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Greetings!

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

February has been a very short but busy month for the club. As you know we have teamed up with the RASCals to co-host this year's Island Star Party. A great suggestion with it being the Year of Astronomy. The date has been confirmed, so mark your calendars for **JULY 17 – 19**. Moe Raven has volunteered to be our club's representative on the ISP planning committee and will be providing additional information as details are sorted out.

Robert Deane has donated a pair of Celestron 20X80 Binoculars and two Cd's (Jupiter impact and Vision of Saturn) for the CVSF raffle this year. Thank you Robert.

In other news we are still looking at other possible sites for the 2010 ISP. We have many possible sites of which two look very promising. At the last social a few of you raised your hand's to volunteer to go and view the sites, unfortunately I didn't record that part ☺. Please send your name to Bryon at: vice-president@starfinders.ca if you are wanting to go and view the site so that he may let you know when a time has been set up.

For the past few years Phyllis Scott has held the Treasurer position. Recently the position has come available and at the last social Ed Nicholas was nominated and accepted the Treasurer position. Thank you Ed for volunteering and thank you Phyllis for all your years of effort. We would love to see you at the socials and/or the ISP should your time permit.

Hang it there, spring is just around the corner and it is a great time to go viewing because it not too cold out but the skies are still crystal clear when they do decide to uncover from all those clouds.

It is always a pleasure to thank this month's contributors: Moe Raven and Bryon Thompson for all their input and enthusiasm.

Freda Eckstein

"Shoot for the moon. Even if you miss, you'll land among the stars". ~Les Brown
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Socials

Socials are held on the **4th Wednesday of each month** at the home of Bryon and Freda. See the website for a 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

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.

Our March Social will be held at **7:30 on WEDNESDAY March 25th**
Our feature is "**Blown Away - The Story of The Dinosaur Extinction**" presented by **Scott Mair**.

Scott is a pioneer in bringing theatre and science promotion together building strong educational programming and sharing his innovative ideas on informal science education through published articles and consulting work with parks, museums and other organizations across North America. He is currently the Skynews Editor for the Royal Astronomical Society (RASC) with previous positions in the RASC including "President and new members Liaison".
Hope to see you all there.

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Highlights - February

By Freda Eckstein

Our February feature "Towards the Heart of Darkness: New Technologies for Precision Astrophysics and Cosmology" presented by Dr. Justin Albert was needless to say mind-expanding!

Justin began by giving us a short history lesson on precision instruments for studying Dark Energy.

1917 – Einstein proposed a cosmological constant in a static universe

1929 – Hubble discovered space was expanding using a "Hubble curve"

1965- Penzies & Wilson discovered the most ancient light that we can see is the microwave spectrum from the big bang.

We have learned that in our universe there is 73% Dark Energy (where the Universe Accelerates), 23% Cold Dark Matter (Galaxy Rotation) and 4% Atoms. We can detect Dark Matter using Supernovae (Type I A) with red shift. First it confirms that the matter density is not zero (flux density) and the rate of expansion is increasing which implies Dark Energy. Because regions of empty space "repel" each other. We can confirm that vacuum energy is real by using the Casimir Effect. Predicted in 1948 by HBG Casimir.

Future telescopes which currently are being developed to measure red shift and signatures of dark energy/matter are:

1) JDEM Concept - JDEM is in conceptual mode and its plan is to survey the sky to accurately measure the magnitude and redshift of a large sample of Type 1a supernovae.

2) LSST - The Large Synoptic Survey Telescope (LSST) is a planned wide-field "survey" reflecting telescope that will photograph the available sky every three nights. Construction should start in 2010 with first light in 2015. The telescope will be located on the El Peñón peak of Cerro Pachón, in northern Chile.

We need to calibrate the stars then calibrate supernovae in order to set absolute calibration. Currently there are numerous precision technologies attempting to do this.

- 1) Using weather balloons
- 2) Tunable laser (LSST, Pan-stars) but they do not calibrate the atmosphere
- 3) Calypso satellite – provides atmospheric calibration (not-tunable) using LIDAR laser.
- 4) Future tunable/portable lasers to provide atmospheric calibration for ground-based observatories
- 5) Justin's favourite ☺ a project underway at UVIC which uses 7 digital cameras to measure the centre of pulse of the LIDAR laser generated from the Calypso satellite which is approximately 700kms and travelling at 7km/second pulsing at 20 hertz. This observation can only be obtained if you are directly underneath the pulse. On Vancouver Island the closest typical overpass of the satellite is just south of Nanaimo.

Justin has agreed to advise us when he will be travelling to Nanaimo for future observations. It will be posted on the listserve and hopefully we can help Justin with his research. If you do tend to get directly below the LIDAR laser the green flash is bright enough to reflect off of a smooth surface for a very brief time. So

those of you who think they saw a UFO just south of Nanaimo; better think again! **3**
Thank you Justin for a very informative and engaging talk. Hopefully we will have you back soon.

Join us for our next social on Wednesday, March 25th/09. For more information about upcoming Socials go to [Starfinders Socials](#)

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Upcoming Events

Every Monday From March 1 – Dec 31 Astronomy Café from 7:30pm - 9:00 pm

Get together with local astronomers at the Fairfield Community Centre to discuss the night sky over coffee. On clear nights, there is observing too. Perfect for people interested in starting this hobby. All ages welcome.

March 1, March 5, March 6 and March 8th Journey to the Edge of the Universe, on Discovery Channel

Leap From The Earth, Soar Through The Cosmos, And JOURNEY TO THE EDGE OF THE UNIVERSE on Discovery This one-of-a-kind television event creates the first accurate non-stop journey from Earth to the edge of the universe

March 1 to April 30, Astronomy open house from 8:00pm – 10:00pm

5th floor of the Bob Wright Centre for Ocean, Earth and Atmosphere — Victoria, BC. Open house with the University of Victoria's telescopes - come see the stars and planets every clear Wednesday evening. Admission: Free

March 1 to April 30, From Earth to the Universe

Location: the Victoria Airport. Exhibition of space photographs created by international and Canadian astronomers, both professional and amateur, works by visual artists who have been inspired by the cosmos. Admission: Free

Mar 3, 2009 "Dark Matters" from 7:30 – 8:30, Professor Joe Silk from the Department of Physics, University of Oxford at the Bob Wright Centre, Room B150, University of Victoria. Professor Silk is the Savilian Professor of Astronomy at Oxford and is a leading authority on contemporary efforts to unravel the mysteries of the Big Bang. This lecture will discuss ongoing efforts by astronomers and particle physicists to detect dark matter. Admission: Free

Mar 4, 2009 "Let There Be Light, Galaxy Formation for the Novice" from 3:30 – 5:00pm, In this talk, Professor Joe Silk will review our current understanding of galaxy formation and assess the challenges that lie ahead. Location: ENGINEERING COMP SCIENCE BUILDING 125, Admission: Free

March 26 Hubble Telescope: Science Legacy and the Future Dunsmuir lodge — Victoria, BC from 5:30 – 8:30pm Admission: \$20 Lecture or \$44 includes dinner. In this lecture, Dr John Hutchings will describe the history, scientific accomplishments, and legacy of the HST. He will also introduce the James Webb Space Telescope, which will be 8 times larger and more powerful, being built by NASA, ESA, and Canada, for launch in 2013. Registration is through UVic's continuing studies program. The lecture is followed by a 3 course dinner. More information is available at the [event website](#).

NASA Launches:

Date: March 5 *

Mission: Kepler

Launch Vehicle: United Launch Alliance Delta II

Launch Site: Cape Canaveral Air Force Station - Launch Complex 17 - Pad 17-B

Launch Time: 10:48:43 p.m. EST

Description: The Kepler Mission, a NASA Discovery mission, is specifically designed to survey our region of the Milky Way galaxy to detect and characterize hundreds of Earth-size and smaller planets in or near the habitable zone.

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This Month In History

Courtesy of: Nick Greene, About.com

March 1: 1982 - Venera 13 landed on Venus

March 3: 1972 - Pioneer 10, USA Jupiter Flyby launched

March 11: 1960 - US Probe, Pioneer 5 Solar Monitor launched. Space probe is now in a solar orbit

March 14: 1879 - Albert Einstein born in Ulm, Württemberg, Germany.

March 31: 1727 - Sir Isaac Newton died in London, England.

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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".

How cool are these! Christina Martens took these wonderful shots of M51 and M81. For more images from Christina go to her link in the photo gallery.



Check out our Photo gallery on the website where you can find pics from the Island Star Party (ISP). Quick link is <http://starfinders.ca/photogallery.htm>

NASA and Google launch virtual exploration of Mars

Fly through enormous canyons and scale huge mountains on Mars. Explore the Red Planet through the eyes of the Mars rovers and other Mars missions.

To view Google Earth's Mars mode

-Install [Google Earth 5.0](#)

-After installation, open Google Earth 5.0

-Look for the ringed planet icon in the horizontal menu bar that runs across the top of the display window

-Click the ringed planet icon, and a dropdown menu appears: "Earth, Sky, Mars"

-Click "Mars"

-Enjoy!

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Featured Articles

A New Method to Measure Asteroids– February 4/09 credit ESA

A new method to measure the size and shape of asteroids that are too small or too far away for traditional techniques increases the number of measurable asteroids by a factor of several hundred. A team of French and Italian astronomers devised this method that takes advantage of the unique capabilities of European Southern Observatory's (ESO) Very Large Telescope Interferometer (VLTI). "Knowledge of the sizes and shapes of asteroids is crucial to understanding how, in the early days of our solar system, dust and pebbles collected together to

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form larger bodies and how collisions and re-accumulation have since modified them," said Marco Delbo from the Observatoire de la Côte d'Azur, France, who led the study. 5

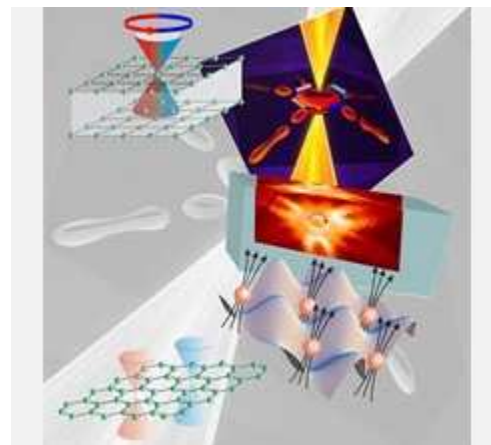
Direct imaging with adaptive optics on the largest ground-based telescopes such as the Very Large Telescope (VLT) in Chile, space telescopes, and radar measurements are currently the favored methods of asteroid measurement. However, direct imaging, even with adaptive optics, is generally limited to the 100 largest asteroids of the main belt, while radar measurements are constrained mostly to observations of near-Earth asteroids. Delbo and his colleagues have devised a new method that uses interferometry to resolve asteroids as small as about 9 miles (15 kilometers) in diameter located in the main asteroid belt, 120 million miles (200 million kilometers) away. This is equivalent to being able to measure the size of a tennis ball a distance of 620 miles (1,000 kilometers). This technique will not only increase the number of objects that can be measured dramatically, but it brings small asteroids that are different from the well-studied larger ones into reach.

The interferometric technique combines light from two or more telescopes. Astronomers proved their method using VLTI, combining the light of two of the VLT's 26.9-foot (8.2-meter) Unit Telescopes. "This is equivalent to having vision as sharp as that of a telescope with a diameter equal to the separation between the two VLT Unit Telescopes used, in this case 154 feet (47 meters)," said co-author Sebastiano Ligori from INAF-Torino, Italy. The researchers applied their technique to the main belt asteroid (234) Barbara, which was found earlier by co-author Alberto Cellino, to have rather unusual properties. Although it is so far away, the VLTI observations also revealed that this object has a peculiar shape. The best fit model is composed of two bodies each the size of a major city - with diameters of 23 miles (37 kilometers) and 13 miles (21 kilometers) - separated by at least 15 miles (24 kilometers). "The two parts appear to overlap," said Delbo, "so the object could be shaped like a gigantic peanut, or it could be two separate bodies orbiting each other." If Barbara proves to be a double asteroid, this is even more significant. Astronomers can then compute the density of these objects by combining the diameter measurements with the parameters of the orbits. "Barbara is clearly a high priority target for further observations," said Ligori. Having proven the validity of their new and powerful technique, the team can now start a large observing campaign to study small asteroids.

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Quantum Twist: Electrons Mimic Presence of Magnetic Field-
February 13/09 credit NSF

An international team of scientists led by a Princeton University group recently discovered that on the surface of certain materials collective arrangements of electrons move in ways that mimic the presence of a magnetic field where none is present. The finding represents one of the most exotic macroscopic quantum phenomena in condensed-matter physics: a topological Quantum Spin Hall effect.



The research could lead to advances in building a new type of quantum computer that has the flexibility to operate at moderate temperatures as opposed to the low temperatures that are a standard requirement for today's powerful computing devices. The work at Princeton was funded by the National Science Foundation's Division of Materials Research and the U.S. Department of Energy Office of Basic Energy Sciences.

Previously researchers could only observe similar motion of electrons under strong

magnetic fields and low temperatures known as the quantum Hall effect, which became the foundation of two Nobel Prizes in Physics in 1985 and 1998. 6

But, theorists at the University of Pennsylvania and the University of California at Berkeley proposed that on the boundaries of certain three-dimensional materials, the spin of individual electrons and the direction in which they move were directly aligned with corresponding electrons without needing high magnetic fields or very low temperatures. In order for this to happen, researchers also theorized that electrons need to move at extremely high speeds.

Now Zahid Hasan, an assistant professor of physics at Princeton University, and his colleagues report observing the synchronized spins of many moving electrons in an exotic material, a bulk crystal of antimony laced with bismuth. They report the findings in the Feb. 13 issue of the journal Science.

Their experiment was based on researchers' hunch that electrons in bismuth-laced antimony would exhibit quantum effects that mimic the presence of a magnetic field because they move at very high velocities. This would allow for the predicated quantum motion to take place.

"This result is quite astonishing for we are seeing electrons behave in a way that is very similar to the way they do when a strong magnetic field is around but there wasn't any around in our experiment" said Hasan, who led the international collaboration with scientists from the U.S., Switzerland and Germany. In addition to electrical charge, electrons possess inherently magnetic or ghostly rotational properties. In the quantum world objects can turn in ways that are at odds with common experience. The British physicist Paul Dirac, who won the Nobel Prize in Physics in 1933, proposed that an electron's internal "rotation" makes it behave like a tiny bar magnet with both north and south poles, a property he coined "quantum spin."

Today's computers employ a simple on-off logic that is based on the motion and storage of electrons in a silicon semiconductor. New designs could take advantage of the additional capacities offered by the quantum spin of the electrons in the experimental material to reduce power consumption and enhance performance.

To make the discovery, the research team used a high-energy, accelerator-based technique called "spin-resolved angle-resolved photoemission." The technique enabled simultaneous measuring of the energy, wavelength and spin of electrons on the surface of the experiment's material. "As a technical achievement, or a series of physics achievements alone, it is pretty spectacular," said Philip Anderson, the Joseph Henry Professor Emeritus of Physics at Princeton and a winner of the 1977 Nobel Prize in physics. "For theoreticians," Anderson added, "the observation of this quantum effect is both interesting and significant."

"The spin sensitive measurement techniques developed here may shed light on other important fundamental questions in condensed matter physics such as the origin of high-temperature superconductivity," said Thomas Rieker, program director for the NSF's Materials Research Science and Engineering Centers. "This discovery has the potential to transform electronics, data storage and computing."

Researchers now need to find materials suitable for ushering in this new class of electronic circuits.

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Canadian Astronaut Says Mission Will Be 'Fascinating' – February 18/09 Credit CTV.ca and Canadian Press

Canadian astronaut Robert Thirsk says everything about his upcoming record-breaking six-month space mission will be "fascinating," except perhaps cleaning the toilets on the International Space Station.

When an international team of astronauts blasts off from Kazakhstan at the end

of May, Thirsk will become the first Canadian to live and work onboard the International Space Station.



His six-month stay will also be the longest mission in the history of Canada's Human Space Program.

And while this is his second trip to space, Thirsk said the experience will be just as exciting as the first time. "On my first flight, everything that I did -- no matter whether it was operating the shuttle or operating an experiment or brushing my teeth in the morning -- everything is fascinating," Thirsk said Wednesday morning on Canada AM. "Maybe toilet duty might be something that we need to take our turn at, but everything is going to be fascinating." Thirsk will join two Americans, two Russians and one European on the mission, which calls for an intense schedule of experiments and maintenance tasks.

For his part, Thirsk will serve as the team's medical officer. He will also be in charge of all robotics on the space station, which will call for him to use the Canadarm 2 to attach a Japanese-made cargo vehicle to the station. He will also conduct a series of experiments to examine the effects of a long-term stay in a zero-gravity environment on the human body. His findings will help future astronauts prepare for the rigours of space travel, he said.

To prepare for the mission, Thirsk has spent more than two years travelling the world, learning how the space station works, studying Russian and preparing for the experiments he will conduct. Thirsk is training for the mission as concerns over the potential hazards of so-called space junk are on the rise. On Feb. 10, a Russian communications spacecraft collided with a U.S.-based satellite about 800 kilometres over Siberia. The accident produced space junk that could orbit the earth and threaten other satellites for 10,000 years. [Read About the Collision](#)

Thirsk said that there is little anyone can do to prevent collisions in space. But the accident speaks to the hazards of human travel into space, and also puts astronauts at risk, he said. "Before the launch of Sputnik, near-earth space was pristine," he said, referring to the world's first orbiting satellite. "It seems that wherever human beings go, that environmental problems follow as well. Now it's a cluttered environment."

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Moon's Puzzling, Thick-Skinned Far Side- February 16/09 Credit Sky and Telescope

It's been about 17 months since the launch of the most productive spacecraft ever to orbit the Moon. No, it wasn't a NASA project — in fact, as remarkable as this might seem, since its final Apollo landing 36 years ago the U.S. space agency has launched only one dedicated lunar mission (Lunar Prospector, in 1998).

Once in its final lunar orbit, 60 miles (100 km) above the Moon, Japan's Kaguya spacecraft released a pair of smaller probes to aid in its scientific mission. JAXA Instead, the rave reviews are pouring in for a spacecraft built and operated by the Japan Aerospace Exploration Agency (JAXA). Its formal name is the cumbersome and contrived Selenological and Engineering Explorer, or Selene for short. But everyone knows it by its nickname, Kaguya, who was an enchanting Moon princess in Japanese folklore.

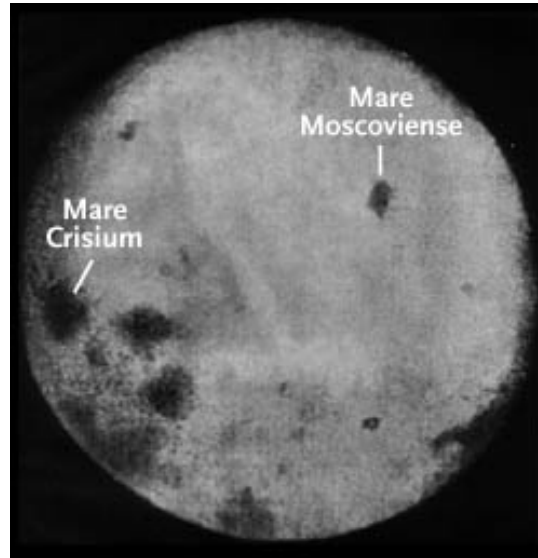
Ever since its launch on September 14, 2007, Kaguya has brimmed with scientific potential. About the size of a small bus and weighing in at 3 tons, the spacecraft carries 11 very capable instruments.



I got my first glimpse of Kaguya's results last March, when some of the mission's scientists trekked to the annual Lunar and Planetary Science Conference in Houston, Texas. They razzled and dazzled with incredibly detailed surface images, topographic maps, and (especially intriguing) gravity maps.

Now the Kaguya team has made a scientific splash with a suite of four articles in this week's *Science*. These emphasize what's been learned about the lunar far side, the mysterious, poorly understood half of the Moon that can't be seen from Earth.

In 1959 the Soviet spacecraft Lunik 3 flew past the Moon and recorded historic first images of the lunar far side.



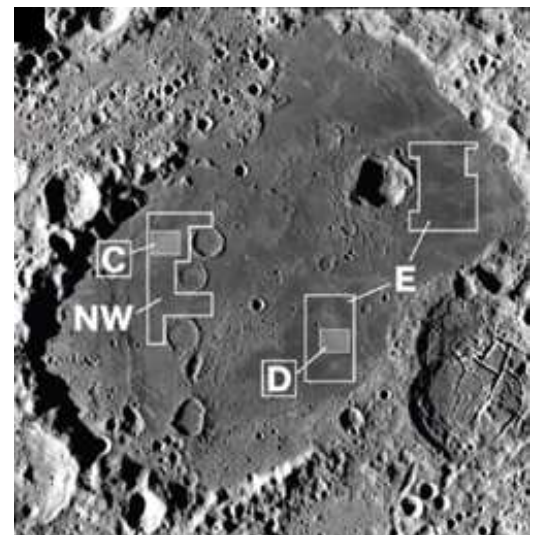
For example, Kaguya's best images, taken with its Terrain Camera, have captured details as small as 35 feet (10 meters) over huge swaths of far-side real estate. Some of these recorded Mare Moscoviense ("Sea of Muscovy"), a lava plain that partially fills one of the far side's most prominent basins — and so named after being discovered in 1959 by the historic lunar flyby made by the Soviet Union's Lunik 3.

The Kaguya images are so crisp that geologists led by JAXA's Junichi Haruyama have found an unexpected paucity of small impact craters on some of the

lava surfaces. As they reckon it, these flows must have erupted about 2½ billion years ago — making them fully 500 million years younger than the last known episodes of far-side volcanism.

Mare Moscoviense is a lava plain that partially fills a far-side impact basin 340 miles (550 km) across. High-resolution Kaguya images reveal that the lava in region D is about 2.5 billion years old — a billion years younger than in C.

Another eye-opening result came from Kaguya's laser altimeter, which has been measuring the lunar terrain's highs and lows with 100 times better coverage than previous craft had achieved. The far-side crust, report Hiroshi Araki (National Astronomical Observatory) and others, is rather rigid — that is, less likely to even out its elevations over the eons as has occurred on the near side or on Earth. The essential difference, they conclude, is that the far side has been completely water free, even deep down. "Dry as lunar dust," you might say.



To me, the most intriguing reading in the *Science* suite concerns striking differences in local gravity that Kaguya found between the Moon's near and far sides. Ever since the 1960s, we've known that the lunar interior is somewhat lumpy; careful radio tracking revealed that orbiting spacecraft sometimes sped up and slowed down ever so slightly as they passed over big, mare-filled basins.

The gravity signatures in and under these basins — and these mass concentrations (mascons) in particular — provide crucial clues to the state of the lunar interior some 3½ billion years ago, when most of the maria made their appearance. Geologists have argued for decades whether the mascons result from the thick "icing" of dense lava atop the basins or from dense mantle material protruding into the weakened crust lying above it.

They do agree that the far side lacks the widespread maria that fill Imbrium, Tranquilitatis, and their kin on the near side. And gravity data back there have been especially hard to come by — after all, how can you follow a spacecraft's motion when it's hidden from tracking stations on Earth?

Kaguya's designers cleverly solved this dilemma by dispatching two smaller satellites, named Okina and Ouna, in separate orbits. Okina served as a radio relay that let the team track Kaguya's motion 24/7. Alas, on February 12th Okina bit the lunar dust, figuratively and literally, ending the far-side gravity measurements.

Irregularities in lunar gravity express themselves as distinct "highs" (red) due to mass concentrations in or under some near-side basins, and as ring-shaped "lows" (blue) on the far side. [Click here for a larger view with labels.](#)

JAXA / NASA-Goddard As the examples at right show, Kaguya found that far-side basins have gravity signatures opposite those of near-side basins: they are gravity "lows," not "highs." No one quite knows what to make of this, though it might be related to the far side's thicker, stiffer crust.

Kudos to JAXA, because Kaguya has performed like a champ. Sure, later this year NASA will counter with its very capable Lunar Reconnaissance Orbiter, complete with a splashy impact in early August. But Japanese engineers plan to plunge Kaguya kamikaze-style into the Moon as well (science manager Manabu Kato couldn't tell me exactly when; "If you can wait till February 18th, I can talk about the new schedule," he teased.)

Besides, Kaguya has a secret PR weapon that NASA can't match: high-def videos shot as the spacecraft coasts 60 miles (100 km) above the lunar landscape.

[Check them out!](#)

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Kepler Mission to Hunt for Earth-like Planets- February 20/09 Credit Science@NASA

Are there other worlds like ours? Are we alone?

NASA's Kepler spacecraft is about to begin an unprecedented journey that could answer these ancient questions. Kepler is scheduled to blast into space from Cape Canaveral Air Force Station, Fla., aboard a Delta II rocket on March 5 at 10:48 p.m. EST. It is the first mission with the ability to find planets like Earth -- rocky planets that orbit sun-like stars in a warm zone where liquid water could be maintained on the surface.

"Kepler is a critical component in NASA's efforts to find and study planets where Earth-like conditions may be present," said Jon Morse, the Astrophysics Division director at NASA Headquarters in Washington. The mission will spend three and a half years surveying more than 100,000 sun-like stars in the Cygnus-Lyra region of our Milky Way galaxy. It is expected to find hundreds of planets the size of Earth and larger orbiting at various distances from their stars. If Earth-size planets are common in the habitable zone (where conditions favor liquid water), Kepler could find dozens of worlds like ours. On the other hand, if those planets are rare, Kepler might find none.

The Kepler telescope is specially designed to detect the periodic dimming of stars caused by transiting planets. Some star systems are oriented in such a way that their planets cross in front of their stars, as seen from our Earthly point of view. As the planets transit, they cause their stars' light to slightly dim, or wink: 1 MB video.

The telescope can register changes in brightness of only 20 parts per million.

"If Kepler were to look down at a small town on Earth at night from space, it would be able to detect the dimming of a porch light as somebody passed in front," said James Fanson, Kepler project manager at NASA's Jet Propulsion Laboratory in Pasadena, Calif.

To accomplish this feat, Kepler will use the largest camera ever launched into space, a 95-megapixel array of charged couple devices or "CCDs."

Right: Kepler's completed flight focal plane array with the 42 science CCDs and four fine guidance CCDs in the corners. [Larger image]



By staring at one large patch of sky for the duration of its lifetime, Kepler will be able to watch planets periodically transit their stars over multiple cycles. This will allow astronomers to confirm the presence of planets. Earth-size planets in habitable zones would theoretically take about a year to complete one orbit, so Kepler will monitor those stars for at least three years to confirm their presence. Ground-based telescopes and NASA's Hubble and Spitzer space telescopes will perform follow-up studies on the larger planets that they can see.

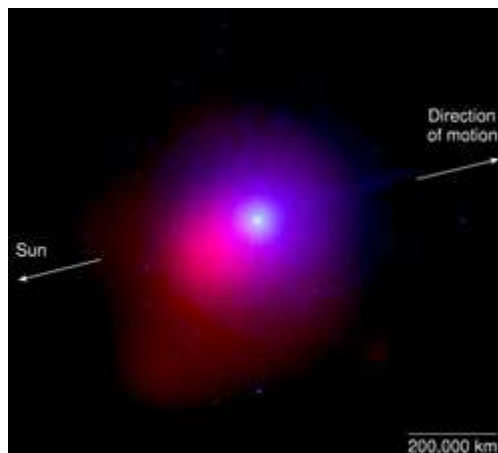
"Kepler is a critical cornerstone in understanding what types of planets are formed around other stars," said exoplanet hunter Debra Fischer of San Francisco State University. "The discoveries that emerge will be used immediately to study the atmospheres of large, gas exoplanets with Spitzer. And the statistics that are compiled will help us chart a course toward one day imaging a pale blue dot like our planet, orbiting another star in our galaxy." For more information about the Kepler mission, visit: <http://www.nasa.gov/kepler>.

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Swift spies Comet Lulin – February 20/09 Credit Science and Technology Council, UK

Astronomers using the NASA Swift Satellite are tracking a spectacular comet as it closes in on Earth and sheds gas and dust from its vaporized ice. Lulin will pass closest to Earth February 24.

The team, which is led by United Kingdom astronomers, is studying the comet to find out more about its chemistry and to gather clues about the origin of comets and the solar system. Swift is a NASA mission in collaboration with the Science and Technology Facilities Council (STFC) in the UK and the Italian Space Agency (ASI).



"Swift is the ideal spacecraft with which to observe this comet", said Jenny Carter from the University of Leicester, United Kingdom, and lead investigator of the team studying the Lulin comet. "We won't be able to send a space probe to Lulin, but Swift is giving us some of the information we would get from just such a mission."

This image of Comet Lulin taken January 28, 2009, merges data acquired by Swift's¹¹ Ultraviolet/Optical Telescope (blue and green) and X-Ray Telescope (red). At the time of the observation, the comet was 99.5 million miles from Earth and 115.3 million miles from the Sun.

Dr. Julian Osborne, leader of the Swift project at Leicester said, "The wonderful ease of scheduling Swift and its joint UV and X-ray capability make Swift the observatory of choice for observations like these."

"The comet is releasing a great amount of gas, which makes it an ideal target for X-ray observations," said Andrew Read, also at Leicester.

Comet Lulin was passing through the constellation Libra when Swift imaged it. This view merges the Swift data with a Digital Sky Survey image of the star field.

NASA/Swift/Univ. of Leicester/DSS (STScI, AURUA)/Bodewits et al



A comet is a clump of frozen gases mixed with dust. These "dirty snowballs" cast off gas and dust whenever they venture near the Sun. Comet Lulin, which is formally known as C/2007 N3, was discovered last year by astronomers at Taiwan's Lulin Observatory. The comet is now faintly visible from a dark site. Lulin will pass closest to Earth - 38 million miles, or about 160 times farther than the Moon - on February 24.

"The comet is quite active," said team member Dennis Bodewits from the Goddard Space Flight Center in Greenbelt, Maryland. "The UVOT data show that Lulin was shedding nearly 800 gallons of water each second." That's enough to fill an Olympic-size swimming pool in less than 15 minutes.

Swift can't see water directly, but ultraviolet light from the Sun quickly breaks apart water molecules into hydrogen atoms and hydroxyl (OH) molecules. Swift's UVOT detects the hydroxyl molecules, and its images of Lulin reveal a hydroxyl cloud spanning nearly 250,000 miles (402,000 kilometers), or slightly greater than the distance between Earth and the Moon.

In the Swift images, the comet's tail extends off to the right. Solar radiation pushes icy grains away from the comet. As the grains gradually evaporate, they create a thin hydroxyl tail. Farther from the comet, even the hydroxyl molecule succumbs to solar ultraviolet radiation. It breaks into oxygen and hydrogen atoms

This interaction, called charge exchange, results in X rays from most comets when they pass within about three times Earth's distance from the Sun. Because Lulin is so active, its atomic cloud is especially dense. As a result, the X-ray-emitting region extends far Sunward of the comet.

"We are looking forward to future observations of Comet Lulin, when we hope to get better X-ray data to help us determine its makeup," said Carter. "They will allow us to build up a more complete 3-D picture of the comet during its flight through the solar system."

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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.

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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 seeing double or unable to focus? Chances are you need to collimate your scope. Are you looking for a good eyepiece? Why do you need to know the focal length of your telescope's mirror and how do you determine the focal length? For answers to these and other telescope questions email [Ed Maxfield](#) our expert on telescope tips, hints and suggestions.

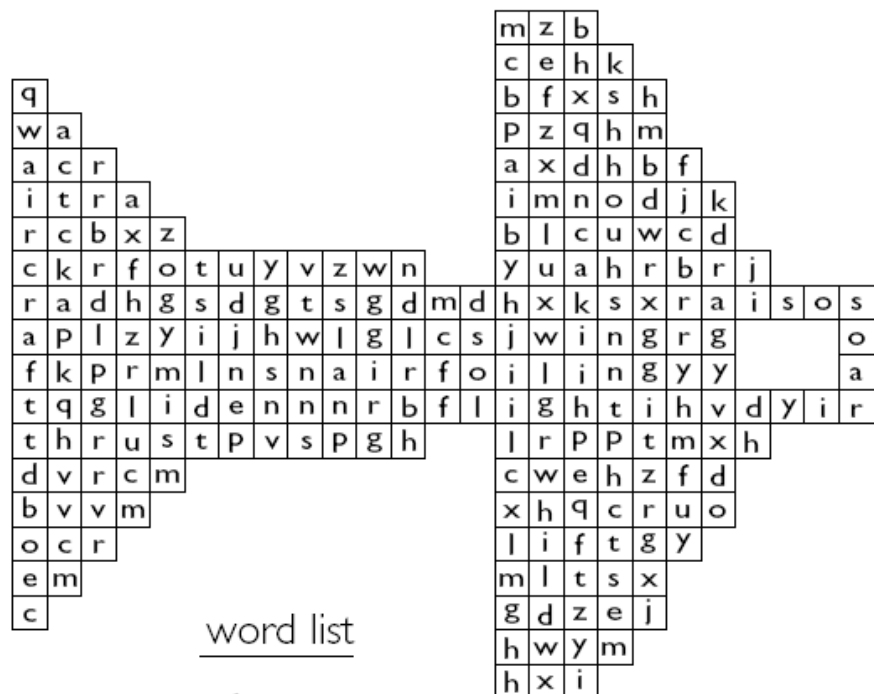
Are you new to astronomy? Want to know the how to find objects in the sky? Or just wondering what that bright object in the evening sky is? Well wonder no more; email [Bryon Thompson](#) our Public Outreach Officer and master of Astronomy 101 basics.

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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.

Find the words in the puzzle from the word list.



credit: www.wonderville.ca

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RASC News

Royal Astronomical Society of Canada, Victoria Centre <http://victoria.rasc.ca>

Meetings

Meetings are held on the second Wednesday of each month except July and August downstairs in the Elliot Bldg at U of Vic.

Astronomy Café

The Astronomy Café Meets on Monday evenings at Sir James Douglas School on Fairfield Road.

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The Sky This Month

By Bryon Thompson

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

The bright evening beacon that has graced our Southwest sky for the past two months is leaving us. Venus has been high and bright but throughout March it will dim and set a little earlier each evening. Venus reaches inferior conjunction on **March 27th**. At this time our Sister Planet is closest to Earth and almost directly between us and the Sun. Its close approach also means its apparent disc grows from 45" on the 1st to 58" on the 20th. As Venus's disc grows however, its sunlit side is slowly turning away from us and we see its telescopic appearance become more crescent shaped. This causes its magnitude to drop from -4.8 to -4.2. By the end of the month Venus will return to the morning sky rising just under one hour before the sun on the 31st.

Saturn reaches opposition on **March 8th** and shines at magnitude 0.5 in Leo. Saturn will also be closest to Earth at opposition, a paltry distance of 780 million miles. Due to some interesting geometry the diminishing tilt of the ring system will experience a slight growth period this month from 2.3° to 3.4°. The rings tilt will continue to increase to a maximum of 4.2° in May. After that, they start to diminish again moving towards an edge on configuration by September, when Saturn will lie near the Sun in our sky. This month then, is a good time to view the gas giant in all its wonder. If you missed the transit of Titan's shadow last month you have two more chances to catch this rare occurrence in March; both events favour west coast enthusiasts. Watch for Titan's shadow to move over the face of Saturn's Northern limb on **March 12th** at 2:34am PST. The moon itself glows at magnitude 8.2 off Saturn's Eastern edge. Titan's shadow remains visible for just over three hours completing its transit at 5:51am PST. At the end of the month on **March 28th** the moon will repeat its performance with a slightly longer show lasting 4 hours from 1:25am PST to 5:23am PST. Saturn's other large moons can be seen in various configurations as well throughout the month. If you have a clear sky on **March 13th** with a small scope you will be able to see Enceladus, Tethys and Dione clustered close together West of Saturn with Rhea nearby. You can actually see them change positions in as little as ten minutes viewing time.

Another planet is also found in Leo this month. The dwarf planet Ceres will make its closest approach to Earth this month since 1857. It will not be this close to Earth again for the next 1000 years. Faintly glowing at magnitude 6.9, you will need binoculars or a telescope to see it in the first week of March, less than 1° from 4th magnitude 54 Leonis. You will have to view the same spot on successive occasions to see the point of light that is Ceres move roughly 5° to the North Northeast through Leo.

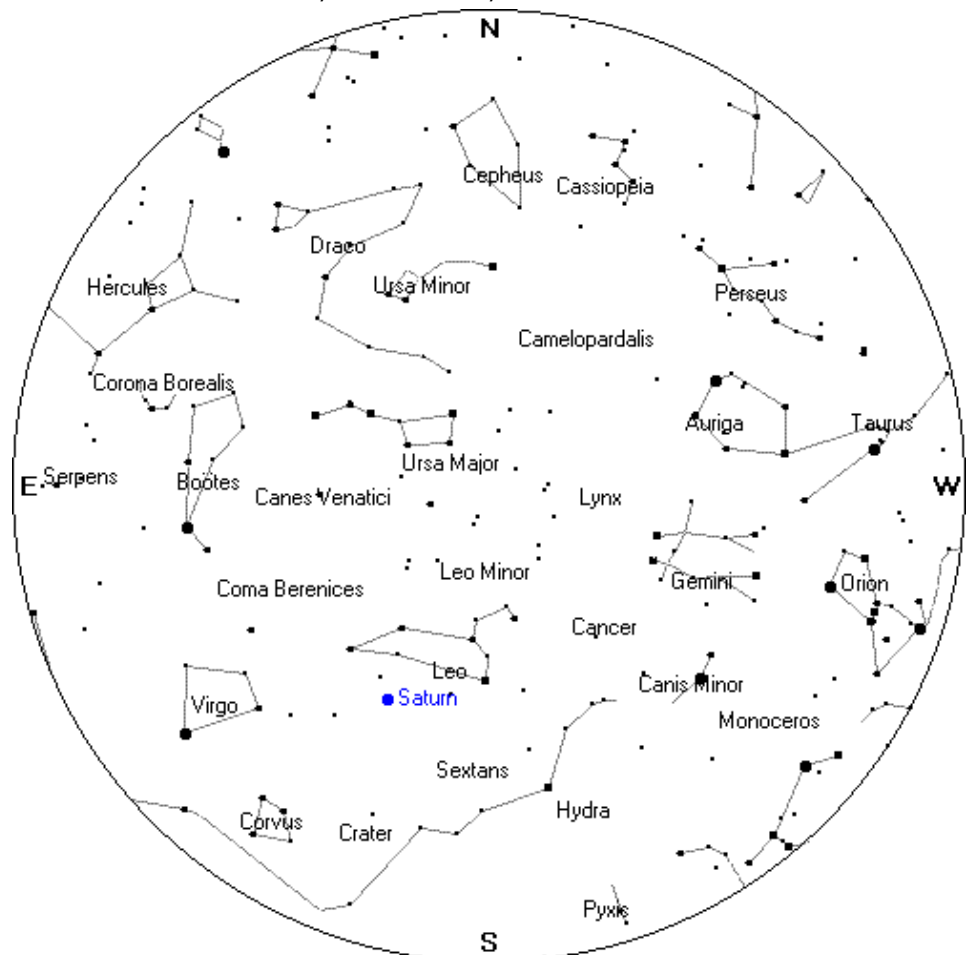
Jupiter continues to be our morning star throughout March, shining brightly in the pre-dawn sky at magnitude 2.0. Both Mercury and Mars are very close to the sunrise and very low in the morning sky. Better views of Mars will be found later this fall. If you haven't seen comet Lulin yet, early March is probably your last chance. It is moving opposite to our orbital rotation and will become progressively harder to see in the days ahead. The comet's faint appearance fades from magnitude 7

to magnitude 9 by month end and with good binoculars or a small telescope you **14** can see it pass 2° south of the Beehive cluster (M44) on **March 5th**. Although there are no meteor showers of importance to watch for, mid-March often favours good views of the zodiacal light. Dust particles contained in the plane of our solar system and illuminated by the setting sun create this magical path of light that stretches from Aries to Taurus. Best seen in the early spring on dark moonless nights this eerie glow is a good photo op. If you happen to get a picture please send it in for next month's newsletter and remember Astronomy is looking up.

March 3	11:46pmPST	First Quarter Moon
March 5	evening	Lulin passes Beehive Cluster (M44)
March 8	01:00pmPST	Saturn at Opposition
March 8	evening	Saturn; brightest and largest appearance all year
March 10	07:38pmPST	Full Moon
March 12	02:34amPST	Titan's shadow transits Saturn
March 13	evening	Enceladus, Tethys and Dione cluster together
March 18	10:47amPST	Last quarter Moon
March 20	04:44amPST	Vernal equinox
March 25	09:06pmPST	New Moon
March 27	12:00pmPST	Venus inferior conjunction
March 28	01:25amPST	Titan's shadow transits Saturn

Sky Chart—Here's your mid-March 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.

Sky Chart Courtesy of Heavens-Above



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