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## Greetings!

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

Well its been a busy time for the club as we are immersing ourselves in the planning and preparations for the 12<sup>th</sup> annual Island Star Party. As many of you already know we had to move our scheduled date up a week to July 13 & 14 to accommodate the Fish and Game Club schedule (we rent the site from the Fish and Game Club). This has caused much anxiety for a number of reasons; two major ones that come to mind are publicity (dates incorrect in major magazines), some of the scheduled speakers cannot make the new date and folks are having to scramble to re-schedule holidays and flights, etc.,. It is a very unfortunate event but we will recover and do the best job we can to make this our 12<sup>th</sup> annual the best it can be.

Our final planning meeting is still scheduled for June 26<sup>th</sup> at serious coffee and we need to see you more than ever to help get this going in this reduced timeframe.

On a completely different track, we are finally starting to see the stars and sol. Hopefully this is the start of summer ☺.

Thanks to the folks (Moe, Ed, Bryon and Norm) who have contributed to this month's newsletter. I think I'll go read it now..cheers.

*Freda Eckstein*

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

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## Meeting Highlights

The June 5<sup>th</sup> planning meeting for the ISP went very well. Norm handed out a volunteer sheet where participants could add their name to their favourite activities. There was some discussion on entrance fees and it was decided to set the fee at \$30 for the weekend (up to a maximum of 4 family members).

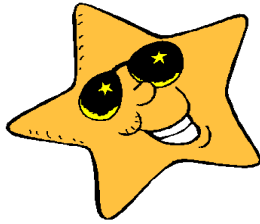
We also talked about the possibility of a raffle (large binocs), entertained a suggestion that we buy the accompanying book for Sky chart 2000 as a Friday draw.

We also agreed to hold the September meeting at the CMHA office, as offered by Chris Martens (will be a new member). The meeting adjourned with the provision that we meet again to finalize the plans for the ISP on Tues.June 26/Serious Coffee, 6:30pm.

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## Upcoming Club Events

**Astronaut:** Comes from the Greek and means sailor among the stars. Since 1961, more than 400 human beings have ventured into space



June 26th - Final planning meeting for the Island Star Party from 6:30 – 8:00 at Serious Coffee in Duncan.

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In July of each year the CVSF hosts the Island Star Party. This year will be our 12th Annual Island Star Party **July 13th & 14th, 2007** held at the Victoria Fish and Game club (at the top of the Malahat). It's a fun weekend open the public with participants from all over North America

attending. Included are lectures, prizes, activities for the young, and many telescopes for everyone to enjoy the night sky. See our website [Cowichan Valley Star Finders](#) for more information.

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## Web News

A cool Site from Bryon Thompson

If anyone is interested in belonging to a list serve on astronomy that only sends out a couple of interesting stories a week then Space Weather dot com deserves a look. I use it in my teaching profession all the time [SpaceWeather.com](#)

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## Cool Pics

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"

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## Featured Articles

### **Gagarin's diary auctioned**—May 10/07 BBC News

A document described as the diary made by the first man in space, the Soviet cosmonaut Yuri Gagarin, has been sold in New York for more than \$170,000.

The typewritten work is said to be a transcript of a tape recording of Gagarin's radio conversations with mission control during his historic flight aboard the Vostok spaceship on 12 April, 1962.



Gagarin was the first human to view Earth from space. It was signed by the space pioneer on 15 April, 1961, three days after his flight. In the document Gagarin, who was 27 at the time, described what he saw as the first man to look at Earth from space.

"The Earth from an altitude of 175-327 kilometers can be seen quite well ... Large mountain ranges, big rivers, large forest tracts, shorelines, and islands. ... "One can see the shadow of ...clouds on the Earth," wrote Gagarin, who died in 1968 while test-flying a MiG-15 fighter plane.

The manuscript was bought by an unidentified American telephone bidder during a sale of space memorabilia at Christie's auction house in New York.

### **Origin questioned**

However, Gagarin's widow, Valentina, told a Moscow radio station on Wednesday that the auctioned document could at best only be a copy because the original, kept in a Moscow archive, would never be released for sale. "Only authorized persons had access to such archive documents, of which only three copies were made"

Yuri's widow Valentina Gagarin "These documents were never shown and have

never been released to the family. She admitted that illegal copies might have **3** been made, but stressed she knew nothing of their existence. She said she had never personally seen any documents concerning her husband's mission aboard the Vostok.

The Russian newspaper Sevodnya says that the seller of the document in New York might be Cuban leader Fidel Castro. It quoted a Russian culture ministry official as saying the late Soviet leader Nikita Khrushchev had given Castro a copy in 1963. But Russia's chief archivist Vladimir Kozlov said there was no evidence of any such presentation.

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## **Did A Comet Hit Great Lakes Region, Fragment Human Populations, 12,900 Years Ago?** - May 23 ScienceDaily

Two University of Oregon researchers are on a multi-institutional 26-member team proposing a startling new theory: that an extraterrestrial impact, possibly a comet, set off a 1,000-year-long cold spell and wiped out or fragmented the prehistoric Clovis culture and a variety of animal genera across North America almost 13,000 years ago.

Driving the theory is a carbon-rich layer of soil that has been found, but not definitively explained, at some 50 Clovis-age sites in North America that date to the onset of a cooling period known as the Younger Dryas Event. The sites include several on the Channel Island off California where UO archaeologists Douglas J. Kennett and Jon M. Erlandson have conducted research.

The theory is being discussed publicly, for the first time, in a news conference at the 2007 Joint Assembly of the American Geophysical Union being held in Acapulco, Mexico. Kennett is among the attendees who will be available to discuss the theory with their peers. The British journal Nature addressed the theory in a news-section story in its May 18 issue.

Before today, members of the team -- including Kennett's father, James P. Kennett of the University of California, Santa Barbara, and Richard B. Firestone of Lawrence Berkeley National Laboratory -- had been quietly introducing the theory to their professional colleagues.

Douglas Kennett, with Erlandson watching, detailed the theory May 19 to a fully packed UO classroom, where students and faculty members from archaeology, art history, anthropology, biology, geology, geography, political science and psychology, pelted Kennett with questions.

The researchers propose that a known reversal in the world's ocean currents and associated rapid global cooling, which some scientists blame for the extinction of multiple species of animals and the end of the Clovis Period, was itself the result of a bigger event. While generally accepted theory says glacial melting from the North American interior caused the shift in currents, the new proposal points to a large extraterrestrial object exploding above or even into the Laurentide Ice Sheet north of the Great Lakes.

"Highest concentrations of extraterrestrial impact materials occur in the Great Lakes area and spread out from there," Kennett said. "It would have had major effects on humans. Immediate effects would have been in the North and East, producing shockwaves, heat, flooding, wildfires, and a reduction and fragmentation of the human population."

The carbon-rich layer contains metallic microspherules, iridium, carbon spherules, fullerenes, charcoal and soot. Some of those ingredients were found worldwide in soils dating to the K-T Boundary of 65 million years ago.

The K-T layer marks the end of the Cretaceous Period and the beginning of the Tertiary Period, when numerous species were wiped out after a massive asteroid is believed to have struck Mexico's Yucatan Peninsula and the Gulf of Mexico.

Missing in the new theory is a crater marking an impact, but researchers argue that a strike above or into the Laurentide ice sheet could have absorbed it since it was less intense than the K-T event.

Kennett said that 35 animal genera went extinct at the end of the Pleistocene, with at least 15 clearly being wiped out close to 12,900 years ago. There would have been major ecological shifts, driving Clovis survivors into isolated groups in search of food and warmth. There is evidence, he said, that pockets of Clovis people survived in refugia, especially in the western United States.

"This was a massive continental scale, if not global, event," Kennett said. He and Erlandson say that they are currently evaluating the existing paleoindian archaeological datasets, which Kennett describes as "suggestive of significant population reduction and fragmentation, but additional work is necessary to test the data further." Earlier research efforts need to be re-evaluated using new technologies that can narrow radiocarbon date ranges, and, as funding becomes available, new sites can be located and studied, Erlandson said.

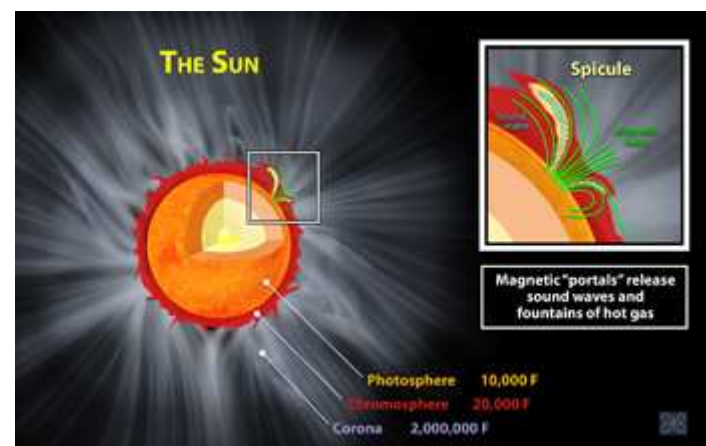
"As we have grown more confident in the theory," Erlandson said, "we've been letting some of it out in informal talks to gage the response to see where we are headed and what the initial objections are, which will help us to maintain our own objectivity."

The interest in pursuing both old and new leads could ignite a major surge of interdisciplinary questioning and attract a new wave of interested students, Kennett and Erlandson said.

Note: This story has been adapted from a news release issued by University of Oregon.

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## Magnetic Field Uses Sound Waves to Ignite Sun's Ring of Fire –



May 29 National Science Foundation  
Sound waves escaping the sun's interior create fountains of hot gas that shape and power a thin region of the sun's atmosphere which appears as a ruby red "ring of fire" around the moon during a total solar eclipse, according to research funded by

the National Science Foundation (NSF) and NASA.

The results are presented today at the American Astronomical Society's Solar Physics Division meeting in Hawaii.

This region, called the chromosphere because of its color, is largely responsible for the deep ultraviolet radiation that bathes the Earth, producing the atmosphere's ozone layer.

It also has the strongest solar connection to climate variability.

"The sun's interior vibrates with the peal of millions of bells, but the bells are all on the inside of the building," said Scott McIntosh of the Southwest Research Institute in Boulder, Colo., lead member of the research team. "We've been able to show how the sound can escape the building and travel a long way using the magnetic field

as a guide."

The new result also helps explain a mystery that's existed since the middle of the last century -- why the sun's chromosphere (and the corona above) is much hotter than the visible surface of the star. "It's getting warmer as you move away from the fire instead of cooler, certainly not what you would expect," said McIntosh.

"Scientists have long realized that observations of solar magnetic fields are the keys that will unlock the secrets of the sun's interior," said Paul Bellaire, program director in NSF's division of atmospheric sciences, which funded the research. "These researchers have found an ingenious way of using magnetic keys to pick those locks."

Using spacecraft, ground-based telescopes, and computer simulations, the results show that the sun's magnetic field allows the release of wave energy from its interior, permitting the sound waves to travel through thin fountains upward and into the solar chromosphere. The magnetic fountains form the mold for the chromosphere.

Researchers say that it's like standing in Yellowstone National Park and being surrounded by musical geysers that pop up at random, sending out shrill sound waves and hot water shooting high into the air.

"This work finds the missing piece of the puzzle that has fascinated many generations of solar astronomers," said Alexei Pevtsov, program scientist at NASA. "If you fit this piece into place, the whole picture of chromosphere heating becomes more clear."

Over the past twenty years, scientists have studied energetic sound waves as probes of the Sun's interior because the waves are largely trapped by the sun's visible surface -- the photosphere. The research found that some of these waves can escape the photosphere into the chromosphere and corona.

To make the discovery, the team used observations from the SOHO and TRACE spacecraft combined with those from the Magneto-Optical filters at Two Heights, or MOTH, instrument in Antarctica, and the Swedish 1-meter Solar Telescope on the Canary Islands.

The observations gave detailed insights into how some of the trapped waves and their pent-up energy manage to leak out through magnetic "cracks" in the photosphere, sending mass and energy shooting upwards into the atmosphere above.

By analyzing motions of the solar atmosphere in detail, the scientists observed that where there are strong knots in the Sun's magnetic field, sound waves from the interior can leak out and propagate upward into its atmosphere.

"The constantly evolving magnetic field above the solar surface acts like a doorman opening and closing the door for the waves that are constantly passing by," said Bart De Pontieu, a scientist at the Lockheed Martin Solar and Astrophysics Laboratory in Palo Alto, Calif.

These results were confirmed by state-of-the-art computer simulations that show how the leaking waves propel fountains of hot gas upward into the sun's atmosphere, and fall back to its surface a few minutes later.

Other research team members are Stuart Jeffries of the University of Hawaii and Viggo Hansteen of the University of Oslo and the Lockheed Martin Solar and Astrophysics Laboratory.

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**Awesome Upheaval**—May 30/07 Credit Science@NASA

*Astronomers using NASA's Chandra X-ray Observatory have discovered an exceptionally dramatic event in the nearby Universe. They're not sure what caused it, but they've narrowed it down to two exciting possibilities; read on.*

Astronomers using NASA's Chandra X-ray Observatory have found evidence for an "awesome upheaval" in a massive cluster of galaxies. A bright arc of ferociously hot gas extending more than two million light years requires one of the most energetic events ever detected.

"The huge feature we detected in the cluster combined with its high temperature (170 million oC) points to an exceptionally dramatic event in the nearby Universe," says Ralph Kraft of the Harvard-Smithsonian Center for Astrophysics, leader of a team of astronomers involved in this research. "While we're not sure what caused it, we have narrowed it down to a couple of exciting possibilities." The favored explanation is that two massive galaxy clusters are running into each other at about 4 million miles per hour. When hot clouds of gas in the two clusters meet, shock waves produce a sharp change in pressure along the boundary where the collision is taking place, giving rise to the observed arc, which resembles an titanic weather front.

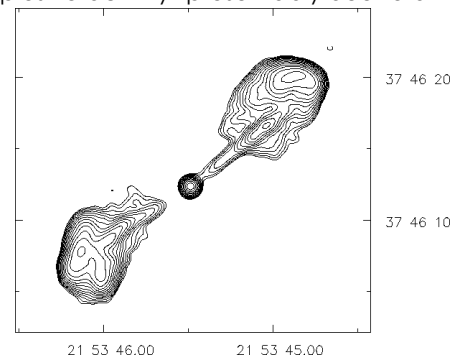
"Although this would be an extreme collision, one of the most powerful ever seen, we think this may be what is going on," says team member Martin Hardcastle of the University of Hertfordshire in the United Kingdom.

One problem with the collision theory is that only a single peak in the X-ray emission is seen, whereas two would be expected. Longer observations with Chandra and the XMM-Newton X-ray observatories should help determine how serious this problem is for the collision hypothesis.

Another possible explanation is that the disturbance was caused by an outburst generated by matter falling into a supermassive black hole. In this scenario, the black hole would inhale most of the matter but expel some of it outward in a pair of high-speed jets, heating and pushing aside surrounding gas.

Such events are known to occur in this cluster. A galaxy named 3C438 near the center of the cluster is a powerful source of explosive activity--presumably due to a supermassive black hole. But the energy in these outbursts is not nearly large enough to explain the Chandra data.

Right: A radio map of 3C438 reveals jets spewing from the galaxy's core--a sign of explosive activity. "If this event was an outburst from a supermassive black hole, then it's by far the most powerful one ever seen," says team member Bill Forman, also from the Center for Astrophysics.



The phenomenal amount of energy involved implies a very large amount of mass swallowed by the black hole, about 30 billion times the Sun's mass consumed over a period of 200 million years. The authors consider this rate of black hole growth implausible.

"These values have never been seen before and, truthfully, are hard to believe," notes Kraft. Until these issues are sorted out, the awesome upheaval remains a mystery.

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## Venus Flyby—June 5/07 Credit Science@NASA

*When NASA's MESSENGER spacecraft flew by Venus en route to Mercury, the craft shot a laser beam into Venus' clouds, among other experiments, read on to learn more about Earth's "evil twin."*

Picture this: A spaceship swoops in from the void, plunging toward a cloudy planet about the size of Earth. A laser beam lances out from the ship; it probes the planet's clouds, striving to reach the hidden surface below. Meanwhile, back on the craft's home world, scientists perch on the edge of their seats waiting to see

what happens.

Sounds like science fiction? This is real, and it's happening today. The spacecraft is MESSENGER, and the planet is Venus. On June 5, 2007, MESSENGER will fly past Venus just 338 km above the planet's surface--and it will shoot a laser into the clouds. MESSENGER is on a mission to Mercury, not Venus. But the spacecraft must pass by Venus for a gravity assist en route. In passing, researchers hope to learn a few things about Earth's "evil twin," an Earth-sized world with sulfuric acid clouds, a choking carbon dioxide atmosphere, and a surface hot enough to melt lead.

"We are treating the Venus flyby as a full dress rehearsal for the first flyby of Mercury in January 2008," says Sean Solomon, the mission's principal investigator at the Carnegie Institution of Washington. "All of the spacecraft's science instruments will be turned on during the flyby."

Of particular interest is the laser experiment, which aims to measure the location of Venus' cloud decks. "It could either fizzle or be a major result," says Ralph McNutt, MESSENGER's project scientist at the Johns Hopkins University Applied Physics Lab. "We've never sent a laser to Venus before. This could give us some unique information about the planet's clouds."

The name of the laser is MLA--short for Mercury Laser Altimeter. It was designed to map the rocky topography of Mercury, but MLA turns out to have some nice properties for the study of Venus. Solomon explains: "Venus' atmosphere and clouds are nearly transparent at several infra-red wavelengths." The wavelength of the laser (1064 nm) is close to one of these spectral "windows," so it may be able to penetrate deep into the atmosphere. "It's a long shot, but we may even see returns from the surface of Venus," he speculates.

In planetary exploration, "you must give yourself the chance to be lucky," says McNutt. "Having the MLA on MESSENGER and turning it on for the Venus flyby is exactly that. If it turns out that there are significant results, then a Venus orbiter in the future with such instrumentation could help us understand why our 'sister planet' is so different from Earth."

In addition to the laser, MESSENGER will scrutinize Venus using high-resolution cameras, a suite of spectrometers ranging in wavelength from infra-red to gamma-rays, an energetic particle counter and a magnetometer. Data from these instruments may shed new light on the chemistry of Venus' atmosphere and how it interacts with the solar wind.

Unlike Earth, Venus has no global magnetic field to protect it from solar wind. A gale of charged particles traveling 300 km/s (almost a million mph) hits Venus with full force, and to some degree this erodes the planet's atmosphere.

"There is still much to understand about how solar wind removes material from the top of Venus' atmosphere," says Solomon. "We know that the process over time is very effective for light elements such as hydrogen, because the Venus atmosphere has a ratio of heavy hydrogen (deuterium) to hydrogen that is higher than on Earth by a factor of more than 100. Some of our measurements may capture this process in action."

The European Space Agency already has a well-instrumented ship named Venus Express orbiting Venus, but this does not diminish the value of the MESSENGER flyby. On the contrary, having two spacecraft at Venus at the same time, even temporarily, is a big bonus, says Solomon. "It gives us an unprecedented opportunity to study Venus atmospheric circulation, cloud structure, chemistry, and solar wind interaction from the perspective of two platforms observing simultaneously with a complementary suite of instruments."

"Venus has been visited by more spacecraft than any other planet. Nonetheless, every time we visit a planet with a new set of instruments, we make discoveries--as New Horizons demonstrated when it flew by Jupiter earlier this year." (See Science@NASA's Fantastic Flyby for details.)

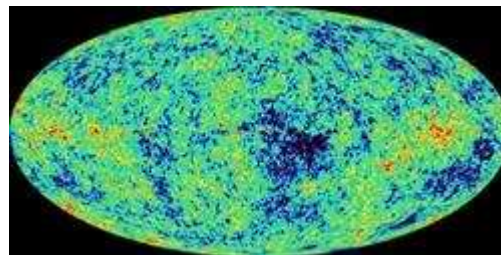
### Milky Way moving away from void - June 12/07 Univ. of Hawaii Institute for Astronomy

Our Milky Way galaxy lies at the edge of a huge void and is being repulsed by the void at high speed. This observation provides astronomers with fundamental insights into how dark matter is distributed and the process of galaxy formation. Brent Tully of the University of Hawaii discussed this discovery at the meeting of the American Astronomical Society in Honolulu, Hawaii.



Two decades ago, Tully and his collaborator, Richard Fisher (National Radio Astronomy Observatory, Charlottesville, Virginia), noted that our galaxy lives adjacent a vast empty region that they called the 'Local Void.' Today, thanks to the contributions of many astronomers around the world, there is information on the distribution of hundreds of thousands of galaxies and an increasingly detailed knowledge of the rich tapestry in the distribution of galaxies. Galaxies collect along filaments and in clusters, at places where the filaments intersect. Elsewhere there are empty regions called voids. Our galaxy resides in a filament that bounds a void. We call this filament the 'Local Sheet.'

It has also been known for two decades that our Milky Way galaxy is traveling through intergalactic space at high speed. The Cosmic Microwave Background (CMB) is radiation that comes to us in all directions from the time when the universe was a hot plasma, 300,000 years after the Big Bang. One part in a hundred systematic variations in frequency of the peak of the CMB radiation is taken to be a Doppler shift caused by our motion with respect to the ensemble of all other matter. Some of the components of our motion have been known for a long time. Earth orbits the Sun once a year and the Sun orbits the center of the Milky Way Galaxy every 250 million years. We also have known that our galaxy is being pulled toward neighboring concentrations of matter, particularly our nearest giant neighbor, the Andromeda Galaxy, at a distance of 2-million light-years and the nearest rich cluster of thousands of galaxies, the Virgo Cluster, at 55 million light-years. It has also become clear that there are very long-range forces pulling on us. We have a motion in a direction toward two huge concentrations of galaxies that happen by chance to line up, one behind the other, at distances of 200 and 600 million light-years. The relative importance of these two attractors has remained a disputed detail among astronomers.



This colorful display shows tiny differences (or "anisotropies") in the Cosmic Microwave Background (CMB) over the entire sky. The average temperature is just 2.73 kelvins (2.73 degrees Celsius above absolute zero), and the temperature differences span mere millionths of a degree. Red

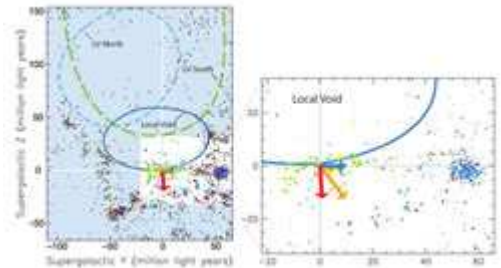
represents the warmest locations, while blue reveals the coldest spots. These tiny temperature variations map the structure of the early universe. Until now, part of the Milky Way's motion inferred from the variation in the CMB was unexplained. Astronomers have discovered that the Milky Way and neighboring galaxies are being pushed from the Local Void. NASA / WMAP Science Team  
Yet until now, part of our motion inferred from the variation in the CMB remained unexplained. It is in a direction aligned with the flattened disk of our galaxy and



there was the possibility that something important was being hidden by the veil of obscuring dust clouds in the plane of the Milky Way. However, radiation at X-ray, infrared, and radio wavelengths are not blocked. Years of observing by many astronomers have failed to reveal anything important.

Now, another kind of observation has resolved the mystery. Astronomers have been measuring the distances to galaxies with precision techniques. With accurate distances it is possible to distinguish between the motions of galaxies due to the general expansion of the universe and the local deviant motions caused by the way matter is clumped, with its consequent gravitational effects. It is found that galaxies are flowing in streams, with coherent flows caused by large attractors far away and eddies caused by modest attractors nearby. The influences on our motion discussed above have been confirmed. In addition, features of the local streaming pattern reveal the source of the additional component.

The critical new information comes from observations of relatively nearby galaxies with Hubble Space Telescope. Accurate distances to galaxies are provided by measuring the luminosities of the brightest old stars that lie on what is known as the Red Giant Branch. These stars have well-established properties. The accurate distances give a detailed map of the flow pattern of nearby galaxies and reveal several remarkable things. First, the direction of our motion with respect to the nearest several thousand galaxies is well defined. Second, all the galaxies within 15 million light-years, within our Local Sheet, are moving together. Third, this motion is NOT shared by galaxies just beyond our Local Sheet and, in fact, we are moving on a collision course toward the nearest adjacent filament, the Leo Spur (it will be at least 10 billion years before the Local Sheet and the Leo Spur pancake together).



This image shows distribution of galaxies in the region around our Milky Way in supergalactic coordinates.

Each dot represents a galaxy of typically 100 billion stars. The colors indicate the relative motions of galaxies with accurately measured distances, with shades of green and blue indicating motions toward us and shades of yellow to red indicating motions away from us. Our nearest neighbors have only small relative motions (represented by yellows and greens), as seen best in the exploded view of the right panel. We, along with all these nearest neighbors, are moving together toward the lower right corner of the figures. The result is that all the galaxies in the lower right appear to be moving toward us and all the galaxies in the upper left appear to be moving away, but it is us and our neighbors that are moving. Our motion is represented by the orange arrow. There are two main causes for this motion. The concentration of objects at the right of the figures is the Virgo Cluster and its mass of quadrillion times the Sun causes an attraction indicated by the blue vector in the exploded panel. The red vector in this panel is what is left over and this represents our motion of 600,000 miles-per-hour away from the Local Void. Univ. of Hawaii Institute for Astronomy [larger image]

These patterns reveal the cause: the Local Void. Whereas concentrations of matter pull, a void pushes. If an object is surrounded uniformly by matter in all directions, except for one sector in which there is nothing, then the absence of a pull is a push away from that sector. The effect can be astonishingly large. Our velocity away from the Local Void is 600,000 miles-per-hour.

To generate such a large velocity, the void must be very large and very empty. The current standard model of the universe with dark matter and dark energy does allow for voids that are as large as we infer for the Local Void, but it is impressive that we should live next to such a large feature. More importantly for our theoretical understanding, we conclude that the void is really empty. Only a small fraction of the matter of the universe is in a visible form, so it is not a given that an apparently empty region is truly empty. However, the large push we are getting from the Local Void is convincing evidence that it really is empty.

## Voyage to the Giant Asteroids –June 15/07 Credit Science@NASA

*This summer, NASA will launch a robotic probe to visit two strange and giant asteroids—one is covered with ice while the other may have been blasted by an ancient supernova. The tales these asteroids tell may reveal the true beginnings of our solar system.*

The asteroid belt between Mars and Jupiter is like the solar system's cluttered old attic. The dusty, forgotten objects there are relics from a time long ago, each asteroid with its own story to tell about the solar system's beginnings.

These are stories planetary scientists want to hear. Much is still unknown about our solar system's distant past. We learn the basic story in school: A vast disc of gas and dust around the sun slowly gathered into larger and larger chunks, eventually forming the planets we know today. But how exactly did this happen, and why did it produce the kinds of worlds that it did, including a certain blue planet well-suited for life?

To answer these questions, NASA plans to launch a robotic probe named Dawn. Its mission: Fly to two giant asteroids, Ceres and Vesta, and explore them up close for the first time. Liftoff is scheduled for July 2007.

Dawn's first stop is Vesta—an asteroid that may implicate ancient supernovas in the solar system's birth. Telescopic observations of Vesta and studies of meteorites believed to have come from Vesta suggest that the asteroid may have been partially molten early in its history, allowing heavy elements like iron to sink and form a dense core with a lighter crust on top.

"That's interesting--and a bit puzzling," says Chris Russell, Principal Investigator for Dawn at the University of California, Los Angeles. Melting requires a source of heat such as gravitational energy released when material comes together to make an asteroid. But Vesta is a small world—"too small," he says--only about 530 km across on average. "There would not have been enough gravitational energy to melt the asteroid when it formed."

Right: A Hubble Space Telescope photo of Vesta.



A supernova (or two) may provide the explanation: Some scientists believe that when Vesta first formed, it was "spiced up" by aluminum-26 and iron-60 created in possibly two supernovas that exploded around the time of the solar system's birth. These forms of iron and aluminum are radioactive isotopes that could have provided the extra heat needed to melt Vesta. Once these radioactive isotopes decayed, the asteroid would have cooled and solidified to its present state. This idea would explain why Vesta's surface appears to bear the marks of ancient basaltic lava flows and magma oceans, much as Earth's moon does.

The supernovas would also change the sequence of events involved in planet formation:

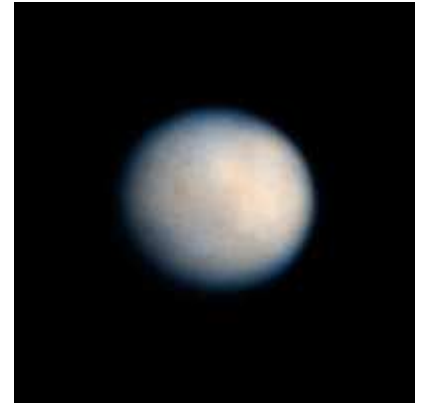
"When I went to school, the thought was that the Earth got together, heated up, and the iron went to the center and the silicate floated on top, producing a core-forming event," Russell says. This view assumes that smaller planetoids that collided and merged to form Earth were amorphous masses that hadn't yet formed their own iron cores. But if chunks of rock the size of Vesta could melt and form dense cores, "it

would affect the way the planets and their cores grew and evolved." If all goes as planned, Dawn would reach Vesta and enter orbit in October 2011. Detailed images of Vesta's surface will reveal traces of its molten past, while spectrometers catalog the minerals and elements that make up its surface. Vesta's gravitational field will be mapped out by the motions of Dawn itself as the probe orbits the asteroid, and that should settle once and for all whether Vesta indeed has an iron core.

After orbiting Vesta for 7 months, Dawn will undertake a maneuver never before attempted: leave the orbit of one distant body, and fly to and orbit another.

This kind of "asteroid hopping" would be practically impossible if Dawn used conventional rocket fuel. "We would need one of the largest rockets that the US has to carry all the propellant," says Marc Rayman, Project System Engineer for Dawn at NASA's Jet Propulsion Laboratory. Instead, Dawn uses ion propulsion, which requires only one-tenth as much propellant. Dawn's engines proved themselves onboard an earlier, experimental spacecraft known as Deep Space 1, managed by NASA's New Millennium Program.

Right: A Hubble Space Telescope photo of Ceres. Dawn's fuel-efficient ion engines will propel the craft from Vesta, arriving at Ceres by February 2015.



Measuring 950 km in diameter, Ceres is by far the largest object in the asteroid belt. Remarkably, it is not a rocky world like Vesta, but one covered in water ice. "Ceres is going to be a real surprise to us," says Russell. Because it appears to harbor a layer of ice 60 to 120 km thick, the surface of Ceres has probably changed more dramatically over time than Vesta's, obscuring much of its early history. But while Ceres may not offer such an early window onto planet formation, it could teach scientists about the role that water has played in planetary evolution since then. For example, why can some rocky worlds like Ceres and Earth hold on to large amounts of water, while others, like Vesta, end up bone dry?

"Vesta will tell us about the earliest epoch, and Ceres will tell us about what happened later," Russell says. Together, they offer two unique stories from our solar system's past, and who-knows-how-many lessons about how the planets came to be.

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## Buy and Sell

Here's your chance to clean out the closet and find a home for your slightly used **12** treasures. Post your buy and sell items by emailing the [Editor](#) with your details.

### Auction for Soviet space capsule - BBC News

A spheroid Soviet-era space capsule has been sold for 72,000 euros (\$96,000; £48,600) at an auction house in the French capital, Paris. The Photon capsule spent two weeks on a scientific mission in space. The exact dates it was in flight are not known.



The spacecraft measures 2.7m (8ft, 10in) in height and has a diameter of 1.6m (5ft, 4in). It was acquired by a private French buyer at the Drouot auction room, French news agency AFP reports.

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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? Have no fear; email [Byron Thompson](#) our Public Outreach Officer and resident expert on Astronomy 101 basics will point you in the right direction.

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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.

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## RASC News

*By Ed Maxfield*

The Royal Astronomical Society of Canada (RASC), Victoria Centre has had a busy spring.

Meetings are held on the second Wednesday of each month except July and August. The June meeting featured a talk by Dr. Gregory Poole from the Dept of Physics and Astronomy, University of Victoria entitled "The Role of X-ray Astronomy in Modern Cosmology". This complex subject was very informative and clearly

presented allowed us to look at the cutting edge of x-ray astronomy.

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The school program under the direction of Sid Sidhu has been busy giving lectures and showing the night sky to students. Regular school visits have finished but there will be one more lecture/star party for learn-at-home students.

The Astronomy Café Meets on Monday evenings at Sir James Douglas School on Fairfield Road. It has become the hot spot for all things astronomy. Ably chaired by John Macdonald, the meetings feature open discussions, the occasional lectures, coffee and snacks and star gazing when weather permits. Meetings resume in September.

#### Saturday Night Volunteers

RASC volunteers set up telescopes at the Dominion Astrophysical Observatory to show and explain the night sky to visitors. This occurs mainly on Saturday evenings but we may do so from Tuesday through Saturday. Unfortunately, the weather has not been very cooperative so far this year. With permission of the DAO, the volunteers may remain after the public has departed and observe as long as they wish. The DAO has also agreed to supply us with a roll-off roof observatory building for use of the members. To that end, we have decided to purchase a high-end mount for this fiscal year to be followed by a 16 inch telescope next year. This will be a formidable set up and will eventually be capable of being operated remotely.

Check out the web site at [RASC - Victoria Centre](#) for further information and to see some really awesome images taken by our very active astrophotographers.

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## The Sky This Month

*By Bryon Thompson*

### Observing Site

Duncan, 48.783°N, 123.700°W

Hi everyone, Warm weather viewing is about to befall our little Island paradise and here are a few things you might like to take note of for the month of July. Remember that being warm in July has nothing to do with the Earth's proximity to the sun. We are actually going to reach our greatest distance away from the sun (Aphelion) on July 6th at 94.5 million miles. Our closest approach will occur in the winter months ahead.

The "New" moon occurs on July 14th at 10am EDT. This darkening of our sky happens on the nights of the Island Star Party; July 13th and 14th which promise dark skies and spectacular viewing. The Full moon which occurs on July 30th will all but obscure the Southern Delta Aquarids Meteor Shower. This usually bright show of 20 plus meteors per hour will peak at the end of the month on July 28th, just two days before the moon turns on the lights. To try for a few of the brighter ones though, look to the east after midnight. If you do miss them, fear not, as next month's popular Perseids promise good viewing. They occur on the same night as the August New moon; August 12th.

The planets are the "Stars" in the night show this month. Venus and Saturn appear low in the sky as they chase the setting sun. The pair will be visible in a wide angle eyepiece on July 1st as they appear only 47' apart. This separation increases as July progresses and they gain on the setting sun. By mid month Saturn becomes lost in the twilight glow and Venus although low in the west will be a little brighter and will show a definite crescent shape to telescopic viewers. By the end of July our sister world sets about 40 minutes after our star does.

Jupiter is also low in the southern sky shining brightly at magnitude -2.5. Feel like a viewing challenge? Try to spot the spot! The New Red Spot is a smaller version of the Great Red Spot and a little south of it. This storm used to be white only a few years ago. Scientists believe a change in the storm's intensity has caused the clouds to be moved to a higher altitude, which has changed their chemical composition, resulting in different reflection characteristics and changing the

A comet is going to grace our Island Star Party this year. Comet Linear (C/2006VZ13) will be visible in Draco moving past Ursa Major and between Bootes and Canes Venatici throughout July. On the Friday night of the star party, to look for the comet, first find Messier object 102 or more correctly NGC 5866, a spectacular Lenticular Galaxy in Draco. About 1 degree away from NGC 5866 and at the same 10th magnitude you should find a small elongated object. This is Comet Linear (C/2006VZ13). The comet will pass to within a moon width of M3, a globular cluster, on the 30th of July.

Please allow a small curiosity for a final note. First seen not by Messier but by a friend of his Pierre Méchain in 1781, M102 sparked a controversy that can still be found in some catalogues. Based on the information he received from his friend Messier included it as #102 and published his catalogue without verifying the galaxy's position. But Méchain had been mistaken. It is thought that he had really been looking at NGC5457 a spiral Galaxy in Ursa Major. Pierre Méchain disclaimed the discovery two years later. Therefore the actual discovery of this object is sometimes credited to William Herschel who independently determined its position on May 5, 1788. The galaxy then also bears Herschel's number HI.215.

07 21:54h Waning Quarter Moon  
 12 20h Moon passes 9° north of Mercury.  
 14 05:04h New Moon.  
 29 17:48h Full Moon.

**Sky Chart** – Here's your sky chart for mid July. In order to use the sky chart properly, you have to imagine holding the chart above your head to use it, and then the directions are correct.

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