

THE YOUNG ASTRONOMERS NEWSLETTER

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STUDY + LEARN = POWER

June 2011

NCSSM'S EXPERIMENT FLIES HIGH

On May 19th, student experiments from NCSSM and three other high schools were launched aboard a NASA helium weather balloon that traveled to the stratosphere, a near-space environment 19 to 20 miles above sea level.

NCSSM is a finalist in the second Balloonsat High-Altitude Flight competition and was the 2010 winner. (Be Proud !)

See: <http://www.grc.nasa.gov/WWW/balloonsat/Index.html>

EARLY UNIVERSE "MISSING MASS"

Amelia Fraser-McKelvie, a 22-year-old Australian university student, has solved a problem which has puzzled astrophysicists for decades, discovering part of the so-called "missing mass" of the universe. After a targeted X-ray search, she found that the mystery mass had moved to the "filaments of galaxies" which stretch across enormous expanses of space.

The "missing mass" is the discrepancy between that which is directly visible, and theory based on the motions of galaxies and clusters. Scientists had previously detected matter that was present in the early history of the universe but until now, could not be located. And astrophysicists had known about the "missing" mass" for the past two decades, but the technology needed to pinpoint its location had only become available in recent years.

SEARCH FOR ALIEN LIFE

The massive Green Bank radio telescope in rural West Virginia is listening for signs of alien life on 86 possible Earth-like planets.

The giant dish is pointing toward each of the planets culled from a list of 1,235 possible planets identified by NASA's *Kepler* space telescope. The surface of the telescope is 328 feet by 360 feet, and it can record nearly one gigabyte of data per second.

ORPHAN PLANETS

In a recent survey, an astronomy team discovered a new class of Jupiter-sized planets floating alone in space, away from the light of a star. They believe these lone worlds probably were ejected from developing planetary systems.

They found evidence for up to 10 free-floating planets roughly the mass of Jupiter. The isolated orbs are difficult to spot, and had gone undetected until now. Although free-floating planets have been predicted, the discovery indicates there are many more free-floating Jupiter-size planets that can't be seen. The team estimates there are about twice as many as stars.

SNAPSHOT OF BLACK HOLE JETS

An international team using radio telescopes located throughout the Southern Hemisphere has produced the most detailed image of particle jets erupting from a supermassive black hole in a nearby galaxy. The jets arise as infalling matter approaches the black hole, but how they form and maintain themselves is unknown. See:

<http://www.nasa.gov/topics/universe/features/radio-particle-jets.html>

NEW ISS TOOL

A new instrument aboard the International Space Station, "**The Alpha Magnetic Spectrometer**" is sponsored by the U.S. Department of Energy and made possible by funding from 16 nations. More than 600 physicists around the globe will be able to participate in the data generated in the mysteries of antimatter, dark matter, and cosmic ray propagation in the universe.

COMET 103P/HARTLEY 2

The nucleus of tumbling **Comet 103P/Hartley 2** has a changing rotational rate observed for the first time. It is a relatively small comet with a 1.2 mile-long nucleus and is highly active for its size. Rotational changes are caused by jets of gases emitting from its icy body.

OLDEST MICROMETEORITES

A Japanese geologist says he has discovered the oldest known bits of micrometeorites (space dust) to have fallen on the Earth, 240 million years ago. The microscopic iron rich spheroids are about 50 million years older than any other space dust ever found on Earth.

About **30,000 tons of space dust** (mostly from comets and asteroids) fall on Earth every year, but is very hard to find due to the particles' small size and the way they scatter after falling.

To have survived intact for 240 million years, the specimens would have had to first survive being burned up completely in the atmosphere, the fate of 90 percent of space dust arriving at Earth, then would have had to fall into some sediment that would encase them and hold their delicate structures safely in place for all those thousands of centuries.

SATURN'S BIG STORM

A giant early-spring storm in Saturn's northern hemisphere is so powerful it stretches around the entire planet, shooting plumes of gas high into the planet's atmosphere. The rare storm has been wreaking havoc since last December and has produced a 3,000-mile-wide dark vortex - like Jupiter's Great Red Spot. This is the strongest disturbance ever detected in Saturn's stratosphere. See: <http://www.nasa.gov/cassini>

GLIESE 581D

A controversial new study suggests that the rocky alien planet, **Gliese 581d**, may be the first known world beyond Earth capable of supporting life as we know it. Astronomers have found that the planet likely lies in the "habitable zone" of its host star — that just-right range of distances that allow liquid water to exist.

The alien world could be Earth-like – clouds, rainfall, and oceans. This conclusion is consistent with several recent modeling studies, but does not definitively establish that life-sustaining water flows across the planet's surface.

SUN / SPACE WEATHER PREDICTION CENTER

- o Education and Outreach
- o Materials for The Classroom
- o Space Weather Information

See: <http://www.swpc.noaa.gov/Education/index.html>

The sky tonight? See - <http://www.skymaps.com/downloads.html>
and also http://amazing-space.stsci.edu/tonights_sky/

Puzzles

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

AHEAD HONOR
APPEAR IDEAL
BOOTES LEVEL
CANES LIGHT
CARGO SHAPE
CLOUDS THEIR
COMET TWICE
DENEK VORTEX
GASES WATER
GLOBE YOUTH

MOONBOT CHALLENGE

The X PRIZE Foundation and LEGO Group announced a second **MoonBots** challenge to youth teams (9 to 17) to design, program, and construct robots that perform simulated lunar missions.

Teams will be asked to submit video clips about space exploration, and a proposal explaining why their robot should be funded to go to the Moon. Finalists will be provided with LEGO components to construct a large Moonscape that will serve as the competition's 'playing field.' They will then design and program their robot. See: <http://www.moonbots.org/>

CUBESATS

NASA has selected 20 small satellites to fly as auxiliary cargo aboard rockets that are planned to launch in 2011 and 2012. These small "CubeSats" are about four inches long and weigh 2.2 pounds or less. One *CubeSat's* mission is **ExoPlanetSat**, a telescope designed to search for planets orbiting distant stars.

ASTRONOMY PICTURE OF THE DAY

Each day a different image or photograph of our fascinating universe is featured, along with a brief explanation written by a professional astronomer.

See: <http://apod.nasa.gov/apod/astropix.html> (Keep)

Scrambled Astronomy : Constellations-Animals

EARIS _ _ _ _ _ PULUS _ _ _ _ _ PELUS _ _ _ _ _
CAROD _ _ _ _ _ EUSUQUL _ _ _ _ _

(Answers below)

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

- o Deep fractures on Mars - http://www.esa.int/esaSC/SEMT4TZ57NG_index_0.html
- o Fourmilab variety site - <http://www.fourmilab.ch/nav/topics/map.html>

***** JUNE MOON *****

New Moon: 6/2 First Quarter: 6/9 Full Moon: 6/15 Last Quarter: 6/23

Perigee: 6/11 9:42 PM 228,159 mi. (367187 km) Apogee: 6/24 12:14 AM 251,204 mi. (404274 km)

- o The June Full Moon was called *The Strawberry Moon* - "Picking at night was said to honor the crops."

- o **Best observing nights:** 6/1 – 6/8; 6/22 – 6/30
- o Total Lunar Eclipse on the 15th but not visible here.

***** PLANETS IN JUNE *****

VENUS is shining brightly as rises in the east during morning twilight. **MERCURY** is behind the Sun on the 12th (*superior conjunction*) and then low in the west-southwest after sunset from the 18th, moving higher each night. **MARS** can be seen in the east-northeast before dawn. It will be very dim. **JUPITER** rises before sunrise in the east – about two hours on the 1st and 3 1/2 hours by the 31st. **SATURN** is big and bold in the southwest at dusk. Great for telescope viewing.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
JUNE BOOTIDS	6/22 – 7/2	6/27	Variable	The Bootids appear to come from the Bootes constellation overhead. They are slow and not very bright. The hourly rate could be up to 18 but can not be forecast. There is also some minor shower activity during June.

SEE THE ISS AND SATELLITES – "FLYBYS"

Just enter your zip code, hit *Go!*, and you will find out what is going to fly over your area in the nights ahead. There are hundreds of satellites in Earth orbit, but the list shows only a half-dozen or so of the most interesting. See: <http://spaceweather.com/flybys/> (Keep)

LOOK FOR: >>>> "The hair of Berenice" – the *Coma Bernices*, an open cluster between **Leo** 1/2 high in the west and **Bootes** overhead. >>>> "The Sickle" in **Leo** – the handle points to the southwest. >>>> The Summer Triangle in the east – bright Vega (**Lyra**) at the top, Deneb (**Cygnus**) at the lower left, and Altair (**Aquila**) at the right near the horizon.

STUDENTS AND TEACHERS FLIGHT EXPERIENCES

Students and educators nationwide can interact with NASA engineers and scientists through two newly developed NASA programs designed to give them hands-on flight experiences using NASA sounding rockets and scientific balloons.

The Wallops Rocket Academy for Teachers and Students will provide technical flight experience to give students and educators lessons in physics and engineering. Teachers also receive resources to integrate the data into classroom lessons.

See: <http://education.wff.nasa.gov/> (and) <http://www.nasa.gov/education/tfs>

ZOONIVERSE

"Somewhere, something incredible is waiting to be known," wrote Carl Sagan. And now you can be the one to find it, thanks to *Zooniverse*, a unique citizen science website. *Zooniverse* volunteers are working on a project called Galaxy Zoo, classifying distant galaxies imaged by the *Hubble Space Telescope*.

People can do better than computers at detecting the subtle differences in galaxies, and do things computers can't do like spot things that just look interesting. One "Zooite" is Hanny van Arkel, a Dutch schoolteacher who discovered a strange green object. See: http://science.nasa.gov/science-news/science-at-nasa/2011/22apr_zooniverse/

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MARS' ATMOSPHERE

The *Mars Reconnaissance Orbiter* has discovered that the total amount of atmosphere on Mars changes dramatically as the tilt of the planet's axis varies. This process can affect the stability of liquid water, if it exists on the Martian surface, and increases the frequency and severity of Martian dust storms.

Researchers used the orbiter's ground-penetrating radar to identify a large deposit of frozen carbon dioxide (dry ice) at the south pole. The deposit has a volume similar to Lake Superior's nearly 3,000 cubic miles.

ANDROMEDA GALAXY

Visible light, as seen by ground-based telescopes and our eyes is just one small part of the full spectrum of electromagnetic radiation. There are many different wavelengths that are invisible to us but which are revealed by ESA's orbiting telescopes.

The *Planck spacecraft* collects microwaves that show up particles of incredibly cold dust at just a few degrees above absolute zero. Slightly higher temperature dust is revealed by the shorter, infrared wavelengths observed by the *Herschel space telescope*. This dust traces locations in the spiral arms of the Andromeda Galaxy where new stars are being born today.

The *XMM-Newton* telescope detects wavelengths shorter than visible light, collecting ultraviolet and X-rays. These show older stars, many nearing the end of their lives and others that have already exploded, sending shockwaves rolling through space. By putting all of these observations together, and seeing Andromeda in its many different colors, astronomers are able to follow the life cycle of the stars. See: http://www.esa.int/export/esaCP/SEM5IUyGRMG_index_

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SCHEILA

Late last year, astronomers noticed that an asteroid named **Scheila** had unexpectedly brightened and had short-lived dust plumes. Data from the *Swift* satellite and *Hubble Space Telescope* showed these changes likely occurred after **Scheila** was struck by a much smaller asteroid. It left a crater 1,000 feet across and probably hit the surface at an angle of less than 30 degrees..

The astronomers estimated the crash ejected more than 660,000 tons of dust. See: <http://www.nasa.gov/topics/universe/features/asteroid-collision.html> (and) <http://www.youtube.com/watch?v=hwHLYDLEF6g>

THE FIRST STARS

Some of the oldest stars in our Galaxy, - the first generations of massive stars, lived fast and furious, and are already dead. But their chemical imprints, like fingerprints, can still be found today in our Galaxy.

These very fast rotators are called **spinstars** by astronomers. Soon after the Big Bang, the composition of the Universe was much simpler than at present as it was made of essentially only hydrogen and helium.

The chemical enrichment of the Universe with other elements had to wait 300 million years until the death of the first generations of those massive stars polluting the primordial gas with new chemical elements, which were later incorporated in the next generations of stars.

UNPLANNED STEREO RESULTS

Researchers have discovered 122 new eclipsing binary stars and observed hundreds more variable stars in an innovative survey using the two *STEREO* solar satellites.

STEREO was launched in 2006 to study the Sun in 3D and coronal mass ejections, the cause of space weather. Each *STEREO* spacecraft carries two cameras able to make such stable measurements that researchers can accurately monitor the brightness of background stars.

To date, **893,000 stars** have provided an unexpected resource of scientific data about the variability of stars that is currently being "data mined".

UNUSUAL STAR'S FLARE

Astronomer Joel Green of The University of Texas has been following a rare massive flare from an emerging star (similar to the early Sun) and has found that it is situated in a tangled web of gas and new stars tightly packed into a small area.

Flares of this magnitude are rare because they are short-lived compared to the relatively quiet states that characterize most young stars.

Outbursts are often considered to be an important part of the process by which a young star acquires its final mass, through a small trickle of material punctuated by short, repeated outbursts. The star is in the "Gulf of Mexico" region of the **North America Nebula** (NGC 7000), in the constellation **Cygnus**, the Swan.

FROM EARTH TO THE SOLAR SYSTEM

NASA has a new online collection of images of our solar system and locations on Earth where astrobiology researchers travel to conduct field research.

The images showcase planetary exploration and the journey to understand the origin and evolution of the solar system, and the search for life elsewhere.

See: <http://fettss.arc.nasa.gov/>

