THE YOUNG ASTRONOMERS NEWSLETTER

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VERY RARE VENUS TRANSIT

On June 5th, we will see a very rare "transit" of Venus when it passes in front of the Sun - the next one is in 2117. But "seeing" it means that *you must have a "solar filter" between you and the Sun*.

Solar filters for a telescope or binoculars are available from numerous sources – search "*solar filters*" on the Internet. No filter is safe to use with any optical device unless it has been specifically designed for that purpose.

Unsafe "filters" include sunglasses, color film, some non-silver black and white film, medical x-ray films with images on them, photographic neutral density filters, smoked glass, and polarizing filters.

Solar filters designed to thread into eyepieces which are often sold with inexpensive telescopes are also dangerous. They should not be used for viewing the Sun at any time since they often crack from overheating.

Do not experiment with other filters unless you are certain that they are safe. Damage to the eyes comes predominantly from invisible infrared wavelengths. The fact that the Sun appears dark in a filter or that you feel no discomfort does not guarantee that your eyes are safe. Avoid all unnecessary risks.

One of the most widely available and least expensive filters for safe solar viewing is a *Number 14 Welder's Glass* available through welding supply outlets. Tape the edges of the glass over a rectangular hole in the center of a piece of cardboard (or similar), 8 1/2" x 11" or more. (2"x4" and 4"x5"+ sizes are available.)

For transit times and other information see:
http://transitofvenus.nl/wp/where-when/local-transit-times/

EBB AND *FLO*

Fourth grade students from the Emily Dickinson Elementary School in Bozeman, Montana, won a nationwide competition by renaming two Moon-orbiting *GRAIL* mission spacecraft as *EBB* and *FLO.* They received the honor of making the first image selections by the MoonKam (Moon Knowledge Acquired by Middle school students). Over 60 student-requested images were downlinked to Earth.

More than 2,700 schools spanning 52 countries are now using the MoonKAM cameras. *GRAIL* is NASA's first planetary mission to carry instruments fully dedicated to education and public outreach.

BLAZARS

Astronomers are searching for supermassive black holes called blazars - they are at the cores of giant galaxies and are among the most energetic objects in the universe. Blazars are scorching hot and glow with gamma rays. As a blazer actively "feeds," - pulls matter in, some of the energy is released in the form of jets at nearly the speed of light and pointed directly at Earth.

30 DORADUS

Several million stars in a raucous stellar breeding ground in 30 Doradus, located in the heart of the Tarantula nebula. It has the most massive stars ever seen. See: **http://hubblesite.org/newscenter/archive/releases/2012/01/image/a/format/zoom/**

"SPACED OUT SPORTS" WINNERS

Three fifth through eighth grades school student teams have been selected as the winners of NASA's second annual Spaced Out Sports challenge. The students designed science-based games that will be played by astronauts aboard the ISS. See:
http://education.ssc.nasa.gov/spacedoutsports

WANT SOME ASTRONAUT TRAINING?

Although the ISS has sophisticated automatic docking systems, astronauts on the Station are trained to ensure a safe docking by ESA's astronaut instructors.

The European Astronaut Center developed refresher courses with lessons that astronauts follow while on the Station. Now two sets of these lessons are now available for the home user to try. With Internet Explorer, go to:
http://www.esa.int/esaCP/SEMET6HWP0H_index_0.html/ *And download the* **Cortona 3D viewer.**

APOPHIS

Russia plans to send a satellite with a radio beacon to "near-Earth asteroid" 99942 Apophis to find out how big the threat of a collision with Earth is. The asteroid is considered as the most serious threat to Earth now known. In 2029, Apophis will be at a distance of only about 36,000 miles from Earth..

"NEARBY" WHITE DWARFS

University of Oklahoma astronomers have identified two white dwarf stars considered the oldest and closest known to man – 11 to 12-billion-years old, and only 100 light-years away from Earth. They said, "These two white dwarf stars have been dead and cooling off almost for the entire history of the universe. The stars are the closest known examples of the oldest stars forming soon after the Big Bang."

THREE MISSIONS EXTENDED

NASA is extending three missions - *Kepler*, *Spitzer,* and the U.S. portion of ESA's *Planck* mission: Kepler is determining what percentage of Sun-like stars host potentially habitable Earth-like planets; *Spitzer*- galaxies, stars, planets, comets and asteroids: *Planck* - the birth of the universe.

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

The Sky Tonight? See - 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

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ISS CHAT? - NASA is inviting school districts and other organizations to host live in-flight interactive conversations with the next generation of explorers and astronauts aboard the International Space Station. During ISS Expeditions 33 and 34, NASA crew members Sunita Williams, Kevin Ford and Thomas Marshburn will participate in 20-minute question-and-answer sessions with students who will learn what it is like to live and work in space. Send an email to JSC-Teaching-From-Space@mail.nasa.gov or call 281-244-7608. Also, see: **http://go.usa.gov/Xqt**

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PUZZLES

FIND THE WORD

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

ABOARD
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SCRAMBLED ASTRONOMY

Summer Sky

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SHEDAY __ __ __ __ __ __

(Answers below)

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

- Musket Ball Cluster - **http://www.sciencedaily.com/releases/2012/04/120412113714.htm**
- UFO Galaxy" NGC 2683 "spaceship"? - **http://www.spacetelescope.org/images/potw1213a**
- Auroras above Uranus - **http://hubblesite.org/newscenter/archive/releases/2012/21/image/a/**

❖❖❖ *SITE OF THE MONTH* ❖❖❖

The Space Telescope Science Institute **- http://www.stsci.edu/resources/**

****** MAY MOON ******

Full Moon: 5/5 **Last Quarter:** 5/12 **New Moon:** 5/20 **First Quarter:** 5/28

Perigee: 5/5 11:34 PM 221,802 mi. (356955 km) **Apogee:** 5/19 12:13 PM 252,555 mi. (406448 km)

o In 2012, the Moon is closest to Earth on 5/5 (largest) and the furthest distance on the 19th - unusually high and low tides around these dates. **o** **May's Full Moon** is known as the Flower Moon and The Rose Moon.

o Partial Solar Eclipse - the western states 5/20 **o Best observing nights**: 5/10 – 5/27

****** PLANETS IN MAY ******

VENUS is at the upper left of the setting Sun and is still at its maximum brilliance for 2012. It is about 37% lit on the 1st and less each night until 1% by the 31st. **MARS** is in the southwest at dusk. **JUPITER** is behind the Sun on the 13th (*superior conjunction)*. **SATURN i**n the southeast at dusk, and has its rings tilted 13° at mid-month. **MERCURY** is at superior conjunction on 5/27 - at the lower right of Venus just after sunset on the 31st.

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

NAME	DATES	BEST NIGHT	PER HOUR	WHERE TO LOOK
ETA AQUARIDS	4/19 – 5/28	5/5	**60**	Low in the southeast. The Full Moon is rising in the east around 7 PM and sets at 4:45 AM on the 6th. If you can block out the Moon, some of the brightest meteors will be seen. May has three minor showers.

LOOK FOR: **>>>>>** **Capella** (the Little She-Goat) - the brightest star in the northwest. It is yellow and is a giant star in a "Binary". It is about 100 times as bright as the Sun. **>>>>>** **The Gemini Twins** - Castor is below Capella, and Pollux is just further south. **>>>>>** **Sirius** (the Dog Star) is the bright star in the southwest visible in early evening. **>>>>>** **Corona Borealis** is a semi-circular arc overhead towards the east. It is called 'The Northern Crown". **>>>>>** (For sharp eyes) **Corvus** (The Crow) – a four-star rectangle half-high in the south-southwest.

ORDINARY" BLACK HOLES

Scientists have discovered an '**ordinary**' black hole in the galaxy **Centaurus A**. This is the first time that a normal-size black hole has been detected away from the immediate vicinity of our own Galaxy. Although exotic by everyday standards, black holes are everywhere.

The lowest-mass black holes are formed when very massive stars reach the end of their lives, ejecting most of their material into space in a supernova explosion and leaving behind a compact core that collapses into a black hole.

There are thought to be millions of undetected low-mass black holes distributed throughout every galaxy

VISTA'S NEW IMAGE

The VISTA telescope at ESO's Paranal Observatory in Chile is the world's largest survey telescope and the most powerful infrared survey telescope in existence. It has created the widest deep view of the sky ever made using infrared light.

The image looks unremarkable, - a few bright stars and a sprinkling of fainter ones. But almost all of those fainter objects are not stars in the Milky Way, but very remote galaxies, each containing billions of stars.

Enlarging the image and zooming in reveals more and more of them, and the image records more than 200 000 galaxies in total.

Close inspection reveals tens of thousands of previously unknown reddish objects scattered between the more numerous cream-colored galaxies. These are mostly very remote galaxies seen when the Universe was only a small fraction of its present age.

SCALE OF THE UNIVERSE

A former astronomy instructor found it very difficult to make students aware of the awesome size of the universe, from the tiniest bits of matter to galaxies at the edge of time and space.

This site illustrates that reality (*it takes a while to load*). See**: http://htwins.net/scale2/**

DEFLECTING ASTEROIDS WITH LASERS

Pioneering engineers at the University of Strathclyde in Glasgow are developing an innovative technique based on lasers that could radically change **asteroid deflection** technology. It shows the possibility of using a swarm of relatively small satellites flying in formation and firing solar-powered lasers onto an asteroid..The scientists are also investigating the use of the same concept to remove space debris. a

COMETS AND LIFE

New research provides further support for the idea that comets bombarding Earth billions of years ago carried and deposited the key ingredients for life to spring up on the planet.

Experiments with powerful laboratory "guns" and computer models recreated the conditions that existed inside comets when these celestial objects hit Earth's atmosphere at almost 25,000 miles per hour and crashed down upon the surface.

The researchers said, "Comets really would have been the ideal packages for delivering ingredients for the chemical evolution thought to have resulted in life - it includes all of the ingredients for life, - amino acids, water and energy."

FAST-GROWING BLACK HOLES

Astronomers have put forward a new theory about why black holes become so hugely massive - some black holes grow so fast that they are billions of times heavier than the Sun.

They grow by drawing in gas that forms a disc around the hole and spirals inward, but usually, so slowly that the holes could not have grown to these huge masses in the entire age of the universe.

The astronomers made a computer simulation of two gas discs orbiting a black hole at different angles. After a short time the discs spread and collide, and large amounts of gas fall into the hole.

According to their calculations black holes can grow 1,000 times faster when this happens. If the flows are chaotic it is very easy for the black hole to feed.

The two biggest black holes ever discovered are each about ten billion times bigger than the Sun.

TITAN

On March 25, 1655, Dutch astronomer Christiaan Huygens, using a telescope he built himself, observed a small bright dot close to the planet Saturn. Huygens correctly surmised that it might be a moon and confirmed as much by following it in its orbit over the next few days.

We now know Titan to be strangely one of the most Earthlike and most interesting worlds in the solar system, that it has clouds, rain and occasional rivers of methane gas and component of natural gas, ethane.

ROCKY PLANETS

A new result from ESO's *HARPS* planet finder shows that rocky planets not much bigger than Earth are very common in the habitable zones around faint red stars.

The international team estimates that there are tens of billions of such planets in the Milky Way galaxy alone, and probably about one hundred in the Sun's immediate neighborhood.

This is the first direct measurement of the frequency of super-Earths around red dwarfs, which account for 80% of the stars in the Milky Way.

HYPERVELOCITY STARS AND PLANETS

In 2005, astronomers were astounded when they found the first runaway star flying out of our Galaxy at a speed of 1.5 million miles per hour. The discovery intrigued scientists who wondered: If a star can get tossed outward at such an extreme velocity, could the star's planets go along for the ride?

And now, new research shows that the answer is **yes**. Not only do runaway planets exist, but some of them zoom through space at speeds up to 30 million miles per hour.

MESSENGER

The tiny *MESSENGER* spacecraft has completed its primary mission to orbit and observe the planet Mercury for one Earth-year. It has provided a bounty of surprises that completely altered our understanding of Mercury.

There is evidence that there have been large-scale changes to Mercury's topography since its earliest geological history. The mission's many successes have allowed it to be extended for another year.

Mercury's core occupies a large fraction of the planet, about 85% of the planetary radius, - larger than estimates.

COMPETITION WINNERS

Winners of the global **YouTube Space Lab** competition were 18-year-old Amr Mohamed of Egypt taking the honor for older students while USA's Dorothy Chen and Sara Ma was top submission in a younger group.

Amr Mohamed suggested studying how microgravity effects the way zebra spiders catch prey and whether the arachnids would adapt to that environment. Dorothy Chen and Sara Ma (both 16 years old) wondered whether "alien superbugs" bred in space could cure diseases on Earth. Bacteria would be given varying nutrients and compounds to see whether they could be turned into weapons against germs

RIDGES *ON MARS*

In new research by University of Washington geologists, an odd, previously unseen landform could provide a window into the geological history of Mars. They call the structures ***periodic bedrock ridges*** (PBRs). The ridges look like sand dunes but the scientists say the ridges actually form from wind erosion of bedrock.

They contrast the ridges with another bedrock form called a ***yardang***, which has been carved over time by headwinds. A yardang has a wide, blunt leading edge in the face of the wind, and its sides are tapered so that it resembles a teardrop. See: **http://www.spxdaily.com/images-lg/mro-hirise-periodic-bedrock-ridges-floor-west-candor-chasma-mars-lg.jpg**

"FIRST" ROBOTICS

On March 16 and 17, sixty-six high school teams from California, Nevada, Brazil and Chile battled on Long Beach Convention Center's courts with their student-designed robots for the title of Regional Champions. The winners from this competition represented the Southern California region at the FIRST championships April 25 to 29 in St. Louis, against 51,000 other students on more than 2,400 teams. See: **http://www.usfirst.org/**

VESTA

New images reveal unusual geologic features, some of which were never previously seen on asteroids. Bright areas appear everywhere with most around craters, and varying from several hundred feet to about 10 miles across. Rocks crashing into the surface of Vesta seem to have exposed and spread this bright material and may have mixed it with darker surface material.

Dawn scientists also did not expect such a wide variety of distinct dark deposits across its surface – they appear dark gray, brown and red, and sometimes appear as small, deposits. See:**http://dawn.jpl.nasa.gov/**

NEW MAP OF IO

Following its discovery by Galileo in January 1610, **IO,** Jupiter's largest moon, has been the focus of elescopic and satellite scientific observation. A team of scientists has now produced the first complete global geologic map of **IO**.

The map depicts the characteristics and relative ages of some of the most unique, active volcanoes and lava flows ever documented in the Solar System. Orbital and gravitational relationships between Io, Europa, Ganymede, and Jupiter cause massive, rapid flexing of its rocky crust, generating tremendous heat within Io's interior. See: **http://pubs.usgs.gov/sim/3168/**

NEAR EARTH ASTEROIDS

A new website tool identifies near-Earth asteroids among the several hundred most likely for future robotic or human space flight round-trip rendezvous missions.

NEAs are discovered almost daily, and often the time just after discovery is also the optimal time to provide follow-up observations to secure their orbits and characterize their physical nature.

And a new NASA public science project called "Target Asteroids!" calls on amateur astronomers to help characterize the population of NEOs, including their position, motion, rotation and changes in the intensity of light they emit. Professional astronomers will use this information to refine theoretical models of asteroids, improving their understanding about asteroids.

See: **http://osiris-rex.lpl.arizona.edu**

WISE ATLAS AND CATALOG

NASA has unveiled a new atlas and catalog of the entire infrared sky showing more than a half billion stars, galaxies and other objects captured by the *Wide-field Infrared Survey Explorer* (WISE) - the fruit of a mission launched in December 2009.

WISE mapped the entire sky with far better sensitivity than its predecessors, collecting more than 2.7 million images, and capturing everything from nearby asteroids to distant galaxies. See:

http://wise2.ipac.caltech.edu/docs/release/allsky/

For a collection of WISE images - see:

http://wise.ssl.berkeley.edu/gallery_images.html

AUSTRALIAN WIDE ARRAY

Astronomers in Australia have linked radio telescopes with counterparts in South Korea to create a giant instrument almost 5,000 miles across. The linkup, similar to ones Australia has made with telescopes in Japan and China previously, should provide resolving power about 100 times the Hubble Space Telescope, they said.

JUPITER WAVE MOVIE

New movies of Jupiter catch an invisible wave shaking up one of the planet's jet streams – a wave that also takes place in Earth's atmosphere and influences the weather. Like Earth, Jupiter has several fast-moving jet streams that circle the globe. Earth's strongest and best known jet streams are those near the North and South Poles that blow west to east, north and south.

Slow-moving waves in Earth's atmosphere, called ***Rossby*** waves, sets these jet streams on their paths and sometimes makes them blast Florida and other warm places with frigid air. See: **http://news.softpedia.com/news/Earth-Like-Atmospheric-Waves-Found-on-Jupiter-258434.shtml**

SOLAR TORNADOES

Solar tornadoes several times as wide as the Earth are being generated in the solar atmosphere. They often occur at the root of huge **coronal mass ejections**.

Superheated gases as hot as 90,000 – 360,000 F are drawn up from the root of a prominence, spiral high in the upper atmosphere and travel about 186,000 miles along helical paths for a period of at least three hour at speeds as high as 186,000 mph.

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