

THE YOUNG ASTRONOMERS NEWSLETTER

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STUDY + LEARN = POWER

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PLANET ORBITING TWO STARS

The existence of a world with a double sunset is now a scientific fact. The *Kepler* mission has made the first detection of a **circumbinary planet** -- a planet orbiting two stars.

The planet is cold, gaseous and not likely to have "life", but its discovery shows the diversity of planets in our galaxy. Kepler detected the planet, by observing **transits**, where the brightness of a parent star dims from the planet crossing in front of it.

NEW PLANETS FOUND

More than 50 new extra-solar planets have been discovered by the European Southern Observatory's *HARPS* telescope. They include 16 super-Earths - rocky worlds that are more massive than Earth and could potentially support life. One of the most likely planets orbits just at the edge of its star's habitable zone.

In the eight years since it started surveying stars like the Sun, *HARPS* has been used to discover more than 150 new planets and is the world's most successful planet finder. *HARPS* discovered about two thirds of all the known exoplanets with masses less than Neptune.

EARTH'S PRECIOUS METALS

U.K. researchers say precious metals in Earth's mantle resulted from bombardment of meteorites more than 200 million years after the planet was formed. As Earth formed, molten iron sank to its center to make the core, and taking with it the vast majority of the planet's existing precious metals such as gold and platinum.

They said that movement to the core should have left the crust and mantle with few precious metals, but they are tens to thousands of times more abundant in the Earth's silicate mantle due to a massive meteor shower that struck Earth well after the core had formed.

SUPERNOVA

New research shows that some old stars might be held up by their rapid spins, and when they slow down, they explode as a supernova. Thousands of these "time bombs" could be scattered throughout our Galaxy. The specific type of stellar explosion (*Type Ia supernova*) occurs when an old, compact star - a white dwarf, destabilizes and gains gasses from a donor star, or two white dwarfs collide. (*In further study of supernova, see Chandrasekhar mass.*)

UNUSUAL STAR AND PLANET

A nearby star has a planet in close orbit causing some exotic effects not seen in our solar system. The star has a mass about three times that of Jupiter. It is pummeling its companion planet with a barrage of X-rays 100,000 times more intense than the Earth receives from the Sun.

Data from *Chandra* suggest that the high-energy radiation is evaporating tons of matter from the planet, showing the difficult survival path for some planets. Such strong activity is usually found in much younger stars and may be caused by the proximity of the planet. And the planet may be speeding up the star's rotation, causing its magnetic fields to remain active longer than expected

REDUCED GRAVITY EXPERIMENTS

Teachers from 14 NASA Explorer Schools have been selected for the 2011 School Recognition Award for their contributions to science, technology, engineering and mathematics education. **Ferndale Middle School** in High Point s one of those selected.

A team of NASA personnel reviewed applications and recognized the schools for demonstrating exemplary classroom practices and finding innovative uses of NES resources to engage a broad school population.

These 14 schools were selected from more than 1300 schools that have registered participants in the NASA Explorer Schools project. See: <http://go.nasa.gov/pjy29I> (and) <http://explorerschools.nasa.gov>. There is also a six-minute video at: <http://go.nasa.gov/pjy29I>

MILKY WAY'S ARMS

Earth orbits the Sun on one of the arms of the Milky Way, - some 200 billion stars with spiral limbs that whirl around a thin disk. A new theory says the limbs formed after the Milky Way was whacked by a dwarf galaxy, sending cascades of stars flying to the galactic rim. And the collision has happened not just once, but twice in the last two billion years, -- and a third smashup is on the cards within the next 10 million years.

BLACK HOLE'S FLARING JET

Astronomers used *WISE* to capture rare data of a black hole outburst and now have new details about these powerful objects and their blazing jets. It is an ultra-dense collection of matter, with gravity that is so great even light cannot escape. This black hole is orbited by a companion star that feeds it, but some matter is blasted away as a jet flowing at nearly the speed of light. See:

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

BROWN DWARF'S STORM

University of Toronto astronomers observed extreme brightness changes on a nearby brown dwarf that may indicate a storm greater than any seen yet on a planet.

The depth and profile of this dwarf's brightness variations changed over weeks and months, suggesting that cloud patterns in its atmosphere are evolving with time. Because old brown dwarfs and giant planets have similar atmospheres, this finding could shed new light on weather phenomena of extra-solar planets.

DARKEST KNOWN GALAXY

Astronomers using the 10-meter Keck II telescope in Hawaii have confirmed that a troupe of about 1,000 small, dim stars just outside the Milky Way make up the darkest known galaxy. It appears to have 3,400 times more mass than can be accounted for by its visible stars. It is mostly an enormous cloud of "dark matter" with a sprinkling of stars, and a treasure trove of ancient stars.

Astronomers suspect there are other, perhaps even darker dwarf galaxies hovering around the Milky Way, waiting to be discovered.

SCIWORKS – For information and Planetarium schedules call: 767-6730

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>

SARK ISLAND

Sark Island is the first island in the world to be designated a "Dark Sky Place" by the International Dark Sky Association. It is a tiny, rustic Channel Island, 2.1 square miles and with only 600 residents. There is no public street lighting and paved roads or cars, so it does not suffer from light as towns and cities do.

To make an area more dark sky friendly, as little light as possible spills upwards where it can drown out starlight. This means that Sark's night sky is very dark with the Milky Way stretching from horizon to horizon, meteors streaking overhead, and countless stars on display. (*An astronomer's "special place."*)

Puzzles

Find The Word

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

ALGOL
 BLACK
 CENTER
 CRUST
 DEMISE
 GREAT
 HARPS
 LIGHT
 LIMIT
 METEORS

METAL
 MIGHT
 PAVED
 STORM
 STREET
 THESE
 SUNSET
 TROVE
 WHIRL
 VIDEO

**Scrambled Astronomy:
 BRIGHT STARS**

ECALALP _ _ _ _ _
 USIRIS _ _ _ _ _
 RCONYPO _ _ _ _ _
 GAVE _ _ _ _
 LEGRI _ _ _ _
 (Answers below)

INTERNET SITES

- ☆ The Moon's North Pole - http://www.nasa.gov/multimedia/imagegallery/image_feature_2054.html
- ☆ Saturn moon quartet - http://www.nasa.gov/multimedia/imagegallery/image_feature_2065.html
- ☆ Space photos - <http://www.amusingplanet.com/2010/11/astronaut-douglas-wheelock-shares.html>
- ☆ Sound bites from NASA - <http://www.nasa.gov/connect/sounds>

OCTOBER MOON

First Quarter: 10/3 Full Moon: 10/11 Last Quarter: 10/19 New Moon: 10/26
 Apogee: 10/12 9:44 AM 252,546 mi. (406434 km) Perigee: 10/26 7:27 AM 221,861 mi. (357050 km)
 ☆ This month's Full Moon was called the Hunter's Moon. ☆ Best observing nights: 10/1 -10/3; 10/18 - 10/31

PLANETS IN OCTOBER

JUPITER* rises north of east about 1.2 hours after sunset, and at sunset by the 28th. It reaches its greatest brilliancy and is opposite the Sun on that date (*opposition*). It is in the west-southwest at dawn.
MARS rises after midnight and is high in the southeast by sunrise.
MERCURY is very low in the east after midnight on the 15th. It is just to the lower right of Venus on the 17th.
SATURN is behind the Sun on the 13th and returns in the southeast by month's end in morning twilight.
URANUS is just bright enough to be seen with the naked eye in good observing conditions. It is a greenish disk half-high in the east just below the faint circle of stars in Piscis. (*Not easy!*)
VENUS* is at the upper left of the Sun on the 1st. It sets 1 hour after sunset by the 31st in the west-southwest.
NEPTUNE is mid-high in the southwest in Aquarius. It is a faint bluish "smudge" best seen with binoculars.

METEOR SHOWERS

<u>NAME</u>	<u>DATES</u>	<u>BEST NIGHT</u>	<u>PER HOUR</u>	<u>WHERE TO LOOK</u>
Orionids	10/2 – 11/07	10/21 – 10/22	Very variable	Low in the northeast before sunrise. Could be a surprise –usually 20 – 40 per hour but has hit 350 per hour! The shower is produce by very old particles from Halley's Comet. (The Last Quarter Moon rises about 11:30 PM.) October has five other showers (minor) 2 to 5 per hour, plus sporadics all during the month.

LOOK FOR: >>>> * An unusual sight: **Venus, Earth and Jupiter** are in line on the 14th. **Venus** and **Jupiter** are said to be in *mutual opposition*. They will be only 3° apart by next March. >>>> **Venus** and **Jupiter** are 2° above opposite horizons 32 minutes after sunset on the 21st. Can you spot both? >>>> **Cassiopeia** is a bright W in the northeast as the Big Dipper sets in the northwest. Her daughter, **Andromeda**, starts at the northeast corner of the **Pegasus** giant square. And below **Andromeda** is her hero, **Perseus**. In his hand is the Halloween star, **Algol**, winking at us. It is an eclipsing binary (double), with an orange star passing in front of the other star during a "wink".

MOON'S FARSIDE

The mountainous region on the far side of the Moon (*lunar farside highlands*) may be the solid remains of a collision with a smaller companion moon according to a new study by planetary scientists. The striking differences between the near and far sides of the Moon have been a longstanding puzzle since the near side is relatively low and flat, while the far side is high and mountainous with a much thicker crust.

The new study is based on the "giant impact" model for the origin of the Moon, in which a Mars-sized object collided with Earth early in the history of the solar system and ejected debris that coalesced to form the Moon. The study suggests that this giant impact also created another, smaller body (initially sharing an orbit with the Moon) that eventually fell back onto the Moon coating the far side with an extra layer of solid crust.

NEW SUPERNOVA

A new-found supernova is closer to Earth than any other of its kind in a generation. Astronomers believe they caught the supernova within hours of its explosion, a rare feat made possible with a specialized survey telescope and state-of-the-art computational tools. The supernova occurred in Ursa Major's **Pinwheel Galaxy**.

SPECA

A galaxy, dubbed **Spec**a by researchers, is only the second spiral galaxy known to produce large, powerful jets of subatomic particles moving at nearly the speed of light. "This is probably the most exotic galaxy with a black hole ever seen. It has the potential to teach us how galaxies and clusters of galaxies formed and developed into what we see today," they said.

Giant jets of superfast particles are powered by supermassive black holes at the cores of galaxies. Both elliptical and spiral galaxies harbor such black holes, but only **Spec**a and one other spiral galaxy produce large jets that pour outward from the poles of rapidly-rotating disks of material orbiting the black hole

A DIAMOND PLANET?

Astronomers think they have discovered a once-massive star that's been transformed into a small planet. It has a density indicating that it is certain to be crystalline - a large part of the star may be similar to a diamond. The planet and its companion star are in the constellation of **Serpens** (the Snake). Although bizarre, the "diamond planet" is in accord with our current picture of how certain binary star systems form.

TWO SUPER-MASSIVE BLACK HOLES

Astronomers using the *Chandra X-ray Observatory* discovered the first pair of supermassive black holes in a spiral galaxy similar to the Milky Way - the nearest known such phenomenon.

Separated by only 490 light years, the black holes are likely the remnant of a merger of two galaxies of unequal mass a billion or more years ago. Both black holes are actively growing and emitting X-rays as gas falls towards them and becomes hotter. If two equal-sized spiral galaxies merge, astronomers think it should result in the formation of a black hole pair and a galaxy with a disrupted appearance and intense star formation. See: <http://www.nasa.gov/chandra>

FUTURE OF THE ISS

The crew of the ISS may run short of supplies and have to return to Earth in their reentry capsules, leaving the station uninhabited. Russia's extended inability to send **Progress** modules to the station may result in the natural reentry of the ISS caused by atmospheric drag – the station's orbit needs to be raised periodically to maintain the space flight's altitude.

Should this happen, we will lose our \$100+ billion investment in the ISS and it could end the U.S. human space flight program. See: http://www.nasa.gov/mission_pages/station/main/index.html

EYES ON THE SOLAR SYSTEM

"**Eyes on the Solar System**" combines video game technology and NASA data for users to ride along with spacecraft and explore the cosmos. Screen graphics and information such as planet locations and spacecraft maneuvers use actual space mission data.

It is a "first time" to see the entire solar system and missions moving together in real-time. A free browser plug-in is available at the site. See:

<http://solarsystem.nasa.gov/eyes>

ASTEROID CLUES

Japanese scientists are now reporting that in their analysis of the **Itokawa** asteroid sample, they found positive evidence that this type of asteroid is the parent of ordinary chondrites - the most common type of meteorites found on Earth.

A scientist said the sample may hold important clues to understanding the illusive question of how the Earth got its oceans. He has reason to believe water on Earth may have originally come from a primitive asteroid.

STELLAR JETS

Using Hubble Space Telescope images collected over 14 years, Rice University astronomer Patrick Hartigan has created time-lapse movies that offer astronomers their first glimpse of the dynamic behavior of stellar jets, huge torrents of gas and particles that spew from the poles of newborn stars.

An analysis of the movies is causing astronomers to rethink some of the processes that occur during the latter stages of star birth. And in an effort to learn even more, Hartigan and colleagues are using powerful lasers to recreate a small-scale version of the jets. See:

<http://www.media.rice.edu/media/NewsBot.asp?>

MODE=VIEW&ID=16091&SnID=468240535

Y-DWARF STARS

Scientists have discovered the coldest class of star-like bodies, with temperatures as cool as the human body. They hunted these dark orbs, termed **Y dwarfs**, for more than a decade without success. But when they used the *Wide-field Infrared Survey Explorer* (WISE) space telescope, they finally spotted the faint glow of six **Y dwarfs** about 40 light-years from Earth.

The Y's are the coldest members of the brown dwarf family - sometimes referred to as "failed" stars. They are too low in mass to fuse atoms at their cores and don't burn with the fires that keep stars like our Sun shining steadily for billions of years. Instead, these objects cool and fade with time, until what little light they do emit is at infrared wavelengths.

