first time by experts at the University of Sheffield, shedding light on the Sun's magnetic atmosphere. With state-of-the-art mathematical theory combined with satellite observations, a team of solar physicists from the University has captured the music on tape.

## NEW STARS

NASA's *Galaxy Evolution Explorer* has discovered a galaxy tail studded with bright knots of new stars. The tail, which was created as the galaxy **IC 3418** plunged into the neighboring Virgo cluster of galaxies, offers new insight into how stars form. "The gas in this galaxy is being blown back into a turbulent wake," said Janice Hester of the California Institute of Technology in Pasadena.

## WHAT DO YOU SEE?

The **Seagull nebula** in a *Wise* image resembles a gull in flight. But when the image is rotated 180 degrees it could be a galloping lizard -- or perhaps a dragon or a dinosaur. The image spans an area about seven times as wide as the Full Moon, and three times as high. It straddles the border between the constellations **Monoceros** and **Canis Major** (the Big Dog). See: [http://www.nasa.gov/multimedia/imagegallery/image\\_feature\\_1695.html](http://www.nasa.gov/multimedia/imagegallery/image_feature_1695.html)

## STILL GOING STRONG !

It takes nearly 13 hours for a radio signal traveling at the speed of light to reach the *Voyager 2* spacecraft from Earth, and another 13 hours to receive an answer. The *Voyager 2* spacecraft is a twin of *Voyager 1*. It has been operating through the Solar System since August 20, 1977. It was exploring Jupiter and Saturn, and then flew to explore Uranus and Neptune before heading into interstellar space.

## TEENAGERS' MISSION

Last year, high school science teacher Ron Dantowitz of Brookline, Mass., played a clever trick on three of his best students. He asked them to plan a hypothetical mission to fly onboard a NASA DC-8 aircraft and observe a spacecraft disintegrate as it came screaming into Earth's atmosphere. How would they record the event? What could they learn?

For 6 months, they worked hard on their assignment but then on March 12th, he stunned them with the news that - "The mission is real, and you're going along for the ride!"

In early June, Dantowitz and the teenagers traveled halfway around the world to help NASA track Japan's *Hayabusa* spacecraft as it plunged into Earth's atmosphere at 27,000 mph and shattered over the Australian outback. After boarding the DC-8 and flying to 41,000 feet, their hard work finally paid off when they successfully recorded the fiery re-entry:

Researchers are hoping that bits of the asteroid's surface are sealed inside the sample-return capsule, which parachuted safely to the ground as bits of the mother ship fell in flaming smithereens with three spellbound teenagers looking on.

## A SLINGSHOT IN SPACE

There are two possible explanations for a "slingshot" in space: kickback by a triple black hole system, or the effects of gravitational waves produced after two supermassive black holes merged a few million years earlier. The discovery of this object comes from a large, multi-wavelength survey plus ground-based observatories. See: [http://www.nasa.gov/multimedia/imagegallery/image\\_feature\\_1702.html](http://www.nasa.gov/multimedia/imagegallery/image_feature_1702.html)

## THE EARLY MILKY WAY

After they ran huge computer simulations to recreate the beginnings of our galaxy, researchers say that many of the Milky Way's ancient stars are remnants of other smaller galaxies torn apart by violent galactic collisions around five billion years ago .

The simulations revealed that the ancient stars, found in a stellar halo of debris surrounding the Milky Way, had been ripped from smaller galaxies by the gravity generated by colliding galaxies. The galaxies collided with each other leaving behind debris that eventually settled into familiar looking galaxies like the Milky Way.

The researchers say their finding supports the theory that many of the Milky Way's ancient stars had once belonged to other galaxies instead of being the earliest stars born inside the galaxy when it began to form about 10 billion years ago.

## MASSIVE STARS

Astronomers have found that in massive star forming regions a major fraction of the massive stars (larger than 10 times the mass of our Sun) form by collecting matter onto disks around their equatorial regions. This was revealed by the detection of gas outflows and shocked regions associated with massive young stars in formation, located in clouds of gas and dust in our Galaxy. We know that lower-mass stars like our Sun form by gravitational collapse of material inside clouds of gas and dust in space.

## A STAR IN PTOLEMY'S "SOUTHERN CROSS"

The star **R Coronae Australis** lies at the heart of a nearby star-forming region and is surrounded by a delicate bluish reflection nebula embedded in a huge dust cloud. It is one of several stars that belong to the class of very young stars that vary in brightness and are still surrounded by the clouds of gas and dust from which they formed. See:

<http://www.eso.org/public/images/eso1027a/>

## "SMALL" EXTRASOLAR PLANET

A planet only about eight times the mass of Jupiter has been confirmed orbiting a Sun-like star at over 300 times farther from the star than the Earth is from our Sun. The planet is the least massive planet known to orbit at such a great distance from its host star. It became the first likely planet known to orbit a Sun-like star that was later revealed by direct observation.

## ALL-AMERICAN SALUTE

Astronaut John W. Young, Apollo 16 on the Moon.

See: [http://www.nasa.gov/images/content/466545main\\_as16-113-18339-4x3\\_946-710.jpg](http://www.nasa.gov/images/content/466545main_as16-113-18339-4x3_946-710.jpg)

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