THE YOUNG ASTRONOMERS NEWSLETTER

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NCSSM CHOSEN FOR FINAL ROUND

The North Carolina School of Science and Mathematics in Durham, N.C. is one of 20 high school teams chosen to compete in the final round of the 2012-2013 Spirit of Innovation Challenge.

The annual competition challenges teams of **students ages 13-18 from around the world** to combine innovation and entrepreneurship along with STEM (science, technology, engineering and math) to create commercially-viable products benefitting humanity.See: **www.conradawards.org**

******* *CONGRATULATIONS NCSSM* *******

STAR BURSTS

A mysterious infant star behaves like a strobe light. Every 25.34 days, the object (**LRLL 54361**) unleashes a burst of bright light. Although a similar phenomenon has been observed in two other stellar objects, this is the most powerful beacon seen to date.

Astronomers think the light flashes are caused by material suddenly being dumped onto the growing stars, and a blast of radiation is unleashed each time the stars get close to each other in their orbits. This has been seen in late stages of other star births but not in a system with such intensity and regularity. See:

http://hubblesite.org/news/2013/04

LETHAL ASTEROID

Less than a month ago, NASA announced that Earth is safe from asteroid Apophis which was expected to collide with our planet in 2036, but the chances are now one in a million.

Despite that good news, Russian astronomers have discovered another asteroid which is on track to crash into Earth in 2106. Based on its size, they estimate that the impact's energy would equate to 25,000 atomic bombs all going off at once.

PLUTO'S MOONS

The team that discovered the two additional moons of Pluto is asking the public to vote on potential names for these distant worlds. In accordance with tradition, the names of Pluto's moons are taken from Greek and Roman mythology and relate to the underworld and Hades (Pluto's other moons are: CHARON, NIX and HYDRA).

Potential names are ORPHEUS, HERCULES, and CERBURUS. See: **http://plutorocks.seti.org/**

KEPLER 37b

Kepler mission scientists have discovered a new planetary system, ***Kepler-37***, that is home to the smallest planet yet found around a star similar to our Sun. They believe that the planet does not have an atmosphere and cannot support life as we know it.

Kepler 37b is slightly larger than our Moon and almost certainly rocky in composition. ***Kepler-37*** is located in the constellation **Lyra**.

SEAGULL NEBULA

An international team of astronomers has captured the first infrared image of a curved cloud of dust extending over a hole in a disk around a young star. Hot new stars form in these clouds with intense ultraviolet radiation causing the dust clouds to glow brightly. See the **Seagull Nebula** at:

http://www.eso.org/public/images/eso1237c/

OORT CLOUD VISITOR

Comet **Pan-STARRS** will pass about 100 million miles from Earth as it briefly dips inside Mercury's orbit. Most experts expect it to be about as bright as the stars in the Big Dipper. The best dates to look for **Pan-STARRS** are March 12th and 13th when it emerges in the western sunset sky not far from the crescent Moon - framed together in the blue twilight.

ASTEROID DESTROYER

Russia is planning to use intercontinental ballistic missiles to deliver "destroyer" spacecraft to celestial bodies that pose a threat to Earth. Russian scientists suggest using a device called **Kapkan** to solve the problem of destroying an asteroid or swaying it off to a safe distance from Earth. A special reconnaissance spacecraft may be used to study the structure and chemical composition of an asteroid.

MESSIER 106

Messier 106 is one of the brightest and nearest spiral galaxies to our own. **Messier 106** has a number of secrets. At its heart is a supermassive black hole that is actively gobbling up material that spirals toward the black hole, heats up and emits powerful radiation.

This galaxy has another startling feature – it has four spiral arms. See: **http://www.cieletespace.fr/files/image_du_jour/M106_12i80_0.jpg**

RUSSIA'S METEOR STRIKE

Below-audible sound waves (infrasound) from the meteor that broke up over Russia's Ural mountains on February 15th were the largest ever recorded. The blast was detected by 17 infrasound stations which track atomic blasts all across Earth - the furthest station to record the sub-audible sound was in Antarctica.

NASA'S MSIP PROGRAM

Since it began in 2002, more than 35,000 students in public, private, urban, suburban and rural schools of all sizes, grade levels and student abilities across America have participated in NASA's **Mars Student Imaging Project**. It enables students from fifth grade through college to take an image of the Red Planet's surface with a camera aboard NASA's *Mars Odyssey*. Students study the image to answer their research questions.

In 2010, a seventh-grade MSIP class in rural California discovered a previously unknown cave on Mars and a student presented their results at a major planetary science conference.

See: **http://mars.nasa.gov/msip**

The Sky Tonight? **http://www.skymaps.com/downloads.html** *and also*
http://amazing-space.stsci.edu/tonights_sky/

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

HABITABLE PLANETS - The idea of an Earth-like planet suggests a world with oceans, breathable air, and even life, but astronomers are far from getting this information because exoplanets are very far away for our current instruments. As of now, the definition of Earth-like planets is limited by what we can measure - their orbit and size. Any exoplanet around a Sun-like star with a similar orbit and size as Earth is considered an Earth-like world. But only a few of the nearly 900 confirmed exoplanets barely fit as candidates for potentially habitable worlds.

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SCIWORKS – for information and planetarium schedules call: 767-6730

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PUZZLES

Find The Word

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

BASED, BEING, BURST, CHANCE, CLOUD, CRASH, DATES, EMITS, FIRST, GIVEN, GREEK, HADES, HYDRA, IMPACTS, NCSSM, SECRETS, STARS, TAKEN, TEAMS, TRACK

Scrambled Astronomy:

MARCH PLANETS

SPENSER __ __ __ __ __ __ __

SCURVO __ __ __ __ __ __

OXFARN __ __ __ __ __ __

GIVOR __ __ __ __ __

STAVE __ __ __ __ __

(Answers below)

****** INTERNET SITES ******

The "Rose Nebula" - **http://www.noao.edu/image_gallery/html/im1139.html**
The Sky this week – **http://www.Astronomy.com/skythisweek**

SITE OF THE MONTH
Hubblesite - **http://hubblesite.org**

****** MARCH MOON ******

Last Quarter 3/4 **New Moon:** 3/11 **First Quarter:** 3/19 **Full Moon**: 3/27

Perigee: 3/5 6:10 PM 223,723 mi. (369957 km)
Apogee: 3/18 11:13 PM 251,196 mi, (404261 km)
Perigee: 3/30 11:31 PM 228,356 mi. (367503 km)

** **The full moon** was called the Magpie Moon, the Crow Moon, and Worm Moon.

** **Best observing nights**: 3/1 – 3/13

** **March 20th is the first day of Spring**. **

****** PLANETS IN MARCH ******

VENUS moves behind the Sun on the 28th (*superior* conjunction) and returns in late April. **JUPITER** is in the evening sky all month. It sets about six hours after the Sun by mid-March. **MARS** sets in the southwest by mid-evening twilight by the 8th. **MERCURY** is in front of the Sun on the 4th (*inferior conjunction*) and appears in the eastern morning sky by the middle of March. It is at its least favorable viewing for 2013. **SATURN** rises about 2 hours after sunset in the east and is in the southwest in morning twilight. **URANUS** is behind the Sun on the 28th.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK

Except for one shower in April and one in May, meteor shower activity remains poor through June. This month's **Eta Virginids** is a typical minor shower with a two-per-hour forecast (plus a possible "few more"). There are eight other minor showers in March and there is one notable feature for this period - an unusual number of sporadic fireballs every few nights.

LOOK FOR: **>>>>>** **Jupiter** and the **Moon** in another close pass: they will be only about 2° apart in the southwest an hour after sunset on the 17th. **>>>>>** **Neptune** – On the 31st, it will be very low near the eastern horizon 30 minutes before sunrise in the twilight sky – look just above Mercury. Neptune is very faint but can be seen with binoculars or a telescope. **>>>>>** Comet **Pan-STARRS** in the west, - to the lower left of the Moon on March 12th and below the Moon on the 13th.

MANATEE NEBULA

A new view of a 20,000-year old supernova remnant demonstrates the upgraded imaging power of the National Science Foundation's (NSF) Karl G. Jansky Very Large Array (VLA) and provides more clues to the history of this giant cloud that resembles a beloved endangered species, the Florida Manatee.

At nearly 700 light years across, it covers two degrees on the sky - that's the span of four full Moons! Aquila, exploded as a supernova around twenty thousand years ago, sending its outer gases in an expanding bubble. See: **http://www.sci.news.com/astronomy/article00832.html**

BLACK HOLE GROWTH

Australian astronomers have discovered how supermassive black holes grow and it's not what was expected. For years, scientists had believed that supermassive black holes increased their mass in step with the growth of their host galaxy. However, new observations have revealed a very different behavior.

Within galaxies, there is a competition for the available gas for the formation of new stars or feeding the central black hole. Models and theories have assigned a fixed fraction of the gas to each process - a ratio of black hole mass to galaxy mass.

But the astronomers say that each ten-fold increase of a galaxy's stellar mass is associated with a much larger 100-fold increase in its black hole mass.

The opposite behavior exists among the tightly packed clusters of stars that are observed at the centers of smaller galaxies and disk galaxies like our Milky Way.

THE SUN'S CORONA

NASA's *High Resolution Coronal Imager* space telescope has given scientists the first clear evidence of energy transfer from the Sun's magnetic field to the solar atmosphere or corona. This process, known as solar braiding, has been theorized by researchers, but remained unobserved until now.

Scientists have tried for decades to understand how the Sun's atmosphere is heated to millions of degrees. Many stars in the universe have magnetic fields. The evolution of these fields is used to explain the emission of the star and any events like flares. Understanding how the magnetic field of the sun heats the solar atmosphere helps explain how all magnetized stars evolve.

TW HYDRAE

A star thought to have passed the age at which it can form planets may be creating new worlds. The disk of material surrounding surprising star **TW Hydrae** may be massive enough to make even more planets than we have in our own solar system.

Scientists used the *Herschel* space telescope to pick out **TW Hydrae**'s spectral signature of gas molecules containing deuterium, a heavier version of hydrogen that emits light at longer, far-infrared wavelengths that Herschel is equipped to see. This enabled astronomers to obtain the disk's weight with the highest precision yet.

The findings demonstrate the more precise method for weighing planet-forming disks. Planets are born out of material swirling around young stars, and the mass of this material is a key factor controlling their formation.

NGC 411

Globular clusters look like **NGC 411** but it is not a globular cluster and its stars are not old. It is an open cluster in the *Small Magellanic Cloud*, a small sister galaxy near our own. And the stars in **NGC 411** are all roughly the same age, having formed at one time from a cloud of gas. See:

http:/www.nasa.gov/mission_pages/hubble/science/ngc411.html

INSECT NAVIGATION

Dung beetles keep their "noses to the ground" but they are actually incredibly attuned to the sky. A report shows that even on the darkest of nights, African ball-rolling insects are guided by the soft glow of the Milky Way and manage to orientate along straight paths.

While birds and humans are known to navigate by the stars, the discovery is the first convincing evidence for such abilities in insects and also the first known example of any animal using the Milky Way.

Swedish researcher Marie Dacke said: "Dung beetles are known to use the Sun, the moon, and their polarized light to roll their balls of dung in straight paths."

A "SWITCHING" PULSAR

New observations of a highly variable pulsar are puzzling astronomers. Within only a few seconds, its radio emission is known to 'switch on and off' periodically, and. it also exhibits the same behavior in reverse when observed at X-ray wavelengths. It is the first time that a switching X-ray emission has been detected from a pulsar, and the properties of this emission are not understood.

Few classes of astronomical objects are as baffling as pulsars. They were discovered as flickering sources of radio waves and soon after interpreted as rapidly rotating and strongly magnetized neutron stars.

Even though about 2000 pulsars have been found since the first was discovered in 1967, a detailed understanding of the mechanisms that power them still eludes astronomers.

UNUSUAL SUPERNOVA

In 1901, the star ***GK Persei*** in the Perseus constellation gave off a powerful explosion that has not stopped growing and astonishing ever since. And contrary to predictions, has hardly slowed down its speed of up to 1,000 km/sec after all this time. The surprising thing is that the explosion created the remaining material in gaseous knots which became visible in 1916.

Long before the explosion in 1901, more than one hundred thousand years ago, GK Persei had already undergone a massive transformation from a red giant to a white dwarf. This process expelled its external layers forming a planetary nebula, which is a giant gas cloud within which the nova is now growing.

LAKE ON MARS ?

Scientists believe that a large crater discovered on Mars might have been a lake several billion years ago. It has layers of clay and carbonate minerals in the walls of the crater - substances that form in the ground only after contact with water.

There are no traces of washouts on the crater's walls, meaning that most likely, no water has ever come into the crater from outside. If the crater really was once full of water, it probably penetrated from underground.

BETELGEUSE

In a new *Herschel* space observatory image, there is a bar and multiple arcs around **Betelgeuse**, the nearest red supergiant star to Earth. The star and its arc-shaped shields could collide with an intriguing dusty "wall" in 5000 years. **Betelgeuse** rides on the shoulder of ***Orion - The Hunter*** and is the orange-red star above and to the left of Orion's famous three-star belt.

This star is likely on its way to a spectacular supernova explosion, having already swelled into a red supergiant and shed a significant fraction of its outer layers. See: **http://herschel.cf.ac.uk/files/ Betegeuse_Herschel_large.jpg**

MERGING BINARY STARS

Astrophysicists have long debated what happens when binary stars – two stars orbiting each other, come together in a common "envelope". More than half of all stars in the universe are believed to be "binary stars" and researchers had no idea what a common envelope event would look like. The two stars may merge into a single star, or transform into an exotic short-period binary.

Canadian astrophysicist Natalie Ivanova found that hot and ionized material in a common envelope cools and then releases energy in the form of a bright red outburst of light. She then linked the envelope outbursts with recently discovered luminous red novae, mysterious transients brighter that typical novae but less than supernovae.

A BABY BINARY

The *Spitzer* and *Hubble* space telescopes have teamed up to uncover a mysterious infant star that behaves like a strobe light. Every 25.34 days, the object (LRLL 54361) unleashes a burst of bright light.

Although a similar phenomenon has been observed in two other stellar objects, this is the most powerful beacon seen to date.

Astronomers think the light flashes are caused by material suddenly being dumped onto the growing stars, and a blast of radiation is unleashed each time the stars get close to each other in their orbits. This has been seen in late stages of other star births but not in a system with such intensity and regularity.

See: **http://hubblesite.org/news/2013/04**

END OF CLOVIS ?

Comet explosions did not end the prehistoric human culture (Clovis) in North America 13,000 years ago according to researchers

They have found evidence which rebuts the belief that a large impact or air burst caused a significant and abrupt change to the Earth's climate and terminated the Clovis culture.

No impact craters from that time period and of an appropriate size have been discovered, and, no shocked material and other features of impact have been found.

RED DWARFS

Using data from the *Kepler* space telescope, astronomers estimate that six percent of the red dwarf stars in the Milky Way galaxy have Earth-size planets in a "habitable zone" – the range of distances from a star where the surface temperature of an orbiting planet might be suitable for liquid water. *(See page 2)* The majority of the Sun's closest neighbors are red dwarfs.

BLACK HOLES MEASUREMENTS

A new way of measuring the mass of black holes could revolutionize our understanding of how they form and help to shape galaxies. The process can spot the telltale tracer of carbon monoxide within the cloud of gas circling a supermassive black hole at the center of a distant galaxy. By detecting the velocity of the spinning gas scientists can determine the mass of the black hole.

ORION

Orion – the Hunter constellation is visible in the evening skies from December through April. It appears to be tranquil and still but lying in Orion's sword, below his three-star belt, is what appears to be a slightly fuzzy star. That "star" is actually a turbulent area of stellar birth - a tangle of clouds and stars. See:

http://apod.nasa.gov/apod/ap130213.html

MILKY WAY BLACK HOLE

New data from the *Chandra X-ray Observatory* suggests that a highly distorted supernova remnant may contain the most recent black hole formed in the Milky Way galaxy. The remnant appears to be the product of a rare explosion in which matter is ejected at high speeds along the poles of a rotating star. The remnant, called **W49B**, is about a thousand years old.

Usually when a massive star runs out of fuel, the central region of the star collapses and triggers a chain of events that quickly ends in a supernova explosion with stellar material blasting away more or less evenly in all directions. See: **http://www.nasa.gov/chandra**

"PRE-SUPERNOVA"?

Before they become a supernova, some large stars undergo a sort of "mini-explosion", throwing off a chunk of their material into space. Actual observations of this activity have been rare. In some new research, scientists found such an outburst taking place a month before a massive star underwent a supernova explosion.

This helped to clarify the series of events leading up to the supernova, and providined insight into the processes taking place in the cores of massive stars as they progress toward the final stage of their lives.

JANTAR MANTAR OBSERVATORY

The Jaipur, India observatory was built in 1734 and consists of fourteen major geometric devices for measuring time, predicting eclipses, tracking stars in their orbits, ascertaining the declinations of planets, and determining celestial altitudes.

Each instrument has an astronomical scale and bronze tablets – all extremely accurate. The Samrat Jantar, the largest instrument at 90 feet tall, is a "sundial" built of stone and marble.

COSMIC RAY SOURCE

A new *Fermi* study has revealed the first clear-cut evidence the expanding debris of exploded stars produces some of the fastest-moving matter in the universe. Scientists have been trying to find the sources of high-energy cosmic rays since their discovery a century ago and now have conclusive proof supernova remnants, long the prime suspects, really do accelerate cosmic rays to almost the speed of light.

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

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