YOUNG ASTRONOMERS NEWSLETTER

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NC – BE PROUD!

NASA has honored 12 Explorer Schools nationwide (including **Ferndale Middle School** in High Point) for their contributions to science, technology, engineering or mathematics education in the 2012-2013 school-years. They were awarded a NASA certificate of recognition and an American flag that was flown in space.

In addition, **Cardinal Gibbons High School** in Raleigh was one of six schools also receiving a $5,000 grant to help implement a STEM project in their classrooms by April 2014. See:

http://explorerschools.nasa.gov

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W26 – A DYING STAR

The biggest known star is in its death throes and will eventually explode. Astronomers said the star located in the constellation of **Ara**, -The Altar. **W26**, first observed in 1998, is a "red supergiant", a star that is as big as it is short-lived. **W26** is becoming unstable and shedding its outer layers

Stars of this kind typically have lifetimes of less than a few million years before they exhaust their nuclear fuel and explode as supernovae.

EARTH VISITORS

A 15-meter "asteroid", similar to the object that exploded above Russia in February was detected just hours before it narrowly missed Earth October 12th. It flew within 36,000 miles of Earth's surface, below the orbit of geostationary satellites. Russian scientists also considered the possibility of it being space debris.

And ----

A potentially catastrophic asteroid has been discovered by astronomers, who say there's a slim chance that the 410-meter-wide minor planet will crash into Earth in 2032, creating a blast 50 times greater than the biggest nuclear bomb. The asteroid has been added to the List of the Potentially Hazardous Asteroids, which includes celestial bodies with orbits closer than 7.5 million kilometers from the Earth's orbit.

BRIGHTEST SUPERNOVAE

Astronomers at Queen's University Belfast have shed new light on the rarest and brightest exploding stars ever discovered in the universe. They say that the most luminous supernovae are powered by small and incredibly dense neutron stars, with gigantic magnetic fields that spin hundreds of times a second.

This is contrary to existing theories which suggest that the brightest supernovae are caused by super-massive stars exploding, and that their origins may be better explained by a type of explosion within the star's core which creates a smaller but extremely dense and rapidly spinning magnetic star.

A TILTED PLANETARY ORBIT

Using Kepler telescope data, an international team of astronomers has discovered a distant planetary system with three planets orbiting at a severe tilt to their host star. A big outer planet seems to be maintaining the tilted orbits of the two inner planets. Tilted orbits had also been found in planetary systems featuring a "hot Jupiter,"

A TYPE Ib SUPERNOVA

A robotic supernova search recorded a new transient source in galaxy **NGC 5806** that was not there the previous evening. It was a **Type Ib supernovae** that seemed to come from nowhere. But after extensive research of Hubble archives, supernova **iPTF13bvn** surprised astrophysicists by revealing its parentage.

1b explosions appear in surveys, but a search back through data usually results in no evidence of a source, likely because they are simply too faint.

INDIA'S MARS MISSION

Scientists in India have set November 5th for the launch of India's first mission to Mars. It had been postponed due to problems in positioning a seaborne tracking system. Two Indian ships have now been sent to Fiji in the Pacific Ocean to enable constant tracking of the rocket.

EXOPLANET COUNT

The count of exoplanets circling distant stars has passed 1,000. 11 of the newly confirmed exoplanets orbit stars with periods of between 8 days to less than 2 days, making them all "hot-Jupiters" and not remotely inhabitable. After further study some may be reclassified as brown dwarfs, or "failed stars," which would take them off the exoplanet count list.

ASTEROID TRACKING

Russia's state-run space agency and the national academy of sciences have announced they are going to combine "thinking" on a project to ward off deadly asteroids that may threaten the Earth. The team will look closely at the asteroid threat forecast for 2032 when the asteroid recently spotted by Crimean astronomers is been estimated to lie directly in Earth's path.

SPACE CANNON

Japanese scientists said they have successfully tested their new space cannon designed to blast a crater in an asteroid and find out what it is made of. The *Japan Aerospace Exploration Agency* (JAXA) said the huge weapon would fire a metal bullet at the surface of asteroid **1999JU3** in 2018.

A NEW LOOK

A new camera on the WIYN 3.5-meter telescope at Kitt Peak National Observatory has imaged the Whirlpool Galaxy. It captured the entire galaxy and its companion in one pointing, something that even the *Hubble Space Telescope* cannot do. See: **http://www.noao.edu/news/2013/img/m51_zoom_1600x1000.jpg**

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 * * * ***

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SCIENTISTS NEED YOU

The Milky Way Project is currently working with data taken from two space surveys and looking for **bubbles** -- part of the life cycle of stars. Some bubbles have already been found – more are needed to build up a comprehensive view of not only these bubbles, but our galaxy as a whole.

The project leaders are asking for help in mapping star formation in our galaxy. So how can you help? Using their bubble-drawing interface, you can find bubbles and note any important or unusual characteristics. For example, if you can see what looks like a knot in the bubble -- it might tell something about how the bubble is affecting star formation in the region. If you see a star cluster, flag it! We hope to map the location of these clusters - many of which have not been located before. See: **http://www.milkywayproject.org/needyou**

PUZZLES

Find The Word

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

COMET LIVED
CRATER METAL
DEADLY METER
DEBRIS MILKY
DENSE MINOR
DYING SMALL
EARTH SPACE
FLOWN THEIR
LIGHT THESE
LIMIT TILTED

Scrambled Astronomy:

BRIGHTEST STARS NOW

AVGE __ __ __ __

ACELPLA __ __ __ __ __ __ __

ILEGR __ __ __ __ __

RTLAAI __ __ __ __ __ __

EEBND __ __ __ __ __

(Answers below)

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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 * * * * * *

Comets, info and basics - **https://sites.google.com/site/robsastropics/comets**
NEOK12 Education site **- http://www.neok12.com/**
SITE OF THE MONTH
Lunar and Planetary Institute - **http://www.lpi.usra.edu/**

* * * * * * NOVEMBER MOON * * * * * *

New Moon: 11/3 **First Quarter:** 11/10 **Full Moon**: 11/17 **Last Quarter:** 11/25
Perigee: 11/6 4:22 AM 227,025 mi. (365361 km) **Apogee**: 11/22 4:49 AM 251,932 mi. (404445 km)
****** The **November** Full Moon was called the **Frosty Moon** and **Beaver Moon**.
**** Best observing nights**: 11/1 – 11/9, 11/24 – 11/30

* * * * * * PLANETS IN NOVEMBER * * * * * *

NEPTUNE is in the S and can be seen as a blue-gray disk between the horizon and overhead. **VENUS** is low in the SSW sky after sunset. **MARS** is above the eastern horizon after 1 AM. **JUPITER** is in the E before midnight and rising earlier each evening. It is half-high in the SW before dawn **MERCURY** is in front of the Sun (*inferior conjunction*) on the 1st and visible again after the 8tth, before sunrise in the ESE. **SATURN** is in the ESE before dawn. **URANUS** – In the S, half-high and to the S of the Pegasus Great Square – "dim, and blue-green, in the evening around 9 PM /*Astronomy Magazine*".

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

NAME	DATES	BEST NIGHTS	PER HOUR	WHERE TO LOOK
LEONIDS	11/13 – 11/21	11/18 (2 AM)	10 - 15	North – northeast, Leo is

below the horizon. The Leonids move very fast and have produced some of the most spectacular meteor displays in history. About every 33 years, the Leonids enter a phase of enhanced activity that accompanies the return of its parent comet Tempel-Tuttle when rates can amount to hundreds and even thousands of meteors per hour.

LOOK FOR: >>>>> Mercury, Saturn and Comet **Ison** in the ESE on the 23rd, 40 minutes before sunrise. The planets stay close together to the month's end but **Ison** is only 725,000 miles from the Sun's surface on the 28th and could burn up.

FIREBALLS

More than a dozen mid-USA states saw brilliant fire balls on September 26th and 27th. Analysts believe the last one was a meter-class space rock that exploded almost directly above Columbus, Ohio.

NASA's Meteoroid Environment Office reported: "This was a very bright event. Flares saturated our meteor cameras, and made determination of the end point of the fireball's flight virtually impossible."

SPITZER

NASA's *Spitzer Space Telescope* has evolved into a premier observatory for the study of exoplanets. While the engineers and scientists who built Spitzer did not have this goal in mind, their visionary work made this capability possible.

Spitzer uses infrared light that can easily pass through stray cosmic gas and dust, allowing researchers to peer into dusty stellar nurseries, the centers of galaxies, and newly forming planetary systems. And, when an exoplanet crosses or "transits" in front of its star, it blocks out a fraction of the starlight revealing the size the star. See: **http://www.spitzer.caltech.edu/**

SUNJAMMER

NASA officials, team partners, and local students were on hand to witness a key milestone for the ***Sunjammer*** Mission as it successfully deployed a quadrant of its solar sail - a critical design component that will eventually herald an era of propellantless spacecraft**.**

Sunjammer will be the largest solar sail ever flown using sunlight to maneuver in space. Solar sails have the potential to be a game changer for space exploration as the low-cost, propellantless and highly maneuverable sail craft will enable future satellites and spacecraft to journey throughout the solar system and beyond.

CAMBRIAN EXPLOSION

According to a new study, the explosion of animal life on Earth around 520 million years ago was the result of a combination of factors rather than a single cause.

Among the weird and wonderful creatures to emerge in the early Cambrian was **Anomalocaris**, the free-swimming, three-foot long top predator of the time with a mouth composed of 32 overlapping plates that could constrict to crush prey. It is distantly related to modern arthropods, including crabs and lobsters. Animals appeared very abruptly and in great diversity - nearly all of the major groups of animals that we recognize today.

EGYPT'S BLACK PEBBLE

A comet exploded over Egypt 28 million years ago leaving behind a "mysterious black pebble" -- the first-ever comet material of this sort found on Earth.

The one-ounce pebble has a clear "extraterrestrial component" yet was distinctly different from meteorites that are about three percent carbon -- it contains 65 percent carbon. Chemical tests led experts to "the conclusion that it represented the first known specimen of **a comet nucleus**. Previous comet material has been found in dust in the Earth's atmosphere or dust in Antarctic ice. Though only one was discovered, many more such stones are thought to litter the desert in the 3,700-mile area where the comet struck.

PRAWN NEBULA

A glowing jumble of gas clouds make up a huge stellar nursery nicknamed **the Prawn Nebula**. Located in the constellation of ***Scorpius*** (The Scorpion), the faint nebula (**IC 4628** is a huge region filled with gas and clumps of dark dust.)

These gas clouds are producing brilliant hot young stars that, in white light, appear blue-white but also emit intense radiation in ultraviolet. See:**http://www.eso.org/public/archives/images/screen/eso1340a.jpg**

A *CSIRO* FIND

Using *CSIRO*, an international team of astronomers caught a small star (a pulsar) undergoing a radical transformation emitting X-rays and extremely fast radio pulses.

The pulsar has a tiny companion star, with about a fifth the mass of the Sun -- the companion is fierce, pounding the pulsar with streams of matter. Sometimes the stream swells to a flood, overwhelming the pulsar's protective 'force field'.

When the stream hits the pulsar's surface its energy is released as blasts of X-rays. Eventually the torrent slackens. Once again the pulsar's magnetic field re-asserts itself and fends off the companion's attacks.

SPACE FENCE

The United States has shut down the "Space Fence", a key component of its space surveillance network (since 1960) that tracks satellites and "space junk" orbiting the Earth. Some experts believe that all that talk of the Space Fence closure is an attempt by the industrial lobby to press Congress and the Pentagon into approving $3 billion in funds for a space surveillance network of a new generation.

RUSSIAN METEORITE

Divers have recovered what is believed to be the largest rock (meteorite) found so far from a meteoroid that exploded over Russia in February.

A spokesman for the town of Chebarkul, near the Urals lake where the 10 1/2-pound rock was retrieved, said it is the largest piece found so far of the meteoroid that recently broke up over the Chelyabinsk Region

M60-UCD1

According to the latest study, the newly discovered **M60-UCD1** galaxy in the Virgo cluster of galaxies is about 10 billion years old and is the densest galaxy ever found. An interesting feature of the galaxy is that roughly about half of its mass is concentrated in a space that has a radius of just 80 light years.

Astronomers also found that the galaxy has a bright X-ray source at its center that they believe is a giant black hole with an equivalent mass of 10 million Suns.

They are trying to determine if the **M60-UCD1** type of galaxy are born as jam-packed star clusters or if they get smaller because they have stars ripped away from them. See: **http://www.nasa.gov/Chandra**

87 SYLVIA

87 Sylvia is one of the largest main-belt asteroids and is the first asteroid known to possess more than one moon. (Its two moons have been named Romulus and Remus.) **87 Sylvia** is porous - from 25% to as much as 60% is empty space.

MARS

o ***Tests for life -*** The quest for evidence of life on Mars could be more difficult than scientists previously thought. A scientific paper details the investigation of a chemical in the Martian soil that interferes with the techniques used by the *Curiosity* rover to test for traces of life. The chemical causes the evidence to burn away during the tests.

The rover found evidence of **perchlorate** - a salt comprised of chlorine and oxygen. When *Curiosity* heats a scoop of Martian soil to test it for organic carbon, perchlorates can cause a chemical reaction that destroys organic carbon.

In future tests, scientists can calculate how much organic carbon burnt away with the decomposing perchlorates in order to estimate the original amount of organic material in the soil.

o ***Mugearites -*** The first rock that scientists analyzed on Mars with a pair of chemical instruments aboard the *Curiosity* rover was a 34.4-inch tall pyramid-shaped rock called a "**mugearite**" that is unlike any other Martian igneous rock ever found. Dubbed "Jake_M" (after JPL's Jake Matijevic), the rock is similar to **mugearites** found on Earth, typically on ocean floors.

o ***Curiosity* finds water** - The first scoop of Martian soil analyzed by NASA's *Curiosity* rover held about two percent water, offering hope for humans who someday explore the Red Planet. While this is not as much water you will find in Earth soil, it's substantial.

Previous rovers and orbiters have found evidence that Mars likely had water in the form of ice, below-ground reservoirs, or even the drinkable kind -- perhaps billions of years ago.

But the latest evidence comes from *Curiosity*'s suite of 10 of the most sophisticated instruments ever sent to scour the Martian surface.

o ***Supervolcanoes -*** U.S. and British researchers suggest that some of Mars' deep craters were actually ancient supervolcanoes that may have changed the planet's climate.

One of them, Eden Patera, is more than a mile deep and almost 43 miles wide. Several irregularly shaped craters in the Arabia Terra region have a structure similar to supervolcanoes on Earth.

o ***Mars meteorites*** - NASA's Curiosity rover on Mars has found evidence confirming some meteorites found on Earth did in fact come from the Red Planet. A key new measurement of Mars' atmosphere by the rover provides the most definitive evidence yet of Mars as the origin of many meteorites that have landed on the Earth.

REFLECTION NEBULA

The **Toby Jug Nebula**, ***IC 2220***, is located in the southern constellation of **Carina** (The Ship's Keel. It is an example of a ***reflection nebula*** - a cloud of gas and dust illuminated from within by a star called **HD 65750**. The star is a red giant in an advanced stage of its life.

The nebula was created by the star losing part of its mass and forming a cloud of gas and dust as the material cools. This phase of a star's life is short-lived and such objects are rare. See:

http://www.robgendlerastropics.com/IC2220L.html

DIAMONDS

o ***The "diamond planet"*** - An exoplanet, believed to be the first-ever discovered to consist largely of diamond, may in fact be of less exotic nature. A University of Arizona team concluded that carbon appears to be less abundant in relation to oxygen in the planet's host star and by extension, perhaps the planet. .

o ***Diamonds***, big enough to grace a necklace or bracelet, may be raining down in the atmospheres of Saturn and Jupiter, U.S. scientists say. When lightning storms high in the atmosphere turn methane into soot -- carbon -- which as it falls into layers of the atmosphere with increasing pressure hardens into chunks of graphite and then diamond.

PLANET WITH NO STAR

A young planet free-floating through the Milky Way galaxy instead of orbiting a star is practically a newborn in cosmic terms, astronomers say. **PSO J318.5-22**, the planet without a host star, has a mass only six times that of Jupiter. It formed only 12 million years ago -- a newborn in planet lifetimes. One of the lowest-mass free-floating objects discovered to date, the planet's most distinguishing aspects is its similar mass, color and energy output to planets orbiting young stars.

NAIAD

Neptune's tiny, innermost moon, **Naiad**, has been seen for the first time since it was discovered by Voyager's cameras in 1989. Neptune is 2 million times brighter than Naiad, and the two are separated by only one "arcsecond" - the width of a human hair from 50 feet away. See: **http://www.spxdaily.com/images-lg/naiad-circled-left-neptune-moons-lg.jpg**

EXOPLANET FIND

Astronomers analyzed the remains of a distant, broken-apart planet and found signs of water and a rocky surface together for the first time. The right conditions for life appear to have once existed, and planets like Earth may have orbited a star known as **GD 61** - a white dwarf circled by planetary debris.

ROSETTA

European space mission controllers say they're preparing to wake the comet-hunting spacecraft *Rosetta* from a two-year hibernation as it nears its cosmic goal – orbit and place a lander on comet **67P/Churyumov-Gerasimenko** in August 2014.

FREE-FLOATING PLANETS

Astronomers have captured an image of an unusual free-floating planet – with no host star it can be observed and examined much easier than planets orbiting stars. Can an object with as low a mass as this have formed directly, in the same way that stars form? Independent observations suggest that this is the case: they discovered that a similar free-floating object is **drawing material from its surrounding just like a young star.**

Another team of astronomers has discovered an object with a mass six times that of Jupiter, which is floating in space on its own - no host star in sight.

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