



Clear Skies

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Categories

1. [EDITOR GREETINGS](#)
2. [SOCIAL HIGHLIGHTS](#)
3. [UPCOMING EVENTS](#)
4. [THIS MONTH IN HISTORY](#)
5. [COOL PICS/VIDEOS](#)
6. [FEATURED ARTICLES](#)
7. [ASK AN EXPERT](#)
8. [KIDS KORNER](#)
9. [THE SKY THIS MONTH](#)

1. Editor Greetings!

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

First and foremost; I would like to welcome back the following returning members, Gerry and Chris R, Gilbert B, Bill H, Maruin & Trudy T, Alan J, David R, Chuck F, Genevieve S and David P.

Also we have a new contributor to "The Sky This Month." Please welcome Brian Ventrudo (Publisher, One-Minute Astronomer www.oneminuteastronomer.com).

Keith has sent some photos taken at the ISP. Witness the hatch opening of the simulated "marsmen" (Mars 500) Six candidates have been sealed in an isolation chamber since June 2010 to simulate a mission to Mars. The hatch opens on **Nov 3 at 4:00am** (Nov 4 at 11:00am CET)
http://www.esa.int/SPECIALS/Mars500/SEMZ97LUBUG_0.html.

Not only are the "marsmen" having a "coming out party" so are the "cavenauts." The five astronauts sent into ESA's CAVES venture to work in an international team under real exploration conditions. The latest 'crew' has returned after six days in the dark. Read more about their isolated journey in the "Featured Articles." From caves to the Ocean. Operation NEEMO-15 sent six astronauts, researchers and habitat technicians to an underwater habitat to live and work for ten days, just as they would at an asteroid. But instead of in deep space, the mission will take place 43 feet underwater, three miles off the coast of Key Largo. Check out the latest on the "neemoids" at http://www.nasa.gov/mission_pages/NEEMO/index.html

You Cosmologists out there will be interested in the MultiDark Database which is part of the MultiDark project. Their Image/movie section is free to use for talks, posters or just enjoy them! Check it out in the Cool Pics/Video section.

Look in the sky Nov 8 to see the flyby of asteroid 2005 YU55. This is the closest this space rock has come for at least the past 200 years. Read more in the Featured Articles. Oh ya, DON'T FORGET to turn your clock back: Daylight Saving Time ends on Sunday November 6, 2011 at 2:00 AM local time. So what are you going to do with your extra hour?

Many thanks to this month's contributors Moe R, Bryon T, Ed N, Keith W and Brian V.

[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



Quick Links

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[MONTHLY SOCIALS](#)

[BECOME A MEMBER](#)

[NEWSLETTER SUBMISSIONS & SUGGESTIONS](#)

Turn on Frayne Rd towards ocean (Serious Coffee is on the corner)
Turn right on Huckleberry Rd
4th 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 November 23rd**
Feature: "TBA"

[back](#)

Social Highlights Oct 26th/11

By Ed Nicholas

The social started with Bryon doing some announcements of upcoming activities and that the club still has some Island Star Party large tee shirts for sale for \$25.00. These are the ones with embroidered "saturn" on the front. If you are wanting another size that may be made available upon request. If you would like one of the large tee-shirts please contact myself at treasurer@starfinders.ca. Note: they are going fast!

Next was a discussion on the request from Shawnigan Lake School, to help them with a telescope that has been offered to the school. The donation includes a clam shell dome, a 14" Celestron STC, a Takahashi telescope, a Paramount computer controlled mount with had paddle, Big tracker camera and an Apogee camera. The school wanted the club to supply some advice, knowledge and assistance to have this set-up on their grounds. During the discussion it was noted the RASC Victoria took a year to set up their observatory on Little Saanich Mountain. In the end the group thought it would be a worthwhile endeavor for the club, a great opportunity for the school, and maybe we could get some access to use their equipment. A sub committee has been set up with the following individuals that mentioned interest in helping the School. The sub-committee includes: Ed Maxfield, Miles Wait, Ed Nicholas, Brian Robillard and Gerry Rozema on a limited bases. If you would like to help contact Ed Maxfield at emaxfield@starfinders.ca

Next up was a video from NASA 25 Years Collection we watched Volume 1- Freedom 7 and Volume 2- Friendship 7, about the early space flights. And of course there was coffee and snacks available!

[back](#)

3. Upcoming Events



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/>

Nov 07 6:30 – 8pm, Café Scientifique "Search for Life in the Universe" led by Dr. Jon Willis, at Peacock Billiards/James Joyce Bistro, 1175 Douglas at View, Victoria. Admission: Free Café Scientifique is a monthly public discussion series sponsored by the U.Victoria Faculty of Science And Dept. of Physics & Astronomy.

Nov 14 9:00 – 3:00pm Rocket Scientists Led by Children get to build their own model planes and a rocket. Young astronauts explore the mysteries of the solar system and discover how astronauts live and work in space. Ages: 6 – 12 Cost: \$ 65 Registration: Panorama Recreation 250-656-7271

Nov 19 Are we ready for Mars? Led by Geobiologist Dr. Darlene Lim, H.R. MacMillan Space Centre, Vancouver. Tickets: \$10.75 general; \$8.75 members.

Nov 24 7:00 – 9:00pm "Killer Rocks From Space!" Presented by Dr. Weller, Nanaimo Astronomy Club Location: Beban Social Complex Street: 2300 Bowen Road City/Town: Nanaimo

Nov 30 Girls in Science Led by CAGIS. The group is geared for girls ages 7-16, and will include one meeting per month with professionals in Science, Engineering and Mathematics. Registration: Canadian Association of Girls in Science 250-686-6917 Registration Link cagisvictoria@gmail.com

South Pacific Eclipse Cruise Nov 2-22, 2012 - Honolulu, Hawaii to Sydney, Australia - observe the 2012 eclipse from the deck of the Celebrity Millennium. Please Contact Sandy Campbell of Expedia CruiseShipCenters by [email](#) or by telephone 250-477-4877 or 250-588-1276 for more details.

NASA Launches credit NASA.Com:

Date: Nov. 14

Assembly Flight: 28S

Mission: Expedition 29/30

Launch Vehicle: Soyuz TMA-22

Launch Site: Baikonur Cosmodrome, Kazakhstan

Description: Soyuz TMA-22 will carry three Expedition 29/30 crew members to the International Space Station.

Date: Nov. 25

Mission: Mars Science Laboratory, Curiosity Rover

Launch Vehicle: Atlas V

Launch Site: Cape Canaveral Air Force Station, Fla.

Launch Pad: Space Launch Complex 41

Launch Time: 10:21 a.m. EST

Description: The Mars Science Laboratory is a rover that will assess whether Mars ever was, or is still today, an environment able to support microbial life and to determine the planet's habitability.

[back](#)

4. This Month In History

Courtesy of: Windows2universe.org

November 3

1957 - Sputnik 2 launched.

The second Sputnik satellite, launched by the Soviet Union, carried a dog, named Laika, into space. Biological data was returned for a week before the animal had to be put to sleep.

November 5

1879 - Death of James Maxwell

James Clerk Maxwell was a Scottish physicist who lived between 1831-1879. Maxwell is most famous for his equations linking electricity and magnetism. His revolutionary work led to the development of quantum physics in the early 1900's and to Einstein's theory of relativity.

November 7

1867 - Birthday of Marie Curie

Marie Curie was a Polish physicist and chemist who lived between 1867-1934. Together with her husband, Pierre, she discovered two new elements and studied the x-rays they emitted. She found that the harmful properties of x-rays could be used in medical treatment to kill tumors.

November 8

1656 - Edmond Halley's birthday

Edmond Halley was an English astronomer who lived between 1656-1742. He reasoned that the comets which had appeared in 1456, 1531, 1607, and 1682, were one and the same. He then correctly predicted the comet's return about every 76 years, and today it bears his name.

1895 - Wilhelm Röntgen discovered x-rays

Wilhelm Roentgen was a German physicist who lived between 1845-1923. His accidental discovery of x-rays in 1895 changed the fields of physics and medicine and brought him the first Nobel Prize in 1901.

November 9

1934 - Carl Sagan's birthday

Carl Sagan is an American astronomer who was born in 1934. He is famous for his research on the origins of life and his belief that life exists elsewhere in the universe.

November 15

1630 - Death of Johan Kepler

Johan Kepler was a German astronomer who lived between 1571-1630. He introduced three important laws of planetary motion and helped the Copernican model of the solar system gain

general acceptance.

1738 - William Herschel's birthday

William Herschel was born in Germany and lived in England as he worked as an astronomer. He lived between 1738-1822. He built high magnification telescopes that let him observe the heavens with greater detail. Herschel discovered the planet Uranus and advanced our understanding of nebulae.

November 17

1979 - Death of Immanuel Velikovsky

Immanuel Velikovsky was a writer born in 1895 in Vitebsk, Russia. After traveling and working in many places throughout the world, he moved to the United States. Immanuel Velikovsky wrote many books regarding history, religion and science. His most famous work is *Worlds in Collision*.

November 18

1962 - Death of Niels Bohr

Niels Bohr was a Danish physicist who lived between 1885-1962. He investigated atomic structure, modifying Rutherford's old model of an atom. Bohr also claimed that an atom's chemical properties are determined only by the electrons with the largest orbits.

November 20

1889 - Birthday of Edwin Hubble

Edwin Hubble was an American astronomer who lived between 1889-1953. His observations of galaxies helped him develop the idea of an expanding universe, which forms the basis of modern cosmology. He also discovered a relationship between a galaxy's speed and its distance.

November 22

1944 - Death of Arthur Eddington

English astrophysicist and mathematician known for his work on the motion, distribution, evolution and structure of stars.

November 28

1882 - Birthday of Sir Arthur Eddington

English astrophysicist and mathematician known for his work on the motion, distribution, evolution and structure of stars.

November 29

1803 - Birthday of Christian Doppler

Christian Doppler was an Austrian mathematician who lived between 1803-1853. He is known for the principle he first proposed in Concerning the coloured light of double stars in 1842. This principle is now known as the Doppler Effect.

1852 - Death of Ada Byron

Ada Byron, Countess of Lovelace, was a British mathematician who lived between 1815-1852. She was a major influence in computer programming.

[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".

Here's a couple of "cool pics" taken at this year's ISP by Keith Walker.

Keith writes:

Both pictures happened to have the same stats:

Orion 200mm Astrograph, f/4

Canon 350D (modified), ISO 800

12 frames @ 60 seconds each, 12 minutes total

Processed in Deep Sky Stacker and Photoshop.

Comet Garradd and M71. I was anxious to get this photo, since I missed the comet's last encounter with a globular cluster a couple of weeks earlier. It turned out better than I expected.



(Right) The Trifid Nebula.

This was the first time I have ever seen it. It, along with all the other fun stuff in that area of the sky, is well below my tall treeline, so I hadn't had the opportunity until the star party.



If you have ISP pictures that you would like added to our website please email: newsletter@starfinders.ca
This year's ISP photos will be posted on our website soon.

Welcome to the MultiDark Database - The Bolshoi supercomputer simulation, the most accurate and detailed large cosmological simulation run to date, gives physicists and astronomers a powerful new tool for understanding such cosmic mysteries as galaxy formation, dark matter, and dark energy. The Bolshoi simulation and its two variants will be made publicly available to astrophysical researchers worldwide in phases via the MultiDark Database, which provides results from cosmological simulations performed within the MultiDark project <http://www.multidark.org/MultiDark/>

Watch online - Mars500 hatch opening - The Mars500 experiment is about to end after almost 1.5 years. Six men have been isolated in their interplanetary spacecraft mockup since early June 2010, faithfully simulating a mission to Mars. During the whole trip - and even before - the crew has been conducting a suite of science experiments, with themselves as subject, and they will continue doing these for some time after the end of their isolation. See the last broadcast on youtube <http://www.youtube.com/esa> Follow the hatch opening at 11:00am CET or 4:00am PST http://www.esa.int/SPECIALS/Mars500/SEMZ97LUBUG_0.html

[back](#)

6. Featured Articles

Articles

Cave Crew Returns to Earth – Oct 19/11 Credit: ESA News

RETURN TO CATEGORIES

1. [Cave Crew Returns to Earth](#)
2. [VISTA Finds New Globular Star Clusters](#)
3. [NASA Telescopes Help Solve Ancient Supernova Mystery](#)
4. [Astronomers Discover Complex Organic Matter Exists In Universe](#)
5. [NASA in Final Preparations for Nov 8 Asteroid Flyby](#)
6. [Boeing to Build Commercial Spacecraft at Kennedy](#)
7. [Evolutionary Timeline for Machine Intelligence](#)



Take five astronauts and instead of sending them into space take them underground. ESA's CAVES venture prepares astronauts to work in an international team under real exploration conditions. The latest 'crew' has returned after six days in the dark.

Sardinia is not only a popular Mediterranean holiday destination but also an excellent place for astronaut training. The island's interior has isolated mountains and forest areas, rugged and savage.

ESA's astronauts passed their survival training there, and two of them recently returned with American, Russian and Japanese colleagues. For six days they lived and worked in the island's complex cave systems – some of them unmapped or unexplored.

"Even for astronauts, life in the dark, cool, humid underground environment can be a completely new situation with interesting psychological and logistical problems," notes Loredana Bessone, astronaut trainer at the European Astronaut Centre in Cologne, Germany. "The cave environment is isolated from the outside world.

There is confinement, minimal privacy, technical challenges and limited equipment and supplies for hygiene and comfort – just like in space." This is not the first time she has taken a training team into the caves, but this was the first with such an international team: ESA's Tim Peake and Thomas Pesquet were joined by Randolph Bresnik from NASA, Norishige Kanai from Japan and Sergey Ryzhikov from Russia.



Left: In cave during the preparatory training

"It was a rare opportunity to experience problems encountered during a space mission in a training environment," says Tim. "Our mission required teamwork and working through problems as a small international team where different cultures and primary languages require consideration." Thomas praises the team and good organisation: "Everyone was focused and we had a great

time together." "Being in a cave was something like mountaineering, but much more challenging – with isolation, darkness and the need for full situational awareness to avoid snagging ourselves on sharp rocks or crevices."

Real exploration

The daily routine was organised around timelines, as on a space mission. Planning sessions were held twice a day through a dedicated telephone line to a support team at the cave's mouth.

"The most exciting moments were the times when we were in unknown passages and had to make decisions on how to proceed and how to organise ourselves," explains Thomas. "We encountered underground lakes, had to decide if we used ropes or an inflatable boat ... should we continue together or divide into small groups ... and so on."

Their scientific work included mapping, photography, monitoring air flow, temperature and humidity, and taking geological and microbiological samples.

Right: Thomas Pesquet on the second day of exploration



Action-packed to the last moment

"It took about five hours to come back from the cave to our campsite, requiring technical caving and a support team to help us," notes Tim. "We really had a feeling of being far away." "When we came back, everything on the surface looked strange: the blue of the sky and other colours looked painted and all the smells of nature were so strong," remembers Thomas. "The real world felt all-too real, exaggerated."

At the end of the mission, the crew prepared a report, went through a final debriefing and gave a handover presentation that will be used for the next 'cavenauts'. Tim summarised the whole experience: "From my point of view, the most valuable part was the personal friendships that were

forged between the participants." CAVES has been designed and developed jointly by ESA and Advanced Training Solutions.

[back](#)

VISTA Finds New Globular Star Clusters – Oct 19/11 *Credit: ESO*

Two newly discovered globular clusters have been added to the total of just 158 known globular clusters in our Milky Way. They were found in new images from ESO's VISTA survey telescope as part of the Via Lactea (VVV) survey. This survey has also turned up the first star cluster that is far beyond the centre of the Milky Way and whose light has had to travel right through the dust and gas in the heart of our galaxy to get to us.



The dazzling globular cluster called UKS 1 dominates the right-hand side of the first of the new infrared images from ESO's VISTA survey telescope at the Paranal Observatory in Chile. But if you can drag your gaze away, there is a surprise lurking in this very rich star field — a fainter globular cluster that was discovered in the data from one of VISTA's surveys. You will have to look closely to see the other star cluster, which is called VVV CL001: it is a small collection of stars in the left half of the image.

But VVV CL001 is just the first of VISTA's globular discoveries. The same team has found a second object, dubbed VVV CL002, which appears in image b [1]. This small and faint grouping may also be the globular cluster that is the closest known to the centre of the Milky Way. The discovery of a new globular cluster in our Milky Way is very rare. The last one was discovered in 2010, and only 158 globular clusters were known in our galaxy before the new discoveries.

These new clusters are early discoveries from the VISTA Variables in the Via Lactea (VVV) survey that is systematically studying the central parts of the Milky Way in infrared light. The VVV team is led by Dante Minniti (Pontificia Universidad Católica de Chile) and Philip Lucas (Centre for Astrophysics Research, University of Hertfordshire, UK).

As well as globular clusters, VISTA is finding many open, or galactic clusters, which generally contain fewer, younger, stars than globular clusters and are far more common (eso1128). Another newly announced cluster, VVV CL003, seems to be an open cluster that lies in the direction of the heart of the Milky Way, but much further away, about 15 000 light-years beyond the centre. This is the first such cluster to be discovered on the far side of the Milky Way.

Given the faintness of the newly found clusters, it is no wonder that they have remained hidden for so long; up until a few years ago, UKS 1 (seen in image a), which easily outshines the newcomers, was actually the dimmest known globular cluster in the Milky Way. Because of the absorption and reddening of starlight by interstellar dust, these objects can only be seen in infrared light and VISTA, the world's largest survey telescope, is ideally suited to searching for new clusters hidden behind dust in the central parts of the Milky Way [2].

One intriguing possibility is that VVV CL001 is gravitationally bound to UKS 1 — making these two stellar groups the Milky Way's first binary globular cluster pair. But this could just be a line-of-sight effect with the clusters actually separated by a vast distance.

These VISTA pictures were created from images taken through near-infrared filters J (shown in blue), H

(shown in green), and Ks (shown in red). The size of the images show only a small fraction of the full VISTA field of view.

Notes

[1] The discovery of the additional new clusters was just announced in San Juan, Argentina, during the first bi-national meeting of the Argentinian and Chilean astronomical associations.

[2] The tiny dust grains that form huge clouds within galaxies scatter blue light much more strongly than red and infrared light. As a result astronomers can see through the dust much more effectively if they study infrared light rather than the usual visible radiation that our eyes are sensitive to.

More information

ESO, the European Southern Observatory, is the foremost intergovernmental astronomy organisation in Europe and the world's most productive astronomical observatory. It is supported by 15 countries: Austria, Belgium, Brazil, the Czech Republic, Denmark, France, Finland, Germany, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom. ESO carries out an ambitious programme focused on the design, construction and operation of powerful ground-based observing facilities enabling astronomers to make important scientific discoveries. ESO also plays a leading role in promoting and organising cooperation in astronomical research. ESO operates three unique world-class observing sites in Chile: La Silla, Paranal and Chajnantor. At Paranal, ESO operates the Very Large Telescope, the world's most advanced visible-light astronomical observatory and two survey telescopes. VISTA works in the infrared and is the world's largest survey telescope and the VLT Survey Telescope is the largest telescope designed to exclusively survey the skies in visible light. ESO is the European partner of a revolutionary astronomical telescope ALMA, the largest astronomical project in existence. ESO is currently planning a 40-metre-class European Extremely Large optical/near-infrared Telescope, the E-ELT, which will become "the world's biggest eye on the sky".

[back](#)

NASA Telescopes Help Solve Ancient Supernova Mystery – Oct 25/11

Astronomy.com, Jet Propulsion Laboratory, Pasadena, California, NASA Headquarters, Washington, D.C.



This image combines data from four different space telescopes to create a multi-wavelength view of all that remains of the oldest documented example of a supernova, called RCW 86.

A mystery that began nearly 2,000 years ago, when Chinese astronomers witnessed what would turn out to be an exploding star in the sky, has been solved. New infrared observations from NASA's Spitzer Space Telescope and Wide-field Infrared Survey Explorer (WISE) reveal how the first supernova ever recorded occurred and how its shattered remains ultimately spread out to great distances.

The findings show that the stellar explosion took place in a hollowed-out cavity, allowing material expelled by the star to travel much faster and farther than it would have otherwise. "This supernova remnant got really big, really fast," said Brian J. Williams from North Carolina State University in Raleigh. "It's two to three times bigger than we would expect for a supernova

that was witnessed exploding nearly 2,000 years ago. Now, we've been able to finally pinpoint the cause."

In A.D. 185, Chinese astronomers noted a "guest star" that mysteriously appeared in the sky and stayed for about eight months. By the 1960s, scientists had determined that the mysterious object was the first documented supernova. Later, they pinpointed RCW 86 as a supernova remnant located about 8,000 light-years away. But a puzzle persisted. The star's spherical remains are larger than expected. If they could be seen in the sky today in infrared light, they'd take up more space than our Moon.

The solution arrived through new infrared observations made with Spitzer and WISE and previous data from NASA's Chandra X-ray Observatory and the European Space Agency's XMM-Newton Observatory. The findings reveal that the event is a type Ia supernova created by the relatively peaceful death of a star like our Sun, which then shrank into a dense star called a white dwarf. The white dwarf is thought to have later blown up in a supernova after siphoning matter, or fuel, from a nearby star. "A white dwarf is like a smoking cinder from a burnt-out fire," Williams said. "If you pour gasoline on it, it will explode."

The observations also show for the first time that a white dwarf can create a cavity around it before

blowing up in a type Ia event. A cavity would explain why the remains of RCW 86 are so big. When the explosion occurred, the ejected material would have traveled unimpeded by gas and dust and spread out quickly.

Spitzer and WISE allowed the team to measure the temperature of the dust making up the RCW 86 remnant at about -325° degrees Fahrenheit (-200° Celsius). They then calculated how much gas must be present within the remnant to heat the dust to those temperatures. The results point to a low-density environment for much of the life of the remnant, essentially a cavity.

Scientists initially suspected that RCW 86 was the result of a core-collapse supernova, the most powerful type of stellar blast. They had seen hints of a cavity around the remnant, and, at that time, such cavities were only associated with core-collapse supernovae. In those events, massive stars blow material away from them before they blow up, carving out holes around them.

But other evidence argued against a core-collapse supernova. X-ray data from Chandra and XMM-Newton indicated that the object consisted of high amounts of iron, a telltale sign of a type Ia blast. Together with the infrared observations, a picture of a type Ia explosion into a cavity emerged.

"Modern astronomers unveiled one secret of a two-millennia-old cosmic mystery only to reveal another," said Bill Danchi from NASA Headquarters in Washington, D.C. "Now, with multiple observatories extending our senses in space, we can fully appreciate the remarkable physics behind this star's death throes, yet still be as in awe of the cosmos as the ancient astronomers."

[back](#)

Astronomers Discover Complex Organic Matter Exists in the Universe—Oct 27/11
Credit ScienceDaily.com

Astronomers report in the journal *Nature* that organic compounds of unexpected complexity exist throughout the Universe. The results suggest that complex organic compounds are not the sole domain of life but can be made naturally by stars.

Prof. Sun Kwok and Dr. Yong Zhang of The University of Hong Kong show that an organic substance commonly found throughout the Universe contains a mixture of aromatic (ring-like) and aliphatic (chain-like) components. The compounds are so complex that their chemical structures resemble those of coal and petroleum. Since coal and oil are remnants of ancient life, this type of organic matter was thought to arise only from living organisms. The team's discovery suggests that complex organic compounds can be synthesized in space even when no life forms are present.

The researchers investigated an unsolved phenomenon: a set of infrared emissions detected in stars, interstellar space, and galaxies. These spectral signatures are known as "Unidentified Infrared Emission features." For over two decades, the most commonly accepted theory on the origin of these signatures has been that they come from simple organic molecules made of carbon and hydrogen atoms, called polycyclic aromatic hydrocarbon (PAH) molecules. From observations taken by the Infrared Space Observatory and the Spitzer Space Telescope, Kwok and Zhang showed that the astronomical spectra have features that cannot be explained by PAH molecules. Instead, the team proposes that the substances generating these infrared emissions have chemical structures that are much more complex. By analyzing spectra of star dust formed in exploding stars called novae, they show that stars are making these complex organic compounds on extremely short time scales of weeks.

Not only are stars producing this complex organic matter, they are also ejecting it into the general interstellar space, the region between stars. The work supports an earlier idea proposed by Kwok that old stars are molecular factories capable of manufacturing organic compounds. "Our work has shown that stars have no problem making complex organic compounds under near-vacuum conditions," says Kwok. "Theoretically, this is impossible, but observationally we can see it happening."

Most interestingly, this organic star dust is similar in structure to complex organic compounds found in meteorites. Since meteorites are remnants of the early Solar System, the findings raise the possibility that stars enriched the early Solar System with organic compounds. The early Earth was subjected to severe bombardments by comets and asteroids, which potentially could have carried organic star dust. Whether these delivered organic compounds played any role in the development of life on Earth remains an open question.

Prof. Sun Kwok is the Dean of Science and Chair Professor of Physics of the University of Hong Kong. He serves as Vice President of Division VI (interstellar matter) of the International Astronomical Union, and is the incoming Vice President of Commission 51 (bioastronomy) of the International Astronomical Union. He has published many books, including the recent book "Organic Matter in the Universe" (Wiley, 2011). Dr. Yong Zhang is a Research Assistant Professor at the University of Hong Kong. This work was supported by the Research Grants Council of Hong Kong.

[back](#)

NASA in Final Preparations for November 8 Asteroid Flyby—Oct 31/11 *credit Astronomy.com, Jet Propulsion Laboratory, Pasadena, California*

NASA scientists will be tracking asteroid 2005 YU55 with antennas of the agency's Deep Space Network at Goldstone, California, as the space rock safely flies past Earth, slightly closer than the Moon's orbit, November 8. Scientists are treating the flyby of the 1,300-foot-wide (400 meters) asteroid as a science target of opportunity, allowing instruments on "spacecraft Earth" to scan it during the close pass.

Tracking the aircraft-carrier-sized asteroid will begin at 9:30 a.m. PDT November 4, using the massive 230-foot (70m) Deep Space Network antenna, lasting for about two hours. The Goldstone facility will continue to track the asteroid for at least four hours each day from November 6 through November 10. Radar observations from the Arecibo Planetary Radar Facility in Puerto Rico will begin November 8, the same day the asteroid will make its closest approach to Earth at 3:28 p.m. PST.

The trajectory of asteroid 2005 YU55 is well understood. At the point of closest approach, it will be no closer than 201,700 miles (324,600 kilometers), or 0.85 the distance from the Moon to Earth. The gravitational influence of the asteroid will have no detectable effect on anything here on Earth, including our planet's tides or tectonic plates. Although 2005 YU55 is in an orbit that regularly brings it to the vicinity of Earth (and Venus and Mars), the 2011 encounter with Earth is the closest this space rock has come for at least the past 200 years.

During tracking, scientists will use the Goldstone and Arecibo antennas to bounce radio waves off the space rock. Radar echoes returned from 2005 YU55 will be collected and analyzed. NASA scientists hope to obtain images of the asteroid from Goldstone as fine as about 7 feet (2m) per pixel. This should reveal a wealth of detail about the asteroid's surface features, shape, dimensions, and other physical properties.

Arecibo radar observations of asteroid 2005 YU55 made in 2010 show it to be approximately spherical in shape. It is slowly spinning, with a rotation period of about 18 hours. The asteroid's surface is darker than charcoal at optical wavelengths. Amateur astronomers who want to get a glimpse at YU55 will need a telescope with an aperture of 6 inches or larger.

The last time a space rock as big came this close to Earth was in 1976, although astronomers did not know about the flyby at the time. The next known approach of an asteroid this large will be in 2028.

NASA detects, tracks, and characterizes asteroids and comets passing close to Earth using both ground- and space-based telescopes. The Near-Earth Object Observations Program, commonly called Spaceguard, discovers these objects, characterizes a subset of them, and plots their orbits to determine if any could be potentially hazardous to our planet.

[back](#)

Boeing to Build Commercial Spacecraft at Kennedy—Nov 1/11 *credit Astronomy.com, NASA Science*



Artist's concept of Boeing's CST-100 vehicle in orbit. *Credit: Boeing*

The Boeing Co. will set up Orbiter Processing Facility-3 at NASA's Kennedy Space Center in Florida to manufacture and assemble its CST-100 spacecraft for launches to the International Space Station under a newly signed agreement with NASA and Space Florida. And that deal could provide a glimpse of how Kennedy's unique facilities will be used in the future.

"It's a clear sign that NASA will continue to be an engine for growth," said Lori Garver from the space center in announcing the deal during a ceremony October 31 at OPF-3. "Together

we're going to win the future right here."

This deal, expected to produce 550 jobs by 2015, may be the first of several affecting other Kennedy facilities as the center sorts through what it needs for the future and what can be turned over to others. The retirement of the space shuttle fleet earlier this year made a number of facilities available for future use.

"Kennedy is moving forward," said Bob Cabana, the center's director. "Partnerships are going to be key." The White House also praised the agreement in a statement released Monday. "My administration will be pressing forward, in partnership with Space Florida and the private sector, to create jobs and make sure America continues to lead the world in exploration and discovery," President Barack Obama said.

The agreement was held up as an example of public and private enterprise cooperation. Under the deal, NASA turned over the facility, which had been used to process space shuttles for launch, to Space Florida, an aerospace economic development agency of the state. Space Florida, in turn, agreed to let Boeing use it. It was a deal that took about a year to complete, according to Florida Lieutenant Governor Jennifer Carroll, who also is the chairwoman of Space Florida. "I think we have it just right, that this is a true partnership," Carroll said, "that all have an equal part in this and an equal opportunity in this, and we can move forward with other companies that want to come in and have a public-private partnership with us."

Officials indicated there would be such agreements coming up. "This is just the first of much to come," said Senator Bill Nelson of Florida. "You just wait until you see what's coming here to the Kennedy Space Center in the future in the way of public-private partnerships."

In OPF-3, the immediate future involves removing the infrastructure of work platforms and ground systems that were used to service space shuttles that returned from orbit and were being prepped for another flight. That should take about a year, said John Mulholland from Boeing.

After that, fixtures tailored to the CST-100 will be moved onto the floor, which, at some 29,000 square feet (2,700 square meters), is large enough to accommodate several CST-100 capsules at once as they go through the assembly. The CST-100, which stands for Crew Space Transportation, is a reusable, capsule-shaped spacecraft built to ferry seven people into Earth orbit. Working with NASA's Commercial Crew Program, Boeing envisions the first missions carrying astronauts to the space station, possibly as soon as 2015. The company also may take people to a space station designed by Bigelow Aerospace, with those launches also potentially taking place at Kennedy.

Boeing expects to hire 550 people by 2015 when the floor of the OPF is expected to be in full operation, with several capsules in different stages of completion. The deal runs 15 years, and there is an option for another five. The company also announced it is basing its commercial crew program office at Kennedy, which is the home of NASA's program. "We selected Florida for the commercial crew headquarters because of its close proximity to not only our NASA customer at Kennedy Space Center, but also because of outstanding facilities and an experienced space workforce," said John Elbon, vice president and general manager of Boeing Space Exploration.

Nelson, who flew as a payload specialist on Columbia's STS-61C mission in January 1986, said NASA is turning over flights to the space station so it can put its efforts into deep-space travel using the new Orion spacecraft and launching on the Space Launch System heavy-lift rocket. "NASA can't stay stuck in low Earth orbit," Nelson said. "NASA's got to get out and explore the heavens. We're just getting cranked up."

[back](#)

Evolutionary Timeline for Machine Intelligence—Nov 1/11 credit *The Daily Galaxy*



"I see a strong parallel between the evolution of robot intelligence and the biological intelligence that preceded it. The largest nervous systems doubled in size about every fifteen million years since the Cambrian explosion 550 million years ago. Robot controllers double in complexity (processing power) every year or two. They are now barely at the lower range of vertebrate complexity, but should catch up with us within a half century."

Hans Moravec, pioneer in mobile robot research and a founder of Carnegie Mellon University's Robotics Institute.

According to Moravec, our robot creations are evolving similar to how life on Earth evolved, only at warp speed. By his calculations, by mid-century no human task, physical or intellectual, will be beyond the scope of robots.

Here is a summary of his educated predictions for the future of robotics up until they can do everything we can do:

2015: Utility robots host programs for several tasks. Larger "Utility Robots" with manipulator arms able to run several different programs to perform different tasks may follow single-purpose home robots. Their tens of billion calculation per second computers would support narrow inflexible competences, perhaps comparable to the skills of an amphibian, like a frog.

2020: Universal robots host programs for most simple chores. Larger machines with manipulator arms and the ability to perform several different tasks may follow, culminating eventually in human-scale "universal" robots that can run application programs for most simple chores. Their tens of billion calculation per second lizard-scale minds would execute application programs with reptilian inflexibility.

2030: Robot competence will become comparable to larger mammals. In the decades following the first universal robots, a second generation with mammallike brainpower and cognitive ability will emerge. They will have a conditioned learning mechanism, and steer among alternative paths in their application programs on the basis of past experience, gradually adapting to their special circumstances. A third generation will think like small primates and maintain physical, cultural and psychological models of their world to mentally rehearse and optimize tasks before physically performing them. A fourth, humanlike, generation will abstract and reason from the world model.

If Moravec is correct in his predictions, it won't be long before robots have cognition. With daily breakthroughs happening in the robotic community—it may happen even sooner. Not only will they be able to think autonomously, but robot intelligence and capabilities would equal (and most likely quickly surpass) any human capability.

That likely possibility begs the question, what happens when robots are superior to their creators? Will they still be subservient to us, or will the popular "robot takeover" of sci-fi movies become reality? I love robots as much as the next geek, but maybe we need some sort of plan for when they stop loving us...

On the other hand, others believe that it is humans who will evolve into advanced "robots". Their belief is that with futuristic technologies being developed in multiple fields, human intelligence may eventually be able to "escape its enslavement in biological tissue" and be able to move freely across boundaries that can't support flesh and blood—while still retaining our identities. That idea seems much further away, but whatever the case may be—there are changes ahead.

[back](#)

7. 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 [Byron Thompson](#) our Editor and master of Astronomy 101 basics.

[back](#)

8. Kids Korner

If you have any ideas that might spark the interest of a young upcoming astronomer, please send your submissions to the editor.

This month we have Anagrams from Think.com. Match the words in column one with the column two.

Astronomer	Unto a star
Astronaut	Brainy
Life on Mars	Comics
Binary	Remote
Earth	Moon-starer
Meteor	Alien forms
Cosmic	Heart

[back](#)

9. The Sky This Month

By oneminuteastronomer.com

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

Lots of planets to see in the sky this month. Jupiter just reached opposition, rising at sunset and reaching its maximum height above the horizon near midnight. Each night the big planet rises earlier, ideally located for after-dinner viewing.

Here's what else to look for in the night sky this month...

Nov. 1-8. The zodiacal light, or "false dawn", persists early this month just before sunrise. This tall, eerie wedge-shaped glow is reflected sunlight off fine dust particles in the plane of the solar system. You need very dark sky to see it.

1-15. Mercury is just 2 degrees below Venus low in the southwest sky after sunset. Venus is brighter.

2 Wed. First Quarter Moon (16:38 UT)

6 Sun. Daylight savings time ends for most of North America at 2 a.m. Set your clocks back an hour... and catch up on your sleep.

8 Tues. Asteroid 2005 YU55 passes within 325,000 km of Earth this evening. That's close, closer than the Moon. The 11th-magnitude object passes rapidly through Pegasus at about 3:00pm (7 p.m. EST). This will be a challenge to see.

9 Wed. Venus, Mercury, and Antares form a short and nearly straight line in the southwest about 30 minutes after sunset. Venus is the brightest, Antares the faintest. The view is better south of 45 N latitude.

10 Thurs. Mars passes within 1.5 degrees of the bright star Regulus in the constellation Leo. Look for the spectacle high in the eastern sky 1-2 hours before sunrise. Mars rises near midnight at mid-month and passes through the Sickle of Leo. The planet brightens from +1 magnitude to +0.7 magnitude by month's end. It's still very small in a telescope, reaching a size of just 6"-7".

10 Thurs. Full Moon (20:16 UT)

14 Mon. Mercury reaches its greatest eastern elongation about 22.7 degrees from the Sun. As noted above, it stays close to Venus in the southwest sky after sunset.

18 Fri. The Leonid meteor shower peaks before dawn. While it's a good shower some years, the Moon washes out fainter meteors this year. Look for the meteors anywhere in the sky. If it's a Leonid, you can trace its path back to a point in the constellation Leo.

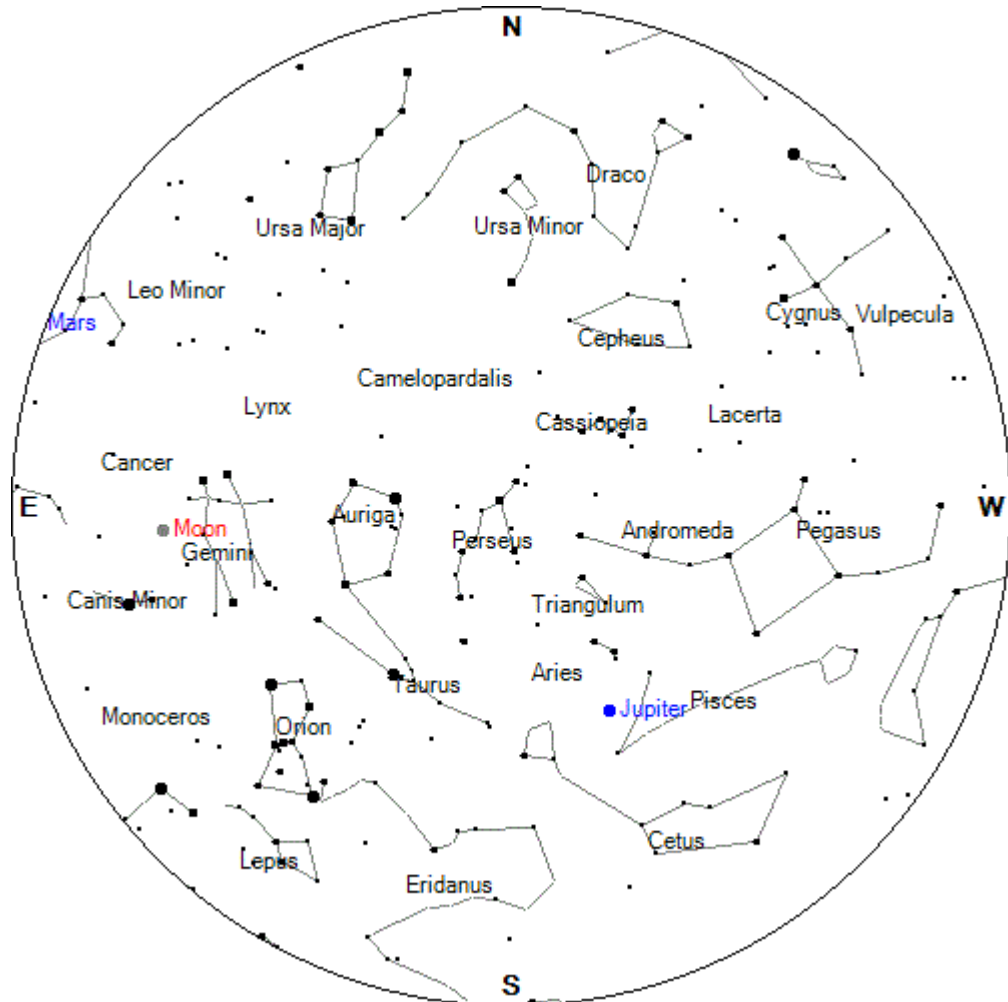
18 Fri. Last Quarter Moon (15:09 UT)

22 Tues. The planet Saturn, bright white star Spica, and a waning crescent Moon line up in the southeastern sky just before sunrise. Saturn rises about 3:30 a.m. by month's end, reaching 25 degrees above the horizon by sunrise. The tilt of the rings is close to 12 degrees, which presents a much more dramatic view in a telescope than in recent years.

22 Saturn, Spica, and a waning crescent Moon line up in the southeastern sky just before sunrise.

25 Fri. New Moon (06:10 UT)

Sky Chart —Here's your mid-November 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](#)