

YOUNG ASTRONOMERS NEWSLETTER

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STUDY + LEARN = POWER

February 2014

MYSTERY STONE ON MARS

A strange black and white stone has appeared near the *Opportunity Mars Rover*. The rover has not moved for more than a month waiting out the Martian winter.

One side of the stone is not covered with dust and glitters like some white mineral, but coal-black parts of unknown origin are visible on it. There is dust on the other side of the stone, which is why it cannot be a newly fallen fragment of a meteorite. See:

<http://www.spxdaily.com/images-lg/mysterious-stone-rawled-mars-merb-lg.jpg>

(More) The rock that suddenly appeared next to the NASA's Opportunity rover turns out to have an irregular chemical composition for Mars: it has too much sulfur, magnesium and manganese, scientists say. And, the rock has twice as much manganese as anything previously analyzed..

There are two theories about the rock's origin. The first is that the Opportunity rover flipped the rock over as it rolled forward, while the second, that the mysterious rock just landed there after a meteorite impact nearby is highly unlikely, the researchers said. See:

<http://www.spxdaily.com/images-lg/mars-opportunity-yellowknife-bay-rocky-ledges-lg.jpg>

SENDING NAMES TO BENNU

NASA is inviting people around the world to submit their names to be sent aboard the *OSIRIS-REx* spacecraft headed for the asteroid **Bennu** in 2016. A sample of **Bennu's** surface will be sent to Earth.

After a person submits their name, they will be able to download a certificate documenting their participation in the mission. See: <http://planetary.org/bennu> to submit names - before September 30th.

THE MPC

The **Minor Planet Center** is the worldwide location for receipt and distribution of positional measurements of minor planets, comets and other irregular natural satellites of the major planets. It is responsible for the identification, designation and orbit computations and maintains the master files of observations and orbits, and keeps track of the discoverer of each object, See:

<http://www.minorplanetcenter.net/>

HIMIKO

The 8,2 meter Subaru Telescope operated by the National Astronomical Observatory of Japan and located at the Mauna Kea Observatories in Hawaii has been combing the night sky since 1999. One of the most fascinating objects to emerge is **Himiko** (*named after a legendary queen from ancient Japan*), an enormous galaxy with a hot glowing gaseous halo occurring about 800 million years after the Big Bang.

Hubble images revealed three stellar clumps the size of a typical luminous galaxy that achieve an extremely high rate of star formation equivalent to about one hundred solar masses per year.

See: <http://www.jpl.nasa.gov/news/news.php?release=2013-338>

WATER ON CERES

Scientists have made the first conclusive detection of water vapor on the dwarf planet **Ceres**. They said: "This is the first time water vapor has been definitely detected on **Ceres** or any other object in the asteroid belt, and provides proof that Ceres has an icy surface and an atmosphere." The *Dawn* spacecraft is on its way to **Ceres** and is scheduled to arrive in the spring of 2015 to take the closest look ever at its surface.

LAGOON NEBULA

The **Paranal Observatory** in Chile has captured a richly detailed new image of the **Lagoon Nebula**. A giant cloud of gas and dust is creating intensely bright young stars, and is home to young stellar clusters. The **Lagoon Nebula** is located in the constellation of *Sagittarius* (The Archer) and also known as Messier 8. See:

<http://www.sci-news.com/astronomy/science-vst-lagoon-nebula-01708.html>

WATER IN STARDUST

The discovery of water in stardust suggests life may exist across solar systems all over the universe, U.S. researchers say. Dust grains floating through our solar system have been found to contain tiny pockets of water that form when they are hit by charged particles from the Sun, a phenomenon created in laboratories but previously unconfirmed inside actual stardust.

Organic compounds have previously been detected in stardust, and the discovery of water in them suggests they contain the basic ingredients needed for life. "The water-producing reaction involving dust particles and solar energy is likely to occur in any corner of the universe with a star or even a supernova."

EUROPE'S NEO PROGRAM

The first **Near-Earth Object** recovery campaign has been successfully carried out by a new collaboration between the European Space Agency and ESO. Asteroid 2009 FD had been ranked among the top five objects in a list of the most dangerous objects, but new observations have now shown that it is far less likely to hit the Earth than had been feared.

RARE BROWN DWARF

A team of researchers has obtained an image of a very rare type of brown dwarf. It can serve as a benchmark for studying objects with masses between low-mass stars and planets. Brown dwarfs emit little light because they do not burn hydrogen and cool rapidly. **HD 19467 B** is a very faint companion to a nearby Sun-like star, and more than 100,000 times as dim.

EARLY MARS

New findings from rock samples examined by the Mars rover Opportunity have confirmed an ancient wet environment that was milder and older than the acidic and oxidizing conditions told by rocks the rover examined previously. These rocks they reveal more favorable conditions for microbial life than any previous results.

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SCIWORKS – planetarium schedules and Information, call 767-6730

The Sky Tonight? <http://www.skymaps.com/downloads.html>
<http://www.skymaps.com/downloads.html>
http://amazing-space.stsci.edu/tonights_sky/

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

NASA's WISE mission has released a new and improved atlas and catalog brimming with data on three-quarters of a billion objects detected during two full scans of the sky. One new feature of the enhanced WISE images is the ability to search for nearby stars, especially cooler ones that only show up in infrared light.

See: <http://wise2.ipac.caltech.edu/docs/release/allwise/>

Puzzles

Find The Word

N R R K C A R T C S	ALPHA	MASSES
W O E E R H W H E A	ARCHER	MONTH
O K R C D I I S T L	ATLAS	NAMES
H E H B C L S L A T	BASIC	OLDER
S E T E I A O N E A	BENNU	ORBIT
R P N N M T D G C L	CERES	ORION
E S O N A E A R R P	CHILI	OTHER
H N M U D M S A O H	KEEPS	SHOWN
T E T W I C E T F A	IMAGE	TRACK
O R I O N C I S A B	LANDED	TWICE

Scrambled Astronomy

IN THE FEBRUARY SKY

RACTER	_____
CORAD	___ _ _ _ _
DYARH	___ _ _ _ _
SPECIS	___ _ _ _ _
IURUIS	___ _ _ _ _

(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 *****

New Orion Nebula image - http://www.nasa.gov/multimedia/imagegallery/image_feature_693.html
 Hubble sees M83 - <http://scitechdaily.com/hubble-views-spiral-galaxy-m83/>
 Inside the Tarantula - <http://scitechdaily.com/hubble-views-interior-tarantula-nebula/>
 Ultra-bright young galaxies - <http://hubblesite.org/news/2014/05>

SITE OF THE MONTH

NASA's "For Students" - <http://www.nasa.gov/audience/forstudents/#.Us3EftJdUqM>

***** MOON IN FEBRUARY *****

First Quarter: 2/6 **Full Moon:** 2/14 **Last Quarter:** 2/22

Apogee: 2/11 11:22 PM 252,420 mi. (406231km) **Perigee:** 2/27 12:53 PM 223,966 mi. (360438 km)

** The **February** Full Moon was called the **Snow Moon**.

** **Best observing nights:** 2/1 – 2/6; 2/19 – 2'28

***** PLANETS IN FEBRUARY *****

VENUS has moved into the morning sky and is fully lit all month. On the 15th, it will be at its greatest brilliancy. **MARS** is above the eastern horizon after midnight and will become brighter as Earth moves closer. **JUPITER** is high up in the eastern sky at sunset and shines brightly all night. **MERCURY** is in front of the Sun (*inferior conjunction*) on the 1st and visible again after the 8th, before sunrise in the ESE. Mercury reaches *inferior conjunction* (in front of the Sun) on the 15th and is a morning object over the next few weeks. **SATURN** is in the eastern sky after midnight.

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

<u>NAME</u>	<u>DATES</u>	<u>BEST NIGHT</u>	<u>PER HOUR</u>	<u>WHERE TO LOOK</u>
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There are 4 minor meteor showers in February with averages up to 3 per hour. The Centaurids are "southern hemisphere" showers with most of the observing reports, visual and radio, coming from Australia. From February 2nd through the 25th, the Alpha Centaurids and Beta Centaurids are only 8° apart with the Alpha shower consistently showing 3 per hour. The Betas are variable and have had as many as 14 per hour.

LOOK FOR: >>>>> The **Orion Nebula**. Orion The Hunter's seven brightest stars form the shape of a man armed with a sword and an hour glass pattern. Rigel, a bright blue star is his left foot and a bright red Betelgeuse is at his right shoulder. The three stars as his belt point down to **Sirius**, the Dog Star, -- the brightest star in the night sky. And the belt points up to **Aldebaran**, the eye of Taurus the Bull. >>>>> **The Rosette Nebula** – a large cluster of stars and a nebula at the left of Betelgeuse (NGC2237, 2238, and 2239).

ORIGIN OF BINARY SYSTEMS

Scientists have discovered previously-unseen binary companions to a pair of very young protostars. The discovery gives strong support for one of the competing explanations for how double-star systems form. Astronomers know that about half of all Sun-like stars are members of double or multiple-star systems, but have debated over how such systems are formed.

Their new clues support the idea that double-star systems form when a disk of gas and dust whirling around one young star fragments, forming another new star in orbit with the first.

ONE-WAY TRIP

The **Mars One** project has announced the selection of 1,058 volunteers from over 200,000 applicants to become potential "human ambassadors" on the Red Planet. Eventually, no more than 40 people will be selected to go to Mars and never return. **Mars One** contracted Lockheed Martin and Surrey Satellite Technology Ltd. to develop mission concept studies.

REVERSAL OF THE SUN'S POLES

The Sun has undergone a "complete field reversal," with its north and south poles changing places as it marks the midpoint of Solar Cycle 24. The Sun's polar magnetic fields weaken, go to zero and then emerge again with the opposite polarity.

This is a regular part of the solar cycle and while it may seem like the event could have catastrophic repercussions for the galaxy, its effects are actually more subtle, mostly interfering with space exploration.

PLANETS WITH CLOUDS

Scientists have identified the characteristics of the atmospheres of two of the most common type of planets in the Milky Way galaxy. They found that both may be blanketed with clouds. Despite numerous efforts, the nature of the atmospheres surrounding these planets was not known until now.

This is an important milestone on the road to characterizing potentially habitable, Earth-like worlds beyond the solar system.

NEOWISE DISCOVERY

The *NEOWISE* spacecraft has spotted a never-before-seen asteroid -- its first such discovery since coming out of hibernation last year. NEOWISE is the re-activated *WISE* with a new mission to identify the population of potentially hazardous near-Earth objects (NEOs). The asteroid, 2013 YP139, is about 27 million miles from Earth. Based on its infrared brightness, scientists estimate it to be roughly 0.4 miles (650 meters) in diameter and extremely dark, like a piece of coal. See:

<http://go.nasa.gov/1cNF9T7>

DUST

Direct evidence of a supernova's dust-making capabilities has been slim and cannot account for the huge amount of dust detected in young, distant galaxies, but data from radio telescopes in Chile could explain how many galaxies acquire their dusty, dark appearance.

Supernovas are thought to be a primary source of dust in galaxies. U.S. astronomers now say the remnant of **supernova 1987A** now contains about 25 percent the mass of our Sun in newly formed dust.

MASSIVE STARS

The hottest and most massive stars do not live long enough to disperse throughout a galaxy but can be found near the clouds of gas and dust where they formed and are huddled in tight clusters with other young stars or in looser groupings. They blast their surroundings with intense ultraviolet light and powerful outflows called **stellar winds**.

Two of these stars are in the **Cygnus OB2 #9** binary system with some 3,000 hot stars. They are so luminous that the pressure of their starlight actually expels material with speeds of several million miles an hour. With two in the same system their winds can collide creating radio emission and X-rays.

TEACHERS ON SOFIA FLIGHT

NASA's *SOFIA - Stratospheric Observatory for Infrared Astronomy*, will become a flying classroom for teachers during research flights in the next few months.

Twelve two-person teams have been selected for *SOFIA's Airborne Astronomy Ambassadors* program, representing educators from 10 states. Each will be paired with a professional astronomer to observe first-hand how airborne infrared astronomy is conducted.

After their flights, **Airborne Astronomy Ambassadors** will take what they learn back to their classrooms and communities to promote science literacy. See: <http://www.nasa.gov/sofia>

SUPER-FAST STARS

An international team of astronomers has discovered a surprising new class of "**hypervelocity stars**" – solitary stars moving at speeds of more than a million miles per hour - fast enough to escape the gravitational grasp of the Milky Way galaxy. The original hypervelocity stars are large blue stars and appear to have originated from the galactic center.

These new stars are about the size of **the Sun** – and none of them appear to come from the galactic core. The astronomers also estimate that the Milky Way's central black hole has a mass equivalent to four million Suns, large enough to produce a gravitational force able to accelerate stars to hyper velocities.

NEW PLANET HUNTER

After nearly a decade of development, the world's most advanced instrument for directly imaging and analyzing planets around other stars is now collecting light from distant worlds.

The **Gemini Planet Imager (GPI)**, was optimized for imaging faint planets next to bright stars and probing their atmospheres. It will also be a powerful tool for studying dusty, planet-forming disks around young stars and is now part of one of the world's biggest telescopes - the 8-meter Gemini South telescope in Chile.

EXTRASOLAR PLANET IN PISCES

An astronomy team has discovered a giant planet located in a star system within the **Pisces** constellation. The planet, perhaps twice the mass of Jupiter, could help researchers learn more about how extrasolar planets are formed. The star system harboring the new planet contains only one star and is a surprising finding, given the high rate of multiple-star systems in our solar neighborhood.

PLANET OR ?

An object discovered by astrophysicists may challenge traditional understandings about how planets and stars form. It is located near - and likely orbiting - a very young star about 440 light years away from the Sun. It is leading the astrophysicists to believe that there is not an easy-to-define line between what is and is not a planet. With detailed measurements spanning seven years and a spectrum revealing its gravity, temperature, and molecular composition, they still cannot determine whether it is a planet or a failed star - a 'brown dwarf'.

MILKY WAY EXOPLANETS

U.S. researchers say they were surprised to find a number of exoplanets in the Milky Way that are only a few times larger than Earth and covered in gas. "This indicates these planets formed very quickly after the birth of their star, while there was still a gaseous disk around the star," and, "By contrast, Earth is thought to have formed much later, after the gas disk disappeared."

In contrast, slightly smaller planets have much higher density, and are denser than rock the research indicated. They are similar to or denser than Earth.

NEW NUSTAR IMAGE

Two new views from *NuStar* (**Nuclear Spectroscopic Telescope Array**), show the energized remains of a dead star, a structure nicknamed the "**Hand of God**" after its resemblance to a hand. Another image shows distant black holes buried in blankets of dust.

NuStar's mission is to explore the high-energy X-ray universe. It is observing black holes, dead and exploded stars and other extreme objects in our own Milky Way galaxy and beyond. The image shows a nebula powered by a dead, spinning star (**PSR B1509-58**) that is a pulsar- the leftover core of a star that exploded in a supernova. See: <http://www.spxdaily.com/images-ig/nustar-remains-dead-star-hand-of-god-ig.jpg>

BLACK HOLE AND A DWARF GALAXY'S STAR

A bright, long duration flare may be the first recorded black hole destroying a star in a dwarf galaxy. As part of an ongoing search of *Chandra's* archival data for events signaling the disruption of stars by massive black holes, astronomers found a prime candidate.

Beginning in 1999, an unusually bright X-ray source had appeared in a dwarf galaxy and then faded after 2005. They said: "We can't see the star being torn apart by the black hole but we can track what happens to the star's remains, and compare it with other, similar events. This one fits the profile of 'death by a black hole.'"

UNIVERSE IN THE CLASSROOM

A corrected edition of **The Universe in the Classroom** is at: <http://m1e.net/c?11566567-qnyez5y/pNzWM%4068761340-Th1j/QnYHyaCc>
AN "EYEBALL"

Floating at the center of a new *Hubble* image is a lidless purple eye, staring back at us through space. This ethereal object, **SBW2007**, is a nebula with a giant star at its center. The star was originally twenty times more massive than our Sun, and is now encased in a swirling ring of purple gas, - remains of an era when it cast off its outer layers in violent pulsations and winds. See: <http://www.spacetelescope.org/images/potw1401a>

A GREEN METEORITE !

The Field Museum in Chicago has unveiled an "oddball" cosmic find -- a green meteorite it says was discovered in southern Morocco two years ago. Museum experts say they're calling the meteorite -- "The Oddball." It does not fall into any known classes of asteroid or meteorites and it is probably from the asteroid belt between Mars and Jupiter.

NEW PLANETARY SYSTEM

A team of Japanese astronomers has obtained evidence of formation of a giant planetary system around a young star. This result has provided new insight into the theories of planet formation and the origin of a wide variety of planetary systems.

Cosmic dust is circling around the star. By measuring the density of dust in the densest part of the ring, the astronomers found that it is highly possible planets are now being formed. See: <http://scitechdaily.com/images/Dust-and-Gas-Disk-around-HD142527.jpg>

RARE STAR

A team of European astronomers has tracked down a star that is composed almost entirely of hydrogen, helium, and only small amounts of other chemical elements. This very unusual composition places it in the "forbidden zone" of an accepted theory of star formation, meaning that it should never have come into existence.

Cosmologists believe that the lightest chemical elements, hydrogen and helium, were created shortly after the Big Bang, together with some lithium. Almost all other elements were formed later in stars where supernova explosions spread the stellar material into the interstellar medium. Newer stars have higher amounts of metals in their composition which tells us how old it is.

PULSAR WITH AN IRREGULAR RATE

Astrophysicists have reviewed five years of survey data and discovered a pulsar that varies in the amount of gamma-ray radiation it emits. Since all previous known neutron stars emit regular beams of electromagnetic energy, this pulsar is "one-of-a-kind".

SUPERMASSIVE BLACK HOLES

Astronomers have found one of the most powerful, supermassive black holes known. It has created enormous structures in the hot gas surrounding it and prevented trillions of stars from forming. Its cluster is very bright in X-rays implying that it has a mass about a quadrillion times that of the Sun.

WATER ON "OLDE" MARS

New findings from NASA's Mars Exploration Rover Opportunity reveal that Mars had an ancient wet environment that was milder and had liquid water so fresh it could have supported life.

"While Mars is too cold now to have the liquid water needed for life, we've had evidence for past water activity on the planet from satellite images of valleys and analysis of rocks by the Rovers," Dr. de Souza of Cornell University said.

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