COWICHAN VALLEY STARFINDERS ASTRONOMY CLUB

Clear Skies

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President:president@starfinders.ca
Web: www.starfinders.ca
Editor: newsletter@starfinders.ca

Categories

Quick Links

1. Greetings!

Welcome to the Cowichan Valley StarFinders Astronomy Club's "Clear Skies" monthly newsletter.

Last month I missed welcoming our newest member David A. Rodger to the club. So….David welcome and we hope to see you at the Island Star Party (ISP) and at our Socials.

Speaking of the ISP; we are looking for volunteers to help organize and run the 16th Annual Island Star Party.

You do not have to provide a huge commitment, 4 hours , 8 hours we are flexible, one day, two days or three days. Everyone is welcomed to contribute to this fun event, no skills required, just enthusiasm.

Before the star party we need people to:
* Organize
* Advertise
* Procure or locate hardware, tents, chairs, power cords, wrist bands, etc
* Set up signs,
* Print and post posters, car window markers, event schedules etc.

During the star party, we need people to help Friday and Saturday:
* Help set up, organize field, gate, tents, parking signs……
* Run the ticket booth
* Greet people at the gate and direct them to the correct parking area

Sunday:
* help pack up and clean up

If you are interested email Brian (CVSF vice president) at vice-president@starfinders.ca and visit our webpage at http://www.starfinders.ca/starparty10.htm

Many thanks to this month's contributors Moe R and Bryon T.

By Freda Eckstein

" Astronomers, like burglars and jazz musicians, operate best at night"- Miles Kington

back

2. Socials

Socials are held on the 4th Wednesday of each month (except for July and August) at the home of Bryon and Freda.

Click on the Map or follow these directions:
Island Hwy, Mill Bay
Turn on Frayne Rd towards ocean (Serious Coffee is on the corner)
Turn right on Huckleberry Rd

SUGGESTIONS

3rd house on the left across from Springbank road and Mail boxes.
Look for the STAR sign
Please park on Huckleberry or Springbank Rd's.
Call Brian 743-6633 if you need directions

Our next Social will be held at **7:30** on **WEDNESDAY September 28th**
Feature: '**"ISP Show and Tell" viewing of ISP Photos.** Come on out and show off your pictures of the event or your astro photos.

back

Social Highlights

By Nancy Kirshfelt

Please Note: Minutes from the "Summer Social & AGM"will be posted in next month's edition.

back

3. Upcoming Events

Every Wednesday 9:00 pm – 10:00 pm Astronomy Open House at University of Victoria, 5th floor Bob Wright Centre
You say you do not know a red dwarf from a black Hole? A giant star from a globular cluster? Well here's your chance to discover everything you've wanted to know about the sky.
Rain or Shine, Admission Free, Parking $2.00

Every Saturdays & Wednesdays* 1:00-1:30 PM, CHLY 101.7 FM
Not Rocket Science (NRS) is a thirty minute weekly radio show about the science of everything and everything science. Dial them up or listen to past podcasts at
http://chly.dailysplice.com/notrocketscience/

Every Thursday starting July 14 to Aug 11at 8pm on CBC-TV, Geologic Journey II The Nature of Things
This series will change the way you look at the world. In each episode, we dive straight into the Earth's mysterious geologic processes – and explore both science and legend as we seek to understand and explain the geologic forces that shape our world, and our lives. Watch the episodes online at
http://www.cbc.ca/documentaries/natureofthings/geologicjourney2/episode-guide.html

CVSF Star Party:

Aug 26 - Aug 28 ,2011 CVSF Starpartyat Bright Angel Park, Cowichan Station B.C.
Located in "the Hub of the Universe" where overnight camping is allowed. Daytime activites include solar viewing, music, lectures and guided nature walks. Evening lectures and great views abound.
More Info: http://www.starfinders.ca/starparty10.htm

Other Star Parties in B.C:

July 29-31, 2011 The **RASCals** Star Party Metchosin, B.C.
The star party is held on the Metchosin Cricket Field and municipal grounds. This location offers us one of the darker urban areas in the western communities near Victoria, and gives us good sight lines in all directions. More info: http://victoria.rasc.ca/events/StarParty/

July 30 - August 7, 2011 Mt. Kobau Star Party by Osoyoos B.C.
Mt. Kobau has a reputation as a star party for serious observers. That doesn't mean "no fun allowed." Nor does it mean you have to be a grizzled sky-veteran to enjoy the experience. The fresh enthusiasm of a fired-up beginner fits right in. Just give proper consideration to the trials Kobau may put you through… and when you come, come prepared! More info: http://www.mksp.ca/

Aug 27 – Sept 3 Summer **Star Quest 2011**, Merritt B.C.
If you're into camping and doing "all nighter's" under a canopy of stars, observing deep sky objects and the ocassional planet then this event is right up your alley! More info:
http://www.merrittastronomical.com/index.html

October 1, 2011. KAS Star Party. Stake Lake Observatory. Kamloops Astronomical Society. More Info: http://kamloopsastronomy.ca/

NASA Launches credit NASA.Com:

Date: July 8 +
Mission: STS-135
Launch Vehicle: Space Shuttle Atlantis
Launch Site: Kennedy Space Center - Launch Pad 39A
Launch Time: 11:26 a.m. EDT
Description: Space shuttle Atlantis will carry the Raffaello multipurpose logistics module to deliver supplies, logistics and spare parts to the International Space Station. Atlantis also will fly a system to investigate the potential for robotically refueling existing spacecraft and return a failed ammonia pump module.

back

4. This Month In History

Courtesy of: Windows2universe.org

July 4
1868 - Birthday of Henrietta Swan Leavitt
Henrietta Swan Leavitt is an Americam astronomer who was born in Massachusetts in 1868. She is known for her discovery of a type of variable stars named cepheid variables.
1910 - Death of Gioavanni Schiaparelli
Gioavanni Schiaparelli was an Italian astronomer who lived between 1835-1910. He observed patterned straight lines on the surface of Mars, and called them "canali", Italian for channels, later misinterpreted as "canals."

July 5
1687 - Principia Mathematica published
Isaac Newton published his three-volume work The Philosophiae Naturalis Principia Mathematica (Latin: "mathematical principles of natural philosophy") which contains the statement of Newton's laws of motion forming the foundation of classical mechanics as well as his law of universal gravitation. This is seen to be the start of Modern Astronomy.
July 8
1695 - Death of Christian Huygens
Christian Huygens was a Dutch physicist and astronomer who lived between 1629-1695. Using a telescope he had made, Huygens first identified Saturn's rings and one of Saturn's moons. Huygens also invented the pendulum clock and proposed the wave theory of light.
July 15
1943 - Jocelyn Bell Burnell's birthday
Jocelyn Bell Burnell is a British astronomer who was born in 1943. In 1967, when she was a graduate student, she discovered pulsars - stars which emit periodic radio waves. Her professor, Antony Hewish, received the Nobel Prize in Physics for the discovery.
July 20
1969 - Armstrong and Aldrin walk on the Moon
"One small step for man, one giant leap for mankind". With these historic words, Armstrong became the first human to set foot on the Moon, at 10:56 pm, leaving his footprint etched in the lunar soil.

back

5. Cool Pics/Videos

Want to show off your latest pics? Well here's your chance; email the editor at My Cool Pics and we will try to post them in the next edition of "Clear Skies".

You can try this at home — cosmic expansion
Bill and Liz demonstrate a hands-on approach to understanding one fantastic consequence of the Big Bang and how you can experiment yourself to demonstrate how the universe is expanding. Fun and interesting, love the outtakes. http://www.astronomy.com/News-Observing/Liz%20and%20Bills%20Cosmic%20Adventures/2011/04/Episode%204.aspx

back

6. Featured Articles

Articles

RETURN TO CATEGORIES

1. Dawn Nears Start of Yearlong Stay at Giant Asteroid Vesta
2. Clocking Neptune's Spin
3. Hydrogen Peroxide Found in Space
4. Eye of Gaia: Billion Pixel Camera to Map Milky Way
5. Your Flying Car is Here
6. 10 Tech Innovations From Shuttle Trickled Down Non Astronauts

Dawn Nears Start of Yearlong Stay at Giant Asteroid Vesta–

June 24/11 credit *NASA*

NASA's Dawn spacecraft is on track to begin the first extended visit to a large asteroid. The mission expects to go into orbit around Vesta July 16 and begin gathering science data in early August. Vesta resides in the main asteroid belt and is thought to be the source of a large number of meteorites that fall to Earth.

"The spacecraft is right on target," said Robert Mase from NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California. "We look forward to exploring this unknown world during Dawn's 1-year stay in Vesta's orbit."

After traveling nearly 4 years and 1.7 billion miles (2.7 billion kilometers), Dawn is approximately 96,000 miles (155,000 km) away from Vesta. When Vesta captures Dawn into its orbit July 16, there will be approximately 9,900 miles (16,000 km) between them. When orbit is achieved, they will be approximately 117 million miles (188 million km) away from Earth.

After Dawn enters Vesta's orbit, engineers will need a few days to determine the exact time of capture. Unlike other missions where a dramatic, nail-biting propulsive burn results in orbit insertion around a planet, Dawn has been using its placid ion propulsion system to subtly shape its path for years to match Vesta's orbit around the Sun.

NASA's Dawn spacecraft obtained this image on its approach to the protoplanet Vesta, the second-most massive object in the main asteroid belt. NASA/JPL-Caltech/UCLA/MPS/DLR/PSI

Images from Dawn's framing camera, taken for navigation purposes, show the slow progress toward Vesta. They also show Vesta rotating about 65° in the field of view. The images are about twice as sharp as the best images of Vesta from NASA's Hubble Space Telescope, but the surface details Dawn will obtain are still a mystery.

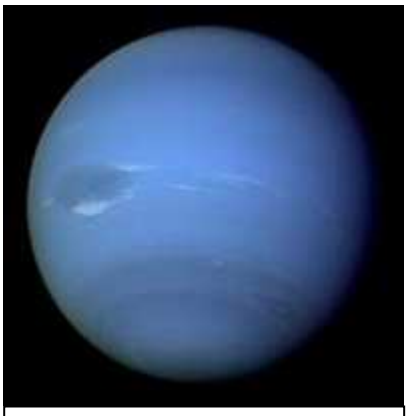
"Navigation images from Dawn's framing camera have given us intriguing hints of Vesta, but we're looking forward to the heart of Vesta operations, when we begin officially collecting science data," said Christopher Russell from the University of California, Los Angeles. "We can't wait for Dawn to peel back the layers of time and reveal the early history of our solar system."

Dawn's three instruments are all functioning and appear to be properly calibrated. The visible and infrared mapping spectrometer, for example, has started to obtain images of Vesta that are larger than a few pixels in size. During the initial reconnaissance orbit, at approximately 1,700 miles (2,700 km), the spacecraft will get a broad overview of Vesta with color pictures and data in different wavelengths of reflected light. The spacecraft will move into a high-altitude mapping orbit, about 420 miles (680 km) above the surface to systematically map the parts of Vesta's surface illuminated by the Sun; collect stereo images to see topographic highs and lows; acquire higher resolution data to map rock types at the surface; and learn more about Vesta's thermal properties. Dawn then will move even closer to a low-altitude mapping orbit approximately 120 miles (200 km) above the surface. The primary science goals of this orbit are to detect the byproducts of cosmic rays hitting the surface and help scientists determine the many kinds of atoms there, and probe the protoplanet's internal structure. As Dawn spirals away from Vesta, it will pause again at the high-altitude mapping orbit. Because the Sun's angle on the surface will have progressed, scientists will be able to see previously hidden terrain while obtaining different views of surface features.

"We've packed our year at Vesta chock-full of science observations to help us unravel the mysteries of Vesta," said Carol Raymond from JPL. Vesta is considered a protoplanet, or body that never quite became a full-fledged planet.

back

Clocking Neptune's Spin– June 30/11 Credit *University of Arizona-Tucson*



Neptune as seen by the Voyager 2 spacecraft in 1989. NASA

By tracking atmospheric features on Neptune, a University of Arizona scientist has accurately determined the planet's rotation, a feat that had not been previously achieved for any of the gas planets in our solar system except Jupiter.

A day on Neptune lasts precisely 15 hours, 57 minutes, and 59 seconds, according to the first accurate measurement of its rotational period made by Erich Karkoschka from University of Arizona, Tucson.

His result is one of the largest improvements in determining the rotational period of a gas planet in almost 350 years since Italian astronomer Giovanni Cassini made the first observations of Jupiter's Red Spot.

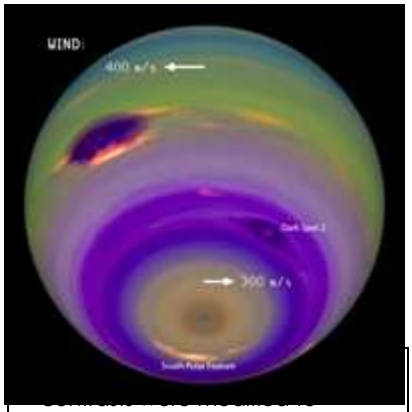
"The rotational period of a planet is one of its fundamental properties," said Karkoschka. "Neptune has two features observable with the Hubble Space Telescope that seem to track the interior rotation of the planet. Nothing similar has been seen before on any of the four giant planets." Unlike the rocky planets — Mercury, Venus, Earth, and Mars — which behave like solid balls spinning in a rather straightforward manner, the giant gas planets — Jupiter, Saturn, Uranus and Neptune — rotate more like giant blobs of liquid. Because they are believed to consist of mainly ice and gas around a relatively small solid core, their rotation involves a lot of sloshing, swirling, and roiling, which has made it difficult for astronomers to get an accurate grip on exactly how fast they spin around.

"If you looked at Earth from space, you'd see mountains and other features on the ground rotating with great regularity, but if you looked at the clouds, they wouldn't because the winds change all the time," Karkoschka said. "If you look at the giant planets, you don't see a surface, just a thick cloudy atmosphere." "On Neptune, all you see is moving clouds and features in the planet's atmosphere. Some move faster, some move slower, some accelerate, but you really don't know what the rotational period is, if there even is some solid inner core that is rotating."

In the 1950s, when astronomers built the first radio telescopes, they discovered that Jupiter sends out pulsating radio beams, like a lighthouse in space. Those signals originate from a magnetic field generated by the rotation of the planet's inner core. No clues about the rotation of the other gas giants, however, were available because any radio signals they may emit are being swept out into space by the solar wind and never reach Earth. "The only way to measure radio waves is to send spacecraft to those planets," Karkoschka said. "When Voyager 1 and 2 flew past Saturn, they found radio signals and clocked them at exactly 10.66 hours, and they found radio signals for Uranus and Neptune, as well. So based on those radio signals, we thought we knew the rotation periods of those planets." But when the Cassini probe arrived at Saturn 15 years later, its sensors detected its radio period had changed by about 1 percent. Karkoschka said that because of its large mass, it was impossible for Saturn to incur that much change in its rotation over such a short time.

"Because the gas planets are so big, they have enough angular momentum to keep them spinning at pretty much the same rate for billions of years," he said. "So something strange was going on." Even more puzzling was Cassini's later discovery that Saturn's northern and southern hemispheres appear to be rotating at different speeds. "That's when we realized the magnetic field is not like clockwork but slipping," Karkoschka said. "The interior is rotating and drags the magnetic field along, but because of the solar wind or other, unknown influences, the magnetic field cannot keep up with respect to the planet's core and lags behind."

Instead of spacecraft powered by billions of dollars, Karkoschka took advantage of what one might call the scraps of space science — publicly available images of Neptune from the Hubble Space Telescope archive. With determination and patience, he then pored over hundreds of images,



emphasize the planet's atmospheric features. The winds in Neptune's atmosphere can reach the speed of sound or more. Neptune's Great Dark Spot stands out as the most prominent feature on the left. Several features, including the fainter Dark Spot 2 and the South Polar Feature, are locked to the planet's rotation, which allowed Karkoschka to precisely determine how long a day lasts on Neptune. Erich Karkoschka

recording every detail and tracking distinctive features over long periods of time. Other scientists before him had observed Neptune and analyzed images, but nobody had sleuthed through 500 of them. "When I looked at the images, I found Neptune's rotation to be faster than what Voyager observed," Karkoschka said. "I think the accuracy of my data is about 1,000 times better than what we had based on the Voyager measurements — a huge improvement in determining the exact rotational period of Neptune, which hasn't happened for any of the giant planets for the last 3 centuries."

Two features in Neptune's atmosphere, Karkoschka discovered, stand out in that they rotate about 5 times more steadily than even Saturn's hexagon, the most regularly rotating feature known on any of the gas giants.

Named the South Polar Feature and the South Polar Wave, the features are likely vortices swirling in the atmosphere, similar to Jupiter's famous Red Spot, which can last for a long time due to negligible friction. Karkoschka was able to track them over the course of more than 20 years. An observer watching the massive planet turn from a fixed spot in space would see both features appear exactly every 15.9663 hours, with less than a few seconds of variation.

"The regularity suggests those features are connected to Neptune's interior in some way," Karkoschka said. "How they are connected is up to speculation." One possible scenario involves convection driven by warmer and cooler areas within the planet's thick atmosphere, analogous to hot spots within the Earth's mantle, giant circular flows of molten material that stay in the same location over millions of years. "I thought the extraordinary regularity of Neptune's rotation indicated by the two features was something really special," Karkoschka said. "So I dug up the images of Neptune that Voyager took in 1989, which have better resolution than the Hubble images, to see whether I could find anything else in the vicinity of those two features. I discovered six more features that rotate with the same speed, but they were too faint to be visible with the Hubble Space Telescope, and visible to Voyager only for a few months, so we wouldn't know if the rotational period was accurate to the six digits. But they were really connected. So now we have eight features that are locked together on one planet, and that is really exciting."

In addition to getting a better grip on Neptune's rotational period, the study could lead to a better understanding of the giant gas planets in general.

"We know Neptune's total mass but we don't know how it is distributed," Karkoschka said. "If the planet rotates faster than we thought, it means the mass has to be closer to the center than we thought. These results might change the models of the planets' interior and could have many other implications."

back

Hydrogen Peroxide Found in Space–July 6/11 *credit ESO*

Molecules of hydrogen peroxide have been found for the first time in interstellar space. The discovery gives clues about the chemical link between two molecules critical for life — water and oxygen. On Earth, hydrogen peroxide plays a key role in the chemistry of water and ozone in our planet's atmosphere, and is familiar for its use as a disinfectant or to bleach hair blonde. Now, it has been detected in space by astronomers using the European Southern Observatory-operated Atacama Pathfinder Experiment (APEX) telescope in Chile.

An international team of astronomers made the discovery with APEX, situated on the 16,400-foot-high (5,000 meters) Chajnantor plateau in the Chilean Andes. They observed a region in our galaxy close to the star Rho Ophiuchi, about 400 light-years away. The region contains cold (around -420° Fahrenheit [-250° Celsius]), dense clouds of cosmic gas and dust in which new stars are being born. The clouds are mostly made of hydrogen, but contain traces of other chemicals, and are prime targets for astronomers hunting for molecules in space. Telescopes such as APEX, which make observations of light at millimeter- and submillimeter-wavelengths, are ideal for detecting the signals

from these molecules.

Now, the team has found the characteristic signature of light emitted by hydrogen peroxide, coming from part of the Rho Ophiuchi clouds. "We were really excited to discover the signatures of hydrogen peroxide with APEX. We knew from laboratory experiments which wavelengths to look for, but the amount of hydrogen peroxide in the cloud is just one molecule for every 10 billion hydrogen molecules, so the detection required very careful observations," said Per Bergman from Onsala Space Observatory in Sweden.

has been detected in space.
ESO/S. Guisard

Hydrogen peroxide (H_2O_2) is a key molecule for both astronomers and chemists. Its formation is closely linked to two other familiar molecules, oxygen and water, which are critical for life. Because much of the water on our planet is thought to have originally formed in space, scientists are keen to understand how it is created.

Hydrogen peroxide is thought to form in space on the surfaces of cosmic dust grains — fine particles similar to sand and soot — when hydrogen (H) is added to oxygen molecules (O_2). A further reaction of hydrogen peroxide with more hydrogen is one way to produce water (H_2O). This new detection of hydrogen peroxide will therefore help astronomers better understand the formation of water in the universe. "We don't understand yet how some of the most important molecules here on Earth are made in space," said Berengere Parise from the Max Planck Institute for Radio Astronomy in Germany. "But our discovery of hydrogen peroxide with APEX seems to be showing us that cosmic dust is the missing ingredient in the process."

To work out just how the origins of these important molecules are intertwined will need more observations of Rho Ophiuchi and other star-forming clouds with future telescopes such as the Atacama Large Millimeter/submillimeter Array — and help from chemists in laboratories.

back

Eye of Gaia: Billion-pixel Camera to Map Milky Way –July 6/11 *credit Astronomy and Space*

The largest digital camera ever built for a space mission has been painstakingly mosaicked together from 106 separate electronic detectors. The resulting "billion-pixel array" will serve as the super-sensitive 'eye' of ESA's Galaxy-mapping Gaia mission. While the naked human eye can see several thousand stars on a clear night, Gaia will map a billion stars within our own Milky Way Galaxy and its neighbours over the course of its five-year mission from 2013, charting their brightness and spectral characteristics along with their three-dimensional positions and motions.

In order to detect distant stars up to a million times fainter than the eye can see, Gaia will carry 106 charge coupled devices (CCDs), advanced versions of chips within standard digital cameras.

Developed for the mission by e2v Technologies of Chelmsford, UK, these rectangular detectors are a little smaller than a credit card, each one measuring 4.7x6 cm but thinner than a human hair. The 0.5x1.0 m mosaic has been assembled at the Toulouse facility of Gaia prime contractor Astrium France. Technicians spent much of May carefully fitting together each CCD package on the support structure, leaving only a 1 mm gap between them. Working in double shifts in strict cleanroom conditions, they added an average four CCDs per day, finally completing their task on 1 June.

"The mounting and precise alignment of the 106 CCDs is a key step in the assembly of the flight model focal plane assembly," said Philippe Garé, ESA's Gaia payload manager. The completed mosaic is arranged in seven rows of CCDs. The main array comprises 102 detectors dedicated to star detection. Four others check the image quality of each telescope and the stability of the 106.5° angle between the two telescopes that Gaia uses to obtain stereo views of stars. In order to increase the sensitivity of its detectors, the spacecraft will maintain their temperature of -110° Celsius.

Gaia's CCD support structure, like much of the rest of the spacecraft, is made of silicon carbide – a

ceramic like material, extraordinarily resistant to deforming under temperature changesFirst synthesised as a diamond substitute, SiC has the advantage of low weight: the entire support structure with its detectors is only 20 kg.

Gaia will operate at the Earth–Sun L2 Lagrange point, 1,5 million kilometers behind the earth, when looking from the sun, where Earth's orbital motion balances out gravitational forces to form a stable point in space. As the spinning Gaia's two telescopes sweep across the sky, the images of stars in each field of view will move across the focal plane array, divided into four fields variously dedicated to star mapping, position and motion, colour and intensity and spectrometry.

Scheduled for launch in 2013, Gaia's three-dimensional star map will help to reveal the composition, formation and evolution of the Milky Way, sampling 1% of our Galaxy's stars. Gaia should also sample large numbers of other celestial bodies, from minor bodies in our own Solar System to more distant galaxies and quasars near the edge of the observable Universe.

back

Your Flying Car is Here –July 7 /11 *credit Nancy Atkinson*

Here's your flying car. And it's just gotten approval from the US National Highway Traffic Safety Administration to hit the road. Terrafugia's Transition® Roadable Aircraft needed a special exemption for having special plexiglas windows and landing-capable tires for a road vehicle, and this is the first combined flying-driving vehicle to receive such special consideration from the Department of Transportation. It can be yours for a downpayment of $10,000, with the current total cost of $250,000.

Terrafugia — which is Latin for "escape from land" — says this new flying car combines the unique convenience of being able to fold its wings with the ability to drive on any surface road. You can stow the wings for road use and deploy them for flight at the airport.

See a video below of how it works.
http://www.youtube.com/watch?feature=player_embedded&v=aeQL-dUjlOg#at=15

It has a maximum speed of 100 knots (115 mph, 185 km/h), and a range of787 km (490 miles). The easy change-out from airplane to car or car to airplane can be done within the cockpit, allowing pilots to drive in case of inclement weather. You can get a full vehicle parachute, just in case, and it includes many crash safety features found in regular cars.

No need for renting hanger space at the airport – just park it in your garage. When using it as a car, it is 2 meters (80 inches) tall, 2.3 meters (90 inches) wide and 6 meters (18 feet nine inches) long.
When flying, the Transition is 2 meters tall (78 inches) and 6 meters (19 feet 9 inches) long, with a wingspan of 8 meters (26 feet 6 inches.)

And no need to check your bags. An on-board cargo compartment holds your carry-on luggage and includes enough room for golf clubs.

Find out more at the Terrafugia website.

back

10 Tech Innovations From Shuttle Trickled Down Non Astronauts–July 8/11 *credit POPSCI*

Your life is full of what NASA calls "spinoffs": ideas or products initially designed for NASA's particular (and particularly challenging) uses, but which trickled down to become commercial products. Of course, you may not recognize these items--there's no "made for NASA" sticker, and many of the iconic NASA products (Tang, Teflon, Velcro) weren't actually designed for or by NASA at all. But NASA-developed stuff is everywhere, from insulation to infant formula, from prostheses to fishing nets. Here are ten of our favorites that originated in the Shuttle program--the very program that just saw its last launch ever.

1. **Baby Formula with Dietary Supplement**
   Daniel Lockney, who works with the NASA Technology Transfer Program, has a favorite spinoff from the Shuttle program: infant formula. "One of the most unusual and ubiquitous NASA spinoffs is a nutritional supplement found in 95 percent of the baby food sold in the US. It's an algae-based supplement containing nutrients previously only known to exist in breast milk. It's believed to be very important in the development of the fatty tissues in the eyes and brain. You just don't expect to find NASA in your baby food. But it's there. It's everywhere."
2. **Goodyear Tires**
   Goodyear has partnered with NASA a few times, most recently on a spring-loaded tire that needs no inflation. Ideas from those creations often trickle down to the tires available to regular, non-astronaut folks, including a radial tire that boasts a tread life about 10,000 miles greater than regular radial tires, thanks to a "fibrous material" developed for NASA.
3. **Artificial Heart Pump**
   Dr. Michael DeBakey, who sadly passed away in 2008 at the impressive age of 99, collaborated with NASA on a tiny pump for the space shuttle's fuel pump system. At only one inch in diameter and weighing less than four ounces, the pump has only one moving part and no shaft seals at all. That made it ideal for the difficult conditions of space, but it also made it perfect for the human body. As a heart pump, DeBakey's creation provides five liters of blood flow per minute but uses under 10 Watts of energy, and its tiny size makes it an ideal fit for children with chest cavities too small for other solutions. So far, it has saved over 200 lives--with more to come.
4. **Extra-Strength Fishing Net**
   We don't want to imply that we're in favor of net-based fishing, or tuna fishing in general--many species of tuna being on the verge of extinction due to overfishing and all--but we'd be remiss to overlook the Hyperester net (not pictured; that's just an ordinary everyday fishing net), which is now used for tuna fishing but was originally designed for the space shuttle project. NASA asked a company called West Coast Netting to create a safety net for the folks working on the shuttle orbiter--but with a few unusual requirements. It had to be small, but with, as NASA says, "extraordinary tensile strength," resistant to both fire and ultraviolet light. The company found the right material, but had to invent a new twisting process for the twine to increase the net's strength. In tuna fishery, the net sinks faster to catch deeper fish, and its strength and resistance to shrinkage makes it an ideal net for fishermen.
5. **Rescue Equipment for Accident Victims**
   The next time you get in a horrific car crash and have to be cut out of it, you can add NASA to the list of things to thank for making it out alive. Rescue squads often use a particular hand-held cutter to get victims out of wrecks, and as it turns out, that cutter is essentially a miniature version of the one used to, as NASA says, "separate the shuttle from the solid rocket boosters after launch." It's ideal for rescue situations because as it uses controlled explosive charges rather than spinning blades, it needs no auxiliary power or "cumbersome hoses," and it's actually 70% cheaper than competing equipment.
6. **Video Stabilization Software**
   Filming a shuttle launch isn't just for our enjoyment; NASA needs to have reliable film to analyze, to understand when things go wrong and to improve the launch every time. But it's not easy to film a massive rocket, so NASA developed an in-house image processing and video stabilization software to "remove defects due to image jitter, rotation, and zoom." That software is a bit intensive to be used on a MacBook, but was of great help to the FBI when agents were attempting to analyze video of the bombing at the 1996 Olympics in Atlanta. Known as VISAR (Video Image Stabilization and Registration), the software was able to make grainy, blurry, shaky nighttime images appear as if they were expertly filmed during the day.
7. **Biodegradable Commercial Lubricants**
   The space shuttle's platform, used to move the shuttle back and forth, weighs about eight million pounds--without the shuttle itself. Wheeling it three miles to the launch pad is no easy task, and needs some very serious lubricant. Plus, as the Kennedy Space Center is located in a wildlife refuge, the lubricant has to be biodegradable and wildlife-friendly. NASA contracted Sun Coast Chemicals to create the ideal lubricant, which eventually became known as the X-1R Crawler Track Lube. That lubricant has been used in all kinds of things since then: a spray lube for general use (rust prevention, lubricating corroded bolts, joints, and hinges), a fishing rod and reel lube, and an engine treatment for a variety of vehicles. The X-1R lubes have an oxidation life of 10,000

hours and won't harm the environment.

8. **Amazing Insulation for Homeowners and NASCAR Drivers**
   In the vacuum of space, insulation is key to keeping NASA astronauts alive. In the comparatively mildly inconvenient weather here on Earth, we've often gotten to use that incredible insulation technology to keep us at our preferred temperature. Aerogel, the ridiculously light, mostly-air material used on the space shuttle, is far more efficient than regular fiberglass home insulation. Then there's the material designed to keep heat, mostly from the crazy shuttle engines, out. NASCAR drivers have used the same thermal protection given to NASA astronauts.
9. **Image Processing for Firefighters**
   What's good for one fire is good for another, right? NASA's super-sensitive, handheld infrared camera was originally used to examine the plumes shot off by shuttles. Able to analyze the fires for hot spots, the camera proved very useful for rocket technology--but just as useful for firefighters, who use it to locate hot spots in wildfires. That could come in handy these days.
10. **Possible Solutions for Osteoporosis Patients**
    Osteoporosis, the most common bone disease, causes a loss of bone mass, which makes bones fragile, brittle, and more susceptible to breaks and fractures. It's often associated with old age (especially in women) here on Earth, but in zero gravity, it affects everyone. Astronauts lose calcium from bones in space, as the body sees no need to keep bones in tip-top shape when they're not supporting the body's weight. It's not osteoporosis, but it has the same effect. Astronauts have been working out with harness and strap-type exercises since the Apollo days, but that doesn't treat the actual loss of bone mass.

    NASA has created several ways to both detect and treat the bone problem, including new kinds of 3-D tomography scans (which analyze the bone's microarchitecture) and a curious vibrating plate. Yeah, you read that right: NASA scientists think that a certain kind of electrotherapy that requires the astronaut (or regular person) to stand on a "lightly vibrating plate for 10 to 20 minutes each day" while held down with elastic straps could have a beneficial effect on bone loss. Testing is still underway, but is very promising in experiments with lab animals.

back

7. Buy and Sell

Here's your chance to clean out the closet and find a home for your slightly used treasures. Post your buy and sell items by emailing the Editor with your details.

back

8. Ask an Expert

Have you been thumbing through the Astronomy or Sky and Telescope magazine and have some questions on the latest and greatest in astronomy gear? Or maybe you're narrowing down your search for just the right telescope and want to know the difference between Dobsonians, Schmidt-Cassegrains, Reflector and Refractors. Well wonder no more, email Brian Robilliard our resident expert to get the "inside scoop" on what's hot or not in astronomy gear.

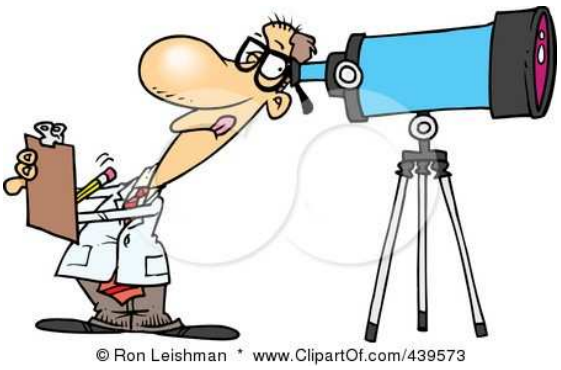
Are you new to astronomy? Want to know the how to find objects in the sky? Or just wondering what that bright object in the evening sky is? Well wonder no more; email Bryon Thompson our Editor and master of Astronomy 101 basics.

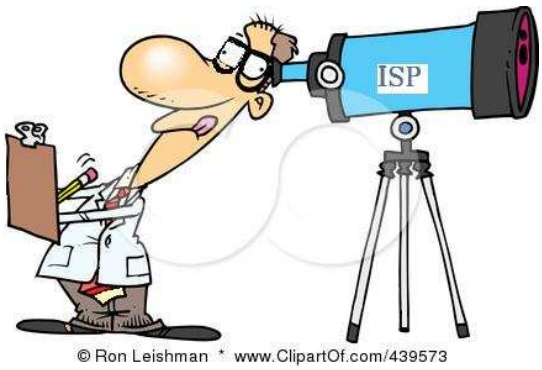
back

9. Kids Korner

For the younger astronomers. We want your input on what you would like to see happening at the club. Tell us a bit about yourself and why you love astronomy. Email the Editor with your submissions. For the older folks, if you have any ideas that might spark the interest of a young upcoming astronomer, please send your submissions to the editor.

See if you can Find 10 Differences in our Astronomers:





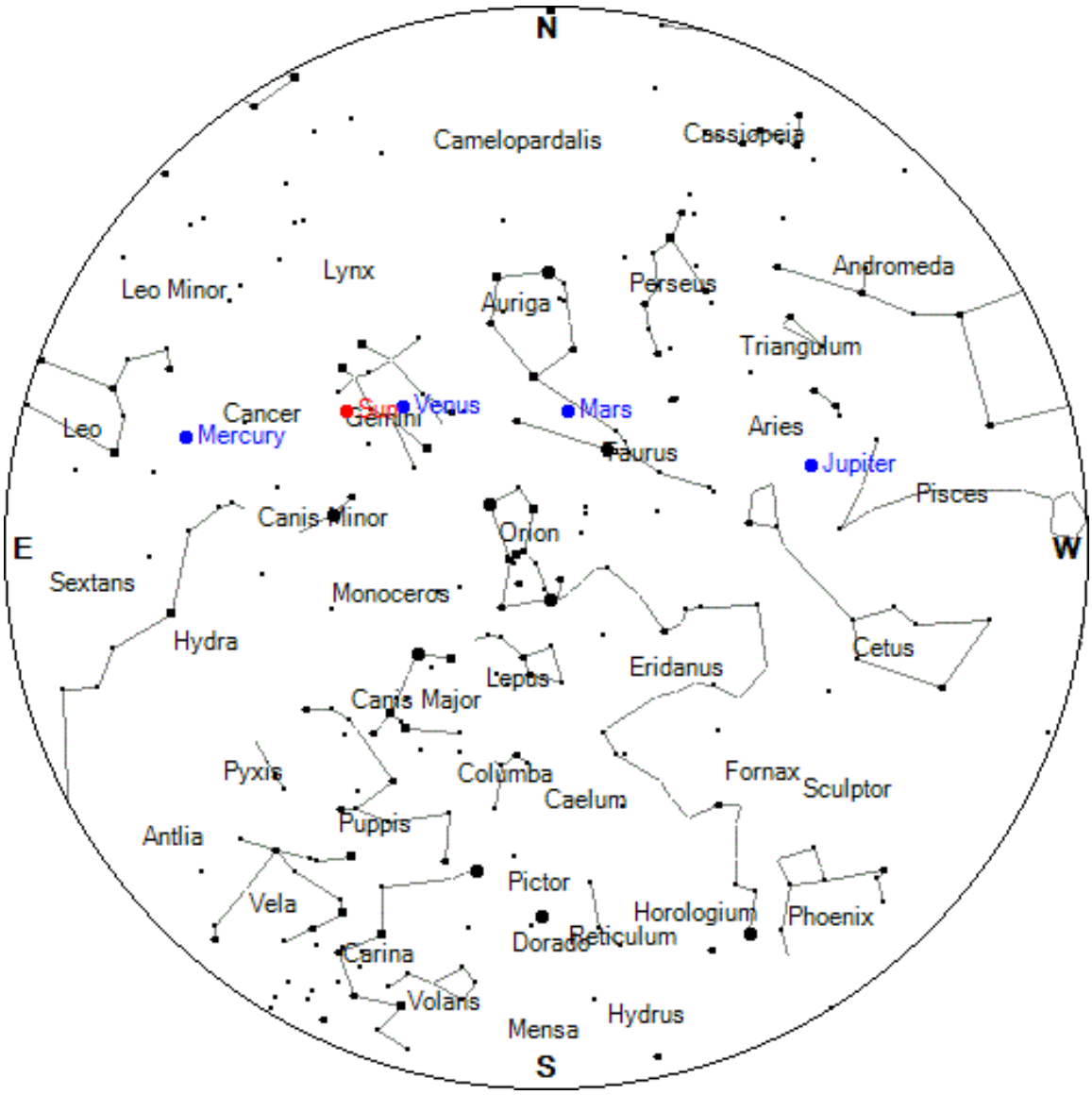
back

10. The Sky This Month

By Bryon Thompson

Observing Site: Duncan, **48.783°N, 123.700°W**

Sky Chart —Here's your mid-July midnight sky chart. In order to use the sky chart properly remember the centre of the chart is the sky directly above your head (or the Zenith). Turn the chart so that the direction you are facing is at the bottom of the chart (or pointed toward your toes). The star field directly in front of you will be between the bottom of the chart and the centre.



SkyChart Courtesy of Heavens-Above

back