

THE YOUNG ASTRONOMERS NEWSLETTER

Volume 23 Number 5

STUDY + LEARN = POWER

April 2015

ROVER CHALLENGE

Nearly 100 high school and college teams from around the world are competing in the 2015 **Human Exploration Rover Challenge** and will race against each other in Huntsville starting on April 16th.

The rover challenge requires students to design, construct and race human-powered rovers through an obstacle course simulating the terrain potentially found on distant planets, asteroids or moons.

See: <http://www.nasa.gov/roverchallenge> and <http://www.ustream.tv/channel/nasa-msfc>

NGC 5253

A star cluster is buried within a supernova in dwarf galaxy **NGC 5253** in the constellation **Centaurus**. The cluster has one billion times the luminosity of our Sun, but is invisible in ordinary light, hidden by its own hot gases – “a factory of stars and soot”. The amount of dust surrounding the stars is extraordinary — approximately 15,000 times the mass of our Sun in elements such as carbon and oxygen.

NGC 5253 has hundreds of large star clusters.

MARS

The *MAVEN* spacecraft has observed two unexplained phenomena in the Martian atmosphere: a high-altitude cloud of dust, and aurora that reaches deep into the Martian atmosphere.

The presence of the dust was not predicted and though unknown, there is no hazard to *MAVEN* and other spacecraft orbiting Mars. See:

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

PLANETS IN THE MILKY WAY

Researchers have calculated the probability for the number of stars in the Milky Way that might have planets in the “habitable zone” - billions of the stars will have one to three planets in the habitable zone where there is the potential for liquid water and where life could exist.

NEBULA IC 4628

Nebula **IC 4628** (aka the **Prawn Nebula**) is a huge region filled with gas and clumps of dark dust in the constellation of **Scorpius** (The Scorpion). These gas clouds are star-forming regions, producing brilliant hot young stars that appear as a blue-white color. See:

https://www.youtube.com/watch?v=XHka4j_tjHU

NEW EXOPLANET WITH FOUR PARENT STARS

Exoplanets can be reared in families with two or more stars. Researchers at the Palomar Observatory have come up with a planet found to have three parents, and another with four.

While that planet was known before, it was thought to have only three stars. This is only the second time a planet has been identified in a quadruple star system.

ACTIVE SATELLITES ORBITING EARTH

There are more than 1,200 active satellites orbiting Earth. Thanks to a database compiled by the Union of Concerned Scientists, the satellites are sized according to their launch mass and colored by launch weight. See: <http://qz.com/296941/interactive-graphic-every-active-satellite-orbiting-earth/>

VOLCANOS ON THE MOON

A volcanic eruption on the Moon, which happened 3.5 billion years ago, threw molten radioactive rock far beyond the slopes of the volcano, reaching several hundred miles in one direction. Since its discovery, the deposit had been hard to study because it is hidden beneath debris from meteorite impacts, but *Lunar Prospector* did detect gamma rays emitted by thorium that can pass through up to a meter of rock.

Also -- China's *Jade Rabbit* (YUTU) discovered at least 9 subterranean layers beneath the Moon's surface that scientists believe are the result of ancient lava flow. *YUTU* explored a relatively fresh crater in a region known as Mare Imbrium

PHILAE UPDATE

European space managers remain hopeful that Rosetta's *Philae* lander will revive as it rides along on Comet 67P/Churyumov-Geras. Monitoring for the lander, which has been hibernating since November, will resume in April. The mission said. "Perhaps it is still too cold for the *Philae* lander to wake up."

CRATER LAKES IN CANADA

The Clearwater lakes in Canada are a **double crater**, but geologists now believe that the craters were formed in two separate events rather than by a binary asteroid. The West Clearwater Lake has accurate plateau ages from *argon dating* of 286 million years. The age of the East Clearwater Lake crater is much more difficult to determine. In previous work a different method suggested that this crater is also around 290 million years old but this method is rather unreliable.

CHEOPS

Like the Pharaoh Cheops who ruled the ancient Old Kingdom of Egypt, ESA's space telescope *CHEOPS* could be someday ruling in the field of exoplanet hunting. It will be the first mission dedicated to search for transiting planets by means of ultrahigh precision photometry on bright stars known to host planets. See: <http://www.nasa.gov/roverchallenge> and <http://www.ustream.tv/channel/nasa-msfc>

RUSSIA AND THE ISS

Russia will continue using the International Space Station (ISS) until around 2024 and is planning to build its own orbital outpost using the existing ISS modules.

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> ***

THE NEW EDITION OF UNIVERSE IN THE CLASSROOM is about how one culture connects to the cosmos through a ceremony taking place both in the stars and here on Earth: "As it is above, it is below".

See: <http://astrosociety.org/publications/universe-in-the-classroom/>

Puzzles

FIND THE WORD

A R G O N S R A T S	ALTAR	LEAST
P N M N A M U H M L	APPEAR	MAVEN
P E A L T A R A E E	ARGON	MOONS
E V E N T E E S L A	CHEOPS	OTHER
A A P R E T E E A S	COMETS	PRAWNS
R M R I S S R R M Y	EARTH	ROVER
E O A T A E M M E H	EVENT	STARS
H O W G H A R M R I	GAMMA	TEAMS
T N N W G R O V E R	GASES	THREE
O S P O E H C S M E	HUMAN	WHERE

SCRAMBLED ASTRONOMY

THEY HAVE TAILS

NCUOOIR _ _ _ _ _
 RCNAE _ _ _ _ _
 TCMEOS _ _ _ _ _
 HEAWL _ _ _ _ _
 DRLZIA _ _ _ _ _

(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** *****

An explosive quartet - <http://sci.esa.int/jump.cfm?oid=55529>

Milky Way and beyond - <https://www.youtube.com/watch?v=i2ufCoTIDEE&feature=youtu.be>

The "Altar" - <http://scitechdaily.com/images/New-Image-of-the-Ara-OB1-Stellar-Association.jpg>

Comet Lovejoy series - <http://www.fnal.gov/pub/presspass/misc/2015/images/c2014-q4-lovejoy-des-medres.jpg>

SITE OF THE MONTH

Amazing facts about the Universe and space - <http://www.amazingspacefacts.50webs.com/>

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

Full Moon: 4/4 **Last Quarter:** 4/12 **New Moon:** 4/18 **First Quarter:** 4/25

Apogee: 4/1 8:42 AM 252,311 mi. (406,027 km) **Perigee:** 4/16 11:45 PM 224,341 mi. (361,017 km)

** The Full Moon was called the Egg Moon and Passover Moon. ** Best observing nights: 4/10 – 4/24

** The Total Lunar Eclipse on the 1st starts just before the Moon is setting in our area. **

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

JUPITER is high overhead and a great opportunity to see the famous Red Spot and the four moons. **VENUS** is in the SW twilight and is 78% Sun-lighted. **MARS** is low in the W to WNW after sunset and lost in the Sun's glare at month's end. **MERCURY** joins Mars after sunset on the 21st and they are only 1.3° apart on the 22nd. **SATURN** rises in the SE after 10 PM and moves to the SW by dawn.

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

<u>NAME</u>	<u>DATES</u>	<u>BEST (pre-dawn)</u>	<u>PER HOUR</u>	<u>WHERE TO LOOK</u>
LYRIDS	4/16 – 4/25	4/22	15 – 18	Northeast. Lyrids are bright, long-lasting meteors from Comet Thatcher. They were first recorded by Chinese astronomers in 687 BC.
VIRGINIDS (ALPHA)	3/10 – 5/6	4/7 – 4/18	5 – 10	Southeast. There are ten Virginid meteor showers occurring from January to May with most peaking in March and April. The ALPHA shower is the strongest.

** April has six minor showers – five or less per hour.

LOOK FOR: >>>> **CAPELLA** - big, bright and yellow dominating the northwestern sky. It is part of the **Auriga** pentagon of stars. >>>> **REGULUS** - A bright star overhead/SW that is at the end of the handle of the famous **Leo Sickle**. >>>> **ARCTURUS** – Overhead/ESE. It is the brightest star in the spring sky. Now in **Bootes**, it may be a fugitive from another constellation.

NEW QUASAR FOUND

Shining with the equivalent of 420 trillion Suns, a new quasar is seven times brighter than the most distant quasar known - it is 13 billion light years from Earth. It harbors a black hole with mass of 12 billion solar masses, proving it to be the most luminous quasar with the most massive black hole among all the known high **redshift** (very distant) quasars. The Milky Way galaxy's black hole with a mass of only 4 million solar masses at its center; the black hole that powers this new quasar is 3,000 times heavier.

Quasars are the most powerful objects beyond our Milky Way galaxy, beaming vast amounts of energy across space as the supermassive black hole in their center sucks in matter from its surroundings. Astronomers have discovered more than 200,000 quasars, with ages ranging from 0.7 billion years after the Big Bang to today.

GALAXY NGC2276-3c

An intriguing object, **NGC2276-3c**, is located in an arm of the spiral galaxy **NGC 2276**. It appears to be what astronomers call an "**intermediate-mass black hole**" (IMBH) - a class of black holes that falls between **small** and **super-massive**.

A remarkable property of **NGC2276-3c** is that it produced a powerful radio jet extending up to 2,000 light years. The region along the jet seems to be missing young stars. This is evidence that the IMBH may have had a strong influence on its environment, as the jet could have cleared out a cavity in the gas, suppressing the formation of new stars

ARTIFICIAL INTELLIGENCE – THE FUTURE?

Researchers have unveiled a software system which has taught itself to play 49 different video games and defeated human professionals -- a major step in the fast-developing **Artificial Intelligence** realm. Not only did the system give flesh-and-blood gamers a run for their money, it discovered tricks its own programmers didn't even know existed.

The advantage of these types of systems is that they can learn and adapt to unexpected things and also... the programmers or the system designers don't necessarily have to know the solution themselves in order for the machine to master that task.

MISSING BROWN DWARF

Astronomers have searched for a brown dwarf expected to be orbiting the unusual double star **V471 Tauri** and found – **nothing!** The surprising absence of this confidently predicted brown dwarf means that the conventional explanation for the odd behavior of **V471 Tauri** is wrong. The two stars are very close and orbit each other every 12 hours. Twice per orbit one star passes in front of the other but timings were not regular. This could be explained by assuming that there was a brown dwarf orbiting both stars whose gravitational pull was disturbing the orbits of the stars. Earlier, they also found hints that there might be a second small companion object.

ONE LUCKY COMET

The unusual comet that skimmed past the Sun on February 18-21 was interesting for two reasons. It's not part of any known family of comets.

Secondly, it is most interesting since the vast majority of comets that come close enough to the Sun to be seen in **SOHO** observations do not survive the trip. Known as **sungrazers**, they usually evaporate in the Sun's intense heat. But this comet made it to within 2.2 million miles of the Sun's surface - but survived the trip intact. See:

<https://www.youtube.com/watch?v=d2TgJP46Ayw>

Toward the end of the video, as the comet begins to develop a tail, the Sun releases an eruption of solar material - a **coronal mass ejection**, or CME, to add something more to the scene.

LOSS OF COOL GAS

Some galaxies are veritable star nurseries while others went barren years ago and now produce few if any new stars. Why that happens is a question that has dogged astronomers for years.

But after more than 20 years of research, a Michigan State University team has concluded that some of the cool gas clouds fall into the massive black holes at the center of galaxy clusters. That triggers the production of jets that reheat the gas like a blowtorch, preventing more stars from forming.

NEW-BORN STARS

Astronomers have found two clusters of stars forming at the very edge of the Milky Way galaxy. Using infrared survey images from WISE, the team discovered the clusters in dense clumps of gas called **giant molecular clouds**. This is the first time astronomers have found stars being born in such a location. See: <https://www.ras.org.uk/news-and-press/2592-astronomers-find-newborn-stars-at-the-edge-of-the-galaxy>

Astronomers also found an unusually small, distant cluster of a handful of stars located in the halo of our galaxy where such a small cluster of stars was never spotted before. They said that it is about ten times more distant than the average globular star cluster – and "It's a lost puppy"

IRAN'S SPACE DREAM

It was all smiles and cheers on Iran's National Day of Space Technology as the country unveiled a prototype of a spacecraft allegedly capable of taking a human to space.

Authorities say the trial test will be conducted this year bringing the country closer to sending a first astronaut into space.

NEW VIDEO OF THE SUN

Our view of the Sun is constantly changing as looping filaments and energetic flares fly outwards from its turbulent surface. It rotates about once every 27 days creating an ever-shifting picture of our star with its' face often marked by inky-black sunspots. See: <http://sci.esa.int/jump.cfm?oid=55523>

WATER ON MARS

According to NASA scientists, a primitive ocean on Mars held more water than Earth's Arctic Ocean. They propose that about 4.3 billion years ago, Mars would have had enough water to cover its entire surface to about 450 feet deep.

The water would have formed an ocean occupying almost half of Mars' northern hemisphere and in some regions reaching depths greater than a mile.

The polar ice caps now hold the planet's largest known water reservoir. See:

<http://youtu.be/WH8kHncLZwM>

SMAP

NASA's newest Earth-observing satellite, *SMAP*, will soon provide the best soil moisture maps ever obtained from space. *SMAP*'s minimum three-year mission will expand our understanding of soil moisture that links the water, energy and carbon cycles driving our planet.

MERGING BLACK HOLES

New research by an astrophysicist at The University of Texas at Dallas provides revelations about the most energetic event in the universe -- the merging of two orbiting black holes into a much larger black hole.

In a binary black hole system, two massive objects are orbiting each other and exerting forces on each other - producing **gravitational waves**.

The energy lost to gravitational waves causes the black holes to spiral closer together until they merge.

SPEEDY STAR

A fast-moving unbound star, **US708** discovered by astronomers at Queen's University Belfast has broken the galactic speed record. It is travelling at 745 miles per second - the fastest speed ever recorded for such an object in our galaxy. The star will eventually leave the Milky Way.

US708 is believed to have once been part of a double-star solar system, which also included a massive white dwarf star. The white dwarf is thought to have turned into a '*thermonuclear supernovae*' and exploded, kicking **US708** and sending it hurtling across space.

GANYMEDE'S OCEAN

NASA's Hubble Space Telescope has the best evidence yet for an underground saltwater ocean on **Ganymede!** (Jupiter's largest moon) - a subterranean ocean thought to have more water than all the water on Earth's surface.

Ganymede is the largest moon in our solar system, and the only moon with its own magnetic field which causes aurorae - *ribbons of glowing, hot electrified gas*. When Jupiter's magnetic field changes, the aurorae on Ganymede also change, "rocking" back and forth. By watching the rocking motion of two aurorae, scientists were able to determine that a large amount of saltwater exists beneath Ganymede's crust and affecting its magnetic field.

MAGNETIC RECONNECTION

NASA's four *Magnetospheric Multiscale* (MMS) spacecraft are in orbit to begin the first space mission dedicated to the study of a phenomenon called **magnetic reconnection**. It occurs when magnetic fields connect, disconnect, and reconfigure explosively, releasing bursts of energy that can reach the order of billions of megatons of TNT.

These bursts of energy can send particles surging through space near the speed of light and are believed to be the catalyst for some of the most powerful explosions in our solar system, disrupting electrical power grids, communications networks, and GPS navigation.

POTENTIAL FOR LIFE

Tiny grains of rock detected by the *Cassini* spacecraft point to hydrothermal activity on the south pole ocean floor of Saturn's icy moon **Enceladus**.

Following a four-year study of Cassini data combined with computer simulations and laboratory experiments, scientists have been able to gain deeper insights into the chemical reactions taking place on the floor at the ocean's base.

A scientist said "*This moon has all the ingredients – water, heat, and minerals – to support habitability in the outer Solar System, confirming the astrobiological potential of Enceladus.*"

GK PERSEI

GK Persei is an object that became a sensation in the astronomical world in 1901 when it suddenly appeared as one of the brightest stars in the sky. Astronomers used Chandra to observe the differences in **GK Persei** over a span of nearly 14 years, providing clues to the dynamics of other, much larger stellar eruptions.

Today, astronomers cite **GK Persei** as an example of a "classical nova," an outburst produced by a thermonuclear explosion on the surface of a white dwarf star, the dense remnant of a Sun-like star.

See: <http://Chandra/Harvard.edu/photo/2015/gkper/>

ENOUGH DUST TO MAKE PLANETS

Using *SOFIA*, an international scientific team discovered that supernovae are capable of producing a substantial amount of the material from which planets like Earth can form. Their conclusion is based on detailed infrared images of an interstellar dust cloud known as **Supernova Remnant Sagittarius A East**, or SNR Sgr A East and said: "Our observations reveal a cloud produced by a super-nova explosion 10,000 years ago contains enough dust to make 7,000 Earths." "The dust survived the shock waves from the supernova explosion, and is now flowing into the interstellar medium to become part of the seed material' for new stars and planets."

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

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