COWICHAN VALLEY STARFINDERS ASTRONOMY CLUB

Clear Skies

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1. Editor Greetings!

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

Happy new year everyone, just to let you know, this newsletter encompasses both January and February and is extra long for you to enjoy. Also, new year…new change. You will notice "Ask an Expert" section has moved to the front of the newsletter and we have a new category "Community Affairs" where we will add news about what we are doing in the community. Check out Brian's story on the Shawnigan Lake Observatory.

First and foremost; welcome David & Susan Doughty as our newest members.

As you all know we get an extra day this month with "leap Year" and all, but do you remember the old nursery rhyme?

Thirty days hath September, April, June and November;
All the rest have thirty-one, Excepting February alone
Which hath but twenty-eight, in fine, Till leap year gives it twenty-nine

That little saying saved my (you know what) in school on many occasions. I'll bet this next little tidbit is something you probably didn't know:

The right of every woman to propose to the man of her choice on February 29 each leap year goes back hundreds of years when the leap year day had no recognition in English law. The day was 'leapt over' and ignored. It was decided that the day had no legal status, meaning that a break in tradition on this day was acceptable. In Scotland, there was a law forbidding a man to refuse a proposal made to him on February 29. The punishment for such an offence was a heavy fine, ranging from 1 pound to a silk gown. Interestingly enough my niece is getting married this Leap year. She and he beau met on a leap year and so they decided to tie the knot on this very special day. Now you thought it was hard to remember your anniversary date, imagine it coming around only once every 4 years! Good luck Renae and Robert, we will be thinking of you.

Since Valentine's day is coming we couldn't resist the Mars Global Surveyor pictures of mesas (raised eroded features) or depressions on Mars. Check out the "hearts" in the *Cool Pics/Videos* section.

There seems to be a lot of astronomical events happening this month in our local area, check them out in the "*Upcoming Events*" section. And don't forget to test your astronomical knowledge in the *Space Race Blast Off* online game that was just released by NASA.

And finally, we at "Clear Skies" are a small team of volunteers that deliver the news each month. We cannot view all Astronomy related information on the net. We need you to help us. Your opinions on what you want to see in future issues and stories that are of interest for the newsletter are crucial to keeping the club moving

forward. So please….get active and send your ideas, pictures and posts to The editor. If you dream it, photograph it or come across it. . We want it!

Many thanks to this month's contributors Moe R, Bryon T, Brian V and Brian R. An last but not least a big "HELLO" to the ole gater…."*teck mah tay*" master Frank ;)

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

Looking for something different for a birthday or fundraiser in your community? How about a "Starparty"? Find out how we can help you organize it and provide demonstrations. For more information contact the president@starfinders.ca

2. Socials

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

Click on the Map or follow these directions:
Island Hwy, Mill Bay
Turn on Frayne Rd towards ocean (Serious Coffee is on the corner)
Turn right on Huckleberry Rd
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 Feb 22nd**
Feature: "**President's Choice"**

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Social Highlights Jan 25th/12

By Bryon Thompson

Our video for the last social was called "Base Camp Moon" 2007 Science channel documentary.

This documentary followes in the footsteps of scientific expeditions from previous years to learn and shape the technological advancements fields as diverse as biology, geology, astrophysics and chemistry. It then looks into the future when once again astronauts will set foot on the lunar surface, with the goal being to ultimately establish a presence on Mars and beyond. While using the moon as a training ground to develop and refine the technologies that such an ambitious vision demands. At times it was a bit dated but it was interesting to see what was envisioned and what eventually really happened; specificallythe much anticipated Lunar CRater Observation and Sensing Satellite (LCROSS)impact in search of lunar water; and the success or unsuccessful lunar plume that was to take place afterward. It was great to have Gerry in the crowd to make sure we had all the facts. A good conversation ensued. Thanks Gerry.

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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/

Every Wednesday, Astronomy Open House, sponsored by the UVic Department of Physics & Astronomy. Held at the Wright Center (5th Floor),this event is held from 8pm - 10pm October to April and 9pm - 10pm from May to August. In January, April and December, the open house may not run regularly, please contact Michelle Shen by phone at 250-721-7700 or by email at mshen@uvic.ca to confirm**.** Admission: Free

Feb 9 – Mar 29 (Thursdays) 7:00pm – 9:00pm An Introduction to the Night Sky at West Shore Parks & Rec, Learn the constellations, how to use a telescope and binoculars, as well as how telescopes work. We will spend time out doors at night viewing when the sky is clear. Admission: 6 / $ 100 to Register call 250-478-8384

Feb 11 - 10:00am - 4:00pm, Port Alberni Community Science Celebration at the Port Alberni Athletic Hall, Port Alberni. MISTIC is excited to once again be partnering with North Island College and Science World BC, to host a Community Science Celebration in Port Alberni! This family oriented community event celebrates the science and technology all around us and will bring students, teachers, parents and the general public to the North Island College, Port Alberni campus, to participate in science and technology related booth activities and see Science World shows. If you are interested in participating or would like more information, please contact the MISTIC office at 250.753.8324. There is no fee to participate - morning snacks and lunch will be provided for exhibitors.

Feb 17 - 9:30am, "Type Ia Supernovae: Explosions and Progenitors" Presented by Dr. Wolfgang Kerzendorf University of Toronto, at the Elliott Building, Room 503 (Chartroom) UVIC Victoria. Type Ia Supernovae can be divided into three distinct phases. The pre-supernova evolution, the explosion itself and the expansion phase, which results in spectra and light-curves.
In this talk I will first presents our findings on the progenitor question (pre-supernova phase):
Are these objects the result of the merger of two white dwarves or one white dwarf accreting from a non-degenerate companion. In the second case, the companion will most likely survive the event and should be seen, post-explosion, in remnants. We have scrutinized two ancient remnants for such a companion star, namely those of SN1572 and SN1006. I will show the findings in the context of other research in that area. In a second part of the the talk, I will outline how to extract information like energies and yields from optical spectra of Type Ia Supernovae fitting them with synthetic spectra. In particular, my work pertains to the automation of this complex fitting processes. I will discuss the merits of the automated fitting many Type Ia supernovae and will outline our progress using artificial intelligence algorithms.

Feb 21 - 11:00am, "Modelling Extreme Mass Ratio Binary Black Hole Inspirals" Presented by Dr. Jonathan Thornburg Indiana University, at the Elliott Building, Room 060, UVIC Victoria. In this talk I'll discuss the challenge of trying to model the orbital dynamics and gravitational-wave (GW) emission of such an "EMRI" system as it evolves under the influence of the gravitational radiation-reaction "self-force". Because of the highly asymmetric mass ratio the orbital-decay timescale is much longer than the orbital period, so a direct "numerical relativity" solution of the Einstein equations would be both impractically expensive and insufficiently accurate. Instead, we can use methods based on black hole perturbation theory, treating the small black hole as a perturbation of a background (Schwarzschild or Kerr) spacetime. I'll outline some of the analytical and computational challenges of these analyses, describe recent progress in surmounting these challenges, and discuss EMRI systems as potential GW sources for the proposed eLISA/NGO space-based GW observatory.

Feb 22 – 7:30pm, CVSF Monthly Social, Cowichan Valley StarFinders (CVSF) Astronomy Club. Come and enjoy an astronomical evening of presentation or videos with like minded individuals in the Cowichan Valley. For more info visit: http://www.starfinders.ca/socials.htm

Feb 22- 3:30pm "The Adventures of Cosmic Baryons" Presented by Dr Dr. Crystal Martin
University of California, Santa Barbara, at UVIC Bob Wright Centre
Room A104, Victoria
Cosmological models have been spectacularly successful in describing the assembly of dark-matter in the Universe, but they lack the resolution to calculate the cosmic history of the gas accreted by galaxies. Yet, how these baryons cycle in and out of galaxies, and what they do while they are there, are key questions in understanding the life cycles of galaxies. Specific challenges include accounting for the dispersal of heavy elements in the intergalactic medium, suppressing star formation in massive structures and dwarf galaxies, and explaining the shift in star formation activity from massive galaxies towards less massive galaxies with cosmic time. Gas heating by supernovae and supermassive black

holes plays an important role in most proposed solutions to these problems, but again simulations lack the resolution to capture these "feedback processes" directly. I will show how observations are beginning to empirically calibrate the circulation of gas between galaxies and the circumgalactic medium, and trace the ejection of elements produced by stellar nucleosynthesis. Come learn about the wild ride of cosmic 'metals' and 'baryons' as they cycle in and out of galaxies.

Feb 23 7:00 – 9:00pm " "A Billion $ Observatory In the Chilean Andes" Presented by Dr. Andy Woodsworth, Nanaimo Astronomy Club Location: Beban Social Complex Street: 2300 Bowen Road, Nanaimo. Canada is a participant in the development of this international radio observatory, which will represent a bigger advance in the field of radio astronomy than Hubble did in optical astronomy. This enormous observatory, which includes 66 large movable antennas in a 15 km area, is being built at the 5,000 meter level in the Atacama desert region of northern Chile. This talk compares optical and radio astronomy, and explains some of the excitement behind the scientific potential and the very challenging technology development required to realize this potential. The talk will also show a few of the touristic aspects of the Atacama region.

Feb 29th – 4:30pm – 5:30pm Would the Discovery of Extra-Terrestrial Life Affect our Religious Beliefs?
@ ENGINEERING COMP SCIENCE BUILDING124
Over a thousand planets are now known to exist within several hundred planetary systems. Although no planet resembling the Earth has yet been detected, one could be found very soon. This will attract much curiosity as to whether or not it supports life, and particularly intelligent life. Some believe that the discovery of such life would profoundly affect our religious beliefs. The speaker will examine the evidence for this claim.

Alan Batten, *currently Chair of the Friends of the Centre, spent over half a century at the Dominion Astrophysical Observatory here in Victoria. He has served as a vice-president of the International Astronomical Union and was elected a Fellow of the Royal Society of Canada in 1977. His most recent book, Our Enigmatic Universe: One Astronomer's Reflections on the Human Condition, was published by Melrose Books in June 2011.*
Sponsor CSRScsrs@uvic.ca 250-721-6325

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: Jan. 26 +
Launch Vehicle: ISS Progress 46
Launch Site: Baikonur Cosmodrome, Kazakhstan
Description: A Progress resupply spacecraft will deliver cargo to the International Space Station.

Date: February +
Mission: Orbital Sciences Corporation
Launch Vehicle: Taurus II
Launch Site: Wallops Flight Facility
Launch Pad: 0A
Description: The Taurus II is scheduled for a test flight under NASA's Commercial Orbital Transportation Services agreement with the company. back

4. This Month In Exploration

Courtesy of: NASA History Program Office

50 Years Ago – 1962
January 3: NASA announced name of two-manned spacecraft, "Gemini."
January 13: Discoverer 37 launched, 4:41 p.m., EST, Vandenberg AFB.
January 24: Composite 1 (Navy), launched, 4:30 a.m., EST, Cape Canaveral, Fla.
January 26: Ranger 3 launched, 3:30 p.m., EST, Cape Canaveral, Fla, Vandenberg AFB.
February 8: Tiros 4 launched, 7:43 a.m., EST, Cape Canaveral, Fla.
February 20: Mercury Atlas 6 (MA-6), Friendship 7 launched, with astronaut John H. Glenn, 9:47:39 a.m., first American to orbit the earth, Cape Canaveral, Fla.
February 27: Discoverer 38 (Corona Mission 9030) launched, Vandenberg AFB. The last Discoverer named Corona mission.

45 Years Ago – 1967
January 11: Intelsat II F-2 launched, 5:55 a.m., EST, Cape Canaveral, Fla. Also known as Pacific 1.
January 26: ESSA 4 launched, 12:32 p.m., EST, Vandenberg AFB.
January 27: Apollo I/AS 204 fire, 6:31 p.m., EST, Cape Can. Fla, Astronauts Virgil I. "Gus" Grissom, Edward H. White II, and Roger B. Chaffee die in capsule fire.
January 27: Outer Space Law Treaty signed, Washington, D.C.
February 4: Lunar Orbiter 3 launched, 8:17 p.m., EST, Cape Canaveral, Fla.
February 8: Diademe 1 launched, Algeria, French satellite.
February 15: Diademe 2 launched, Algeria, French satellite.
40 Years Ago – 1972
January 22: Intelsat IV F-4 launched, 7:12 p.m., EST, Cape Canaveral, Fla.
January 31: HEOS A-2 launched, 12:20 p.m., EST, WSMC.
February 14: USSR launches Luna 20 (Lunik 20) at 03:27:59 UTC by Proton K from Baikonur which soft lands on the Moon four days later. A rotary-percussion drill retrieved samples from the surface which were returned to Earth by capsule on February 25.
35 Years Ago -- 1977
January 27: NATO III-B launched, 7:49 p.m., EST, Cape Canaveral, Fla.
February 7: USSR launches Soyuz-24 from Baikonur. Cosmonauts: Viktor V.Gorbatko and Yuri N.Glazkov. Ferry flight to Salyut-5 space station.
February 18: Enterprise, the first space shuttle orbiter,flight tested at Dryden Flight Research Center.
30 Years Ago – 1982
January 15: RCA-IV or Satcom 4 launched, 8:54 p.m., EST, Cape Canaveral, Fla.
February 25: Westar IV launched, 7:04 p.m., EST, Cape Canaveral, Fla.
25 Years Ago – 1987
February 5: Soyuz TM-2 launched from Baikonur, 2138 Moscow time, Yuri V. Romanenko and Aleksandr I. Laveykin docked with space station Mir. Romanenko established world space record of 326 days in space.
February 12: SDS launched by Titan 34D for DOD, l0:40 p.m., PST, Vandenberg AFB.
February 26: GOES 7 launched, 6:05 p.m., EST, Cape Canaveral, Fla.
20 Years Ago – 1992
January 22: STS-42 (Space Shuttle Discovery) launched at 9:52 a.m, EST, KSC. Crew: Ronald J. Grabe, Stephen S. Oswald, Norman E. Thagard, David C. Hilmers, William F. Readdy, Roberta L. Bondar (Canada), and Ulf D. Merbold (ESA-Germany). Carried in the cargo bay was the International Microgravity Laboratory 1 (IML-1) a pressurized manned Spacelab module, to explore in depth the complex effects of weightlessness on living organisms and materials processing. Landed January 30, 8:07 a.m., PST, Edwards Air Force Base, CA. Mission Duration: 8 days, 1 hour, 14 minutes.
15 Years Ago – 1997
January 12: STS-81 (Space Shuttle Atlantis) launched at 4:27 a.m. EST, KSC. Crew: Michael A. Baker, Brent W. Jett, Jr., John M. Grunsfeld, Marsha S. Ivins, Peter J. K. Wisoff, and Jerry M. Linenger. Fifth Mir docking. Astronaut John Blaha, who had been on Mir since September 19, 1996, was replaced by astronaut Jerry Linenger. Landed at KSC on January 22, 9:23 a.m., EST. Mission Duration: 10 days, 4 hours, 56 minutes.
February 10: Russia launches Soyuz TM-25 aboard a Soyuz-U rocket from Baikonur. Cosmonauts: Vasili V. Tsibliyev, Aleksandr I. Latuzkin, Reinhold Ewald (Germany). Ferry flight to space station MIR.
February 11: STS-82 (Space Shuttle Discovery) launch at 3:55 a.m. EST, KSC. Crew: Kenneth D. Bowersox, Scott J. Horowitz, Mark C. Lee, Steven A. Hawley, Gregory J. Harbaugh, Steven L. Smith, and Joseph R. Tanner. Second in a series of planned servicing missions to the orbiting Hubble Space Telescope (HST). Landed February 21 at 3:32 am EST, KSC. Mission Duration: 9 days, 23 hours, 38 minutes.
February 26: Superbird B1, a Japanese communications satellite, and Arabsat 1C, a Saudi Arabian communications satellite were launched at 23:58:10 UTC using the Ariane-44L launch vehicle from the Kourou Space Center, French Guiana.
5 Years Ago – 2007
January 10: SRE 1, India's first recoverable capsule, was launched by a PSLV-C7 rocket from Sriharikota at 03:57. It was a technology demonstrator for the planned 2010 launch of a lunar mission.

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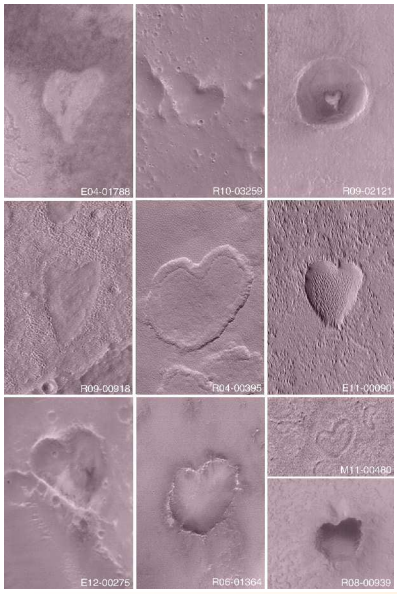
5. Cool Pics/Videos



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".

Now who could resist this Valentine collage of pictures from the Mars Global Surveyor show *(courtesy of Bad Astronomy) Image credit: Malin Space Science Systems/NASA*

These are all mesas (raised eroded features) or depressions on Mars. Pretty cool that the universe celebrates too!

Looking for the Sounds of Silence. Bryon sent in this wonderful TED video on what it takes to do extreme astrophysics. It is presented by Anil Ananthaswamy in Dec 2010 but the message is just as relevant today. Enjoy!
http://www.wimp.com/extremeastrophysics/

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6. Featured Articles

Articles

RETURN TO CATEGORIES

1. Chandra Finds Largest Galaxy Cluster
2. Kepler Discovers a Tiny Solar System
3. The Milky Way's True Colours
4. Soon 1st Ever Picture of Black Hole
5. IBEX Glimpse of Interstellar Matter
6. Grail's Video From Farside of the Moon
7. Worlds Largest Mirror
8. Microsoft OmniTouch

Chandra Finds Largest Galaxy Cluster– Jan 10/12 Credit: *Chandra X-ray Center,*

An exceptional galaxy cluster, the largest seen in the distant universe, has been found using NASA's Chandra X-ray Observatory and the Atacama Cosmology Telescope (ACT) in Chile. Officially known as ACT-CL J0102-4915, the galaxy cluster has been nicknamed "El Gordo" ("the big one" or "the fat one" in Spanish) by the researchers who discovered it. The name, in a nod to the Chilean connection, describes just one of the remarkable qualities of the cluster, which is located more than 7 billion light-years from Earth. This large distance means that it is being observed at a young age.

Composite image of the El Gordo galaxy cluster. Credit: X-ray: NASA/CXC

"This cluster is the most massive, the hottest, and gives off the most X-rays of any known cluster at this distance or beyond," said Felipe Menanteau from Rutgers University in New Brunswick, New Jersey.

Galaxy clusters, the largest objects in the universe that are held together by gravity, form through the merger of smaller groups or sub-clusters of galaxies. Because the formation process depends on the amount of dark matter and dark energy in the universe, clusters can be used to study these mysterious phenomena.

Dark matter is material that can be inferred to exist through its gravitational effects, but it does not emit and absorb detectable amounts of light. Dark energy is a hypothetical form of energy that permeates all space and exerts a negative pressure that causes the universe to expand at an ever-increasing rate. "Gigantic galaxy clusters like this are just what we were aiming to find," said Jack Hughes, also from Rutgers. "We want to see if we understand how these extreme objects form using the best models of cosmology that are currently available." Although a cluster of El Gordo's size and distance is extremely rare, it is likely that its formation can be understood in terms of the standard Big Bang model of cosmology. In this model, the universe is composed predominantly of dark matter and dark energy and began with the Big Bang about 13.7 billion years ago.

The team of scientists found El Gordo using ACT thanks to the Sunyaev-Zel'dovich effect. In this phenomenon, photons in the cosmic microwave background interact with electrons in the hot gas that pervades these enormous galaxy clusters. The photons acquire energy from this interaction, which distorts the signal from the microwave background in the direction of the clusters. The magnitude of this distortion depends on the density and temperature of the hot electrons and the physical size of the cluster. X-ray data from Chandra and the European Southern Observatory's Very Large Telescope, an 8-meter optical observatory in Chile, show that El Gordo is, in fact, the site of two galaxy clusters running into one another at several million miles per hour. This and other characteristics make El Gordo akin to the well-known object called the Bullet Cluster, which is located almost 4 billion light-years closer to Earth. As with the Bullet Cluster, there is evidence that normal matter, mainly composed of hot, X-ray bright gas, has been wrenched apart from the dark matter in El Gordo. The hot gas in each cluster was slowed down by the collision, but the dark matter was not.

"This is the first time we've found a system like the Bullet Cluster at such a large distance," said Cristobal Sifon from Pontificia Universidad de Catolica de Chile (PUC) in Santiago. "It's like the expression says: If you want to understand where you're going, you have to know where you've been."

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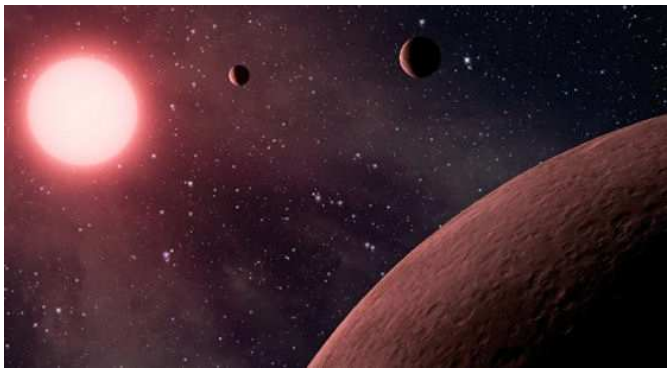
Kepler Discovers a Tiny Solar System– Jan 11/12 *Credit: Science@NASA*

Astronomers using data from NASA's Kepler mission have discovered the three smallest planets yet detected orbiting a star beyond our sun. The planets orbit a single star, called KOI-961, and are 0.78, 0.73 and 0.57 times the radius of Earth. The smallest is about the size of Mars.

"This is the tiniest solar system found so far," said John Johnson, the principal investigator of the research from NASA's Exoplanet Science Institute at the California Institute of Technology in Pasadena. "It's actually more similar to Jupiter and its moons in scale than any other planetary system. The discovery is further proof of the diversity of planetary systems in our galaxy."

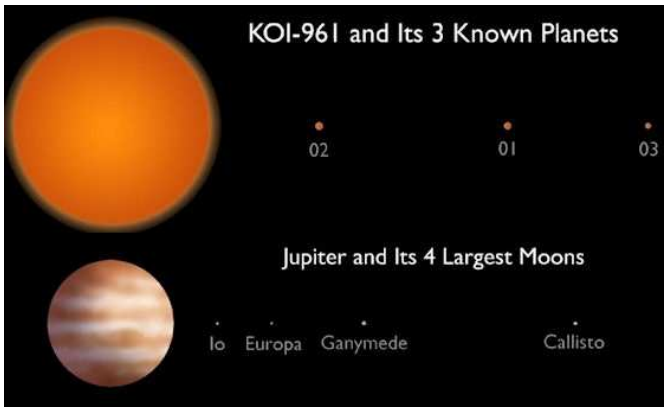


This artist's concept depicts an itsy bitsy planetary system -- so compact, in fact, that it's more like Jupiter and its moons than a star and its planets. Astronomers using data from NASA's Kepler mission and ground-based telescopes recently confirmed that the system, called KOI-961, hosts the three smallest exoplanets known so far to orbit a star other than our sun.

All three planets are thought to be rocky like Earth, but orbit close to their star. That makes them too hot to be in the habitable zone, which is the region where liquid water could exist. Of the more than 700 planets confirmed to orbit other stars -- called exoplanets -- only a handful are known to be rocky.

"Astronomers are just beginning to confirm thousands of planet candidates uncovered by Kepler so far," said Doug Hudgins, Kepler program scientist at NASA Headquarters in Washington." Finding one as small as Mars is amazing, and hints that there may be a bounty of rocky planets all around us."

Kepler searches for planets by continuously monitoring more than 150,000 stars, looking for telltale dips in their brightness caused by crossing, or transiting, planets. At least three transits are required to verify a signal as a planet. Follow-up observations from ground-based telescopes also are needed to confirm the discoveries. The latest discovery comes from a team led by astronomers at the California Institute of Technology in Pasadena. The team used data publicly released by the Kepler mission, along with follow-up observations from the Palomar Observatory, near San Diego, and the W.M. Keck Observatory atop Mauna Kea in Hawaii. Their measurements dramatically revised the sizes of the planets from what originally was estimated. The three planets are very close to their star, taking less than two days to orbit around it. The KOI-961 star is a red dwarf with a diameter one-sixth that of our sun, making it just 70 percent bigger than Jupiter.



'Honey I Shrunk the Planetary System': This artist's concept compares the KOI-961 planetary system to Jupiter and the largest four of its many moons.

Red dwarfs are the most common kind of star in our Milky Way galaxy. The discovery of three rocky planets around one red dwarf suggests that the galaxy could be teeming with similar rocky planets. "These types of systems could be ubiquitous in the universe," said Phil Muirhead, lead author of the new study from Caltech. "This is a really exciting time for planet hunters."
For more information about the Kepler mission, visit: http://www.nasa.gov/kepler

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The Milky Way's True Colours – Jan 12/12 *Credit: BBC News*

Astronomers have determined exactly what colour our home galaxy the Milky Way is, and find it is aptly named. They wanted to find out how our galaxy looked from the outside - a difficult task given the Earth is inside it. A comparison of star types in other galaxies gives perhaps an unsurprising result: white. But not just any white - specifically, like spring snow at an hour after sunrise or before sunset. The finding was announced at the 219th American Astronomical Society meeting.

"For astronomers, one of the most important parameters is actually the colour of the galaxy," Jeffrey Newman of the University of Pittsburgh told BBC News. "That tells us basically how old the stars in the galaxy are, how recently it's been forming stars - are they forming today or did its stars form billions and billions of years ago?" Prof Newman told the meeting: "But it's worse than that; not only are we looking at the Milky Way from the inside, but our view is blocked by dust." "We can only see about one or two thousand light years in any direction."

So Prof Newman and his student Tim Licquia went about putting the Milky Way on the map of other galaxies that we can see from outside. They gathered data from the Sloan Digital Sky Survey, with information on about a million galaxies. They compared those data with what they knew about the total mass in the Milky Way, as well as the rate of star formation, looking for near matches among other galaxies. For those most nearly matched to our own galactic home, the team took an average and came up with a precise measure of what colour it must be.

"The best description I can give would be that if you looked at new spring snow, which has a fine grain size, about an hour after dawn or an hour before sunset, you'd see the same spectrum of light that an alien astronomer in another galaxy would see looking at the Milky Way," Prof Newman told BBC News. This "colour temperature" is somewhere between that of an old-fashioned incandescent lightbulb and noon-time sunlight; both whites, but subtly different.

And what does the colour tell us about our Milky Way's development - is it a cosmic newcomer or past its prime? "It appears our Milky Way is on the road between those two stages - based on the colour we find, the rate of formation of stars has been declining over time," Prof Newman said. "The Milky way is in a very interesting evolutionary state right now."

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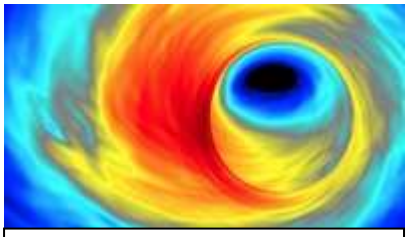
Soon First-Ever Picture of a Black Hole – Jan 18/12 *Credit: University of Arizona-Tucson*

Astronomers, physicists, and scientists from related fields across the world will convene in Tucson, Arizona, January 18–20 to discuss an endeavor that only a few years ago would have been regarded as nothing less than outrageous. The conference is organized by Dimitrios Psaltis and Dan Marrone

from the University of Arizona's Steward Observatory.



A computer simulation of superheated plasma swirling around the black hole at the center of our galaxy. Credit: Scott Noble/RIT

"Nobody has ever taken a picture of a black hole," Psaltis said. "We are going to do just that."

"Even five years ago, such a proposal would not have seemed credible," said Sheperd Doeleman from the Haystack Observatory at Massachusetts Institute of Technology in Cambridge who is the principal investigator of the Event Horizon Telescope, as the project is dubbed. "Now we have the technological means to take a stab at it."

First postulated by Albert Einstein's general theory of relativity, the existence of black holes has since been supported by decades' worth of observations, measurements, and experiments. But never has it been possible to directly observe and image one of these maelstroms whose sheer gravity exerts such cataclysmic power that it twists and mangles the very fabric of space and time.

"Black holes are the most extreme environment you can find in the universe," Doeleman said. The field of gravity around a black hole is so immense that it swallows everything in its reach; not even light can escape its grip. For that reason, black holes are just that — they emit no light whatsoever, their "nothingness" blends into the black void of the universe.

So how does one take a picture of something that by definition is impossible to see?

"As dust and gas swirls around the black hole before it is drawn inside, a kind of cosmic traffic jam ensues," Doeleman said. "Swirling around the black hole like water circling the drain in a bathtub, the matter compresses and the resulting friction turns it into plasma heated to a billion degrees or more, causing it to 'glow' and radiate energy that we can detect here on Earth."

By imaging the glow of matter swirling around the black hole before it goes over the edge and plunges into the abyss of space and time, scientists can only see the outline of the black hole, also called its shadow. Because the laws of physics either don't apply to or cannot describe what happens beyond that point of no return from which not even light can escape, that boundary is called the event horizon. "So far, we have indirect evidence that there is a black hole at the center of the Milky Way," Psaltis said. "But once we see its shadow, there will be no doubt." Even though the black hole suspected to sit at the center of our galaxy is a supermassive one at 4 million times the mass of the Sun, it is tiny to the eyes of astronomers. Smaller than Mercury's orbit around the Sun, yet almost 26,000 light-years away, it appears about the same size as a grapefruit on the Moon.

"To see something that small and that far away, you need a very big telescope, and the biggest telescope you can make on Earth is to turn the whole planet into a telescope," Marrone said. To that end, the team is connecting up to 50 radio telescopes scattered around the globe, including the Submillimeter Telescope on Mt. Graham in Arizona, telescopes on Mauna Kea in Hawaii, and the Combined Array for Research in Millimeter-wave Astronomy in California. The global array will include several radio telescopes in Europe, a 10-meter dish at the South Pole, and potentially a 15-meter antenna atop a 15,000-foot (4.6 kilometers) peak in Mexico. "In essence, we are making a virtual telescope with a mirror that is as big as the Earth," Doeleman said. "Each radio telescope we use can be thought of as a small silvered portion of a large mirror. With enough such silvered spots, one can start to make an image. The Event Horizon Telescope is not a first-light project, where we flip a switch and go from no data to a lot of data. Every year, we increase its capabilities by adding more telescopes, gradually sharpening the image we see of the black hole."

One crucial and eagerly expected key element about to join Event Horizon's global network of radio telescopes is the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile. Comprising 50 radio antennas itself, ALMA will function as the equivalent of a dish that is 90 meters in diameter and become what Doeleman called "a real game changer." "We will be able to actually see what happens very close to the horizon of a black hole, which is the strongest gravitational field you can find in the universe," Psaltis said. "No one has ever tested Einstein's general theory of relativity at such strong fields."

General relativity predicts that the bright outline defining the black hole's shadow must be a perfect circle. According to Psaltis, whose research group specializes in Einstein's general theory of relativity, this provides an important test. "If we find the black hole's shadow to be oblate instead of circular, it

means Einstein's general theory of relativity must be flawed," he said. "But even if we find no deviation from general relativity, all these processes will help us understand the fundamental aspects of the theory much better."

Black holes remain among the least understood phenomena in the universe. Ranging in mass from a few times the mass of the Sun to billions, they appear to coalesce like drops of oil in water. Most if not all galaxies are now believed to harbor a supermassive black hole at their center, and smaller ones are scattered throughout. Our Milky Way is known to be home to about 25 smallish black holes ranging from five to 10 times the Sun's mass.

"What is great about the one in the center of the Milky Way is that it is big enough and close enough," Marrone said. "There are bigger ones in other galaxies, and there are closer ones, but they're smaller. Ours is just the right combination of size and distance."

The reason astronomers rely on radio waves rather than visible or infrared light to spy on the black hole is twofold: For one, observing the center of the Milky Way from Earth requires peering right through the plane of the galaxy. Radio waves are able to penetrate thousands of light-years worth of stars, gas, and dust obstructing the view. Secondly, combining optical telescopes into a virtual super-telescope would not be feasible, according to the researchers. Only very recent technological advances have made it possible to not only record radio waves at just the right wavelengths where they don't interfere with water vapor in the atmosphere, but also to ensure the ultra-precise timing necessary to combine observations from multiple telescopes thousands of miles apart into one exposure.

Each telescope will record its data onto hard drives, which will be collected and physically shipped to a central data processing center at MIT's Haystack Observatory. Bringing together radio telescopes around the globe requires an equally global team effort. "This is not only the usual international conference where people come from all over the world because they are interested in sharing their research," Psaltis said. "For the Event Horizon Telescope, we need the entire world to come together to build this instrument because it is as big as the planet. People are coming from all over the world because they have to work on it."

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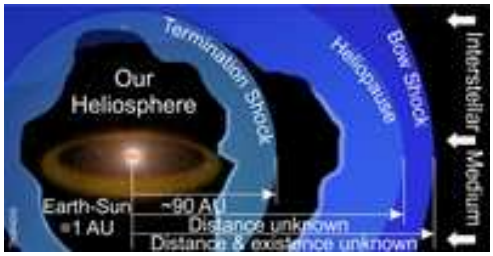
IBEX Glimpse of Interstellar Matter– Feb 1/12 Credit: *NASA Headquarters*



NASA's Interstellar Boundary Explorer (IBEX) has captured the best and most complete glimpse yet of what lies beyond the solar system. The new measurements give clues about how and where our solar system formed, the forces that physically shape our solar system, and the history of other stars in the Milky Way.

The Earth-orbiting spacecraft observed four separate types of atoms, including hydrogen, oxygen, neon, and helium. These interstellar atoms are the byproducts of older suns, which spread across the galaxy and fill the vast space between stars. IBEX determined the distribution of these elements outside the solar system, which are flowing charged and neutral particles that blow through the galaxy, called the interstellar wind.

"IBEX is a small Explorer mission and was built with a modest investment," said Barbara Giles from NASA Headquarters in Washington, D.C. "The science achievements, though, have been truly remarkable and are a testament to what can be accomplished when we give our nation's scientists the freedom to innovate."

Scientists report finding 74 oxygen atoms for every 20 neon atoms in the interstellar wind. In our solar system, there are 111 oxygen atoms for every 20 neon atoms. This translates to more oxygen in any part of the solar system than in nearby interstellar space. "Our solar system is different than the space right outside it, suggesting two possibilities," said David McComas from the Southwest Research Institute in San Antonio. "Either the solar system evolved in a separate, more oxygen-rich part of the galaxy than where we currently reside, or a great deal of critical life-giving oxygen lies trapped in interstellar dust grains or ices, unable to move freely throughout space."

The new results hold clues about the history of material in the universe. While the Big Bang initially

created hydrogen and helium, only the supernova explosion at the end of a star's life can spread the heavier elements of oxygen and neon through the galaxy. Knowing the amounts of elements in space may help scientists map how our galaxy evolved and changed over time. Scientists want to understand the composition of the boundary region that separates the nearest reaches of our galaxy, called the local interstellar medium, from our heliosphere. The heliosphere acts as a protective bubble that shields our solar system from most of the dangerous galactic cosmic radiation that otherwise would enter the solar system from interstellar space.

IBEX measured the interstellar wind traveling at a slower speed than previously measured by the Ulysses spacecraft, and from a different direction. The improved measurements from IBEX show a 20 percent difference in how much pressure the interstellar wind exerts on our heliosphere. "Measuring the pressure on our heliosphere from the material in the galaxy and from the magnetic fields out there will help determine the size and shape of our solar system as it travels through the galaxy," said Eric Christian from NASA's Goddard Space Flight Center in Greenbelt, Maryland.

The IBEX spacecraft was launched in October 2008. Its science objective is to discover the nature of the interactions between the solar wind and the interstellar medium at the edge of our solar system.

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GRAIL's Video From Farside of the Moon–Feb 3/12 *credit Jet Propulsion Laboratory, Pasadena, California*

South pole of the farside of the Moon as seen from the GRAIL mission's Ebb spacecraft. *Credit: NASA/Caltech-JPL*

A camera aboard one of NASA's twin Gravity Recovery And Interior Laboratory (GRAIL) lunar spacecraft has returned its first unique view of the farside of the Moon. Students nationwide will be using Knowledge Acquired by Middle school students (MoonKAM) to select lunar images for study.

GRAIL consists of two identical spacecraft, recently named Ebb and Flow, each of which is equipped with a MoonKAM. The images were taken as part of a test of Ebb's MoonKAM on January 19. The GRAIL project plans to test the MoonKAM aboard Flow at a later date.

In the video, the north pole of the Moon is visible at the top of the screen as the spacecraft flies toward the lunar south pole. One of the first prominent geological features seen on the lower third of the Moon is Mare Orientale, a 560-mile-wide (900 kilometers) impact basin that straddles both the Moon's near and farside. The clip ends with rugged terrain just short of the lunar south pole. To the left of center, near the bottom of the screen, is the 93-mile-wide (149km) Drygalski Crater with a distinctive star-shaped formation in the middle. The formation is a central peak created many billions of years ago by a comet or asteroid impact. "The quality of the video is excellent and should energize our MoonKAM students as they prepare to explore the Moon," said Maria Zuber from the Massachusetts Institute of Technology in Cambridge. Check out the video: http://www.nasa.gov/multimedia/videogallery/index.html?media_id=130956191

The twin spacecraft successfully achieved lunar orbit last New Year's Eve and New Year's Day. Previously named GRAIL-A and -B, the washing machine-sized spacecraft received their new names from fourth graders at the Emily Dickinson Elementary School in Bozeman, Montana, following a nationwide student-naming contest. Thousands of fourth- to eighth-grade students will select target areas on the lunar surface and send requests to the GRAIL MoonKAM Mission Operations Center in San Diego, California. Photos of the target areas will be sent back by the satellites for students to study. Sally Ride, American's first woman in space, is leading the MoonKAM program. Her team at Sally Ride Science and undergraduate students at the University of California, San Diego, will engage middle schools across the country in the GRAIL mission and lunar exploration. GRAIL is NASA's first planetary mission carrying instruments fully dedicated to education and public outreach. "We have had great response from schools around the country, more than 2,500 signed up to participate so far," Ride said. "In mid-March, the first pictures of the Moon will be taken by students using MoonKAM. I expect this will excite many students about possible careers in science and engineering."

Launched in September 2011, Ebb and Flow periodically perform trajectory correction maneuvers that, over time, will lower their orbits to near-circular ones with an altitude of about 34 miles (55km). During their science mission, the duo will answer longstanding questions about the Moon and give

scientists a better understanding of how Earth and other rocky planets in the solar system formed.

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World's Largest Mirror–Feb 3/12 *credit BBC News*

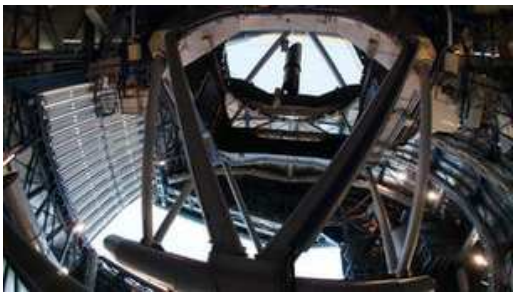
Astronomers have created the world's largest virtual optical telescope, linking four telescopes in Chile so that they operate as a single device. The telescopes of the Very Large Telescope (VLT) at the Paranal Observatory form a virtual mirror of 130m (424ft) in diameter.

A previous attempt to link the telescopes last March failed. Thursday's link-up was the system's scientific verification - the final step before scientific work starts. Linking all four units of the VLT will give scientists a much more detailed look at the Universe than previous experiments using just two or three telescopes to create a virtual mirror.

The process that links separate telescopes together is known as interferometry. In this mode, the VLT becomes the biggest ground-based optical telescope on Earth. Besides creating a gigantic virtual mirror, interferometry also greatly improves the telescope's spatial resolution and zooming capabilities. The VLT is one of several telescopes in the Atacama Desert set up by the European Southern Observatory (Eso). Eso is an international research organisation headquartered in Munich, Germany, and sponsored by 15 member countries.

Vital milestone

Even prior to the start of the operation, as the domes of the four VLT units opened on the desert mountaintop, excitement filled the Paranal Observatory's tiny control room. VLT, Paranal The combination of four units of the Very Large Telescope facility creates a virtual 130m-wide mirror



It was going to be a special night, said one of the astronomers. The head of instrumentation at Paranal, Frederic Gonte, called the event a "milestone in our quest for uncovering secrets of the Universe". "It's an extremely important step because now we know that we're ready to do real science," he told BBC News. "From now on, we'll be able to observe things we were not able to observe before."

To link the VLT units, the team of international astronomers and engineers used an instrument called Pionier, which replaces a multitude of mirrors with a single optical microchip. Although the first attempt to combine the four telescopes occurred in March 2011, it did not really work, said Jean-Philippe Berger, a French astronomer involved in the project. But this time, it was already pretty clear that all the instruments were working correctly, he added. "Last time, the atmospheric conditions and vibrations in the system were so bad that the data was just worthless," he recalled. "We stopped after half an hour knowing that it wouldn't improve. "So, this attempt is the real first one to carry out observations for several hours straight to test the system in different conditions." From now on, the system will be offered to the astronomical community, he added - any astronomer working at Paranal or visiting the observatory will be able to use it.

Right: Paranal observatory, Chile

VLTI, or the VLT Interferometer, has been used since 2002 to link together up to three VLT telescopes, as well as four small auxiliary telescopes that reside beside the big ones on the same platform at Cerra Paranal mountain, at 2,635m altitude.

The main component of an optical telescope is a mirror, and the light coming from a particular object being observed with separate telescopes - such as a star, a nebula or a galaxy - first gets reflected off individual mirrors.

And this is where the interferometer comes into play. It directs the light underground into tunnels, where specific instruments compensate for the delay that inevitably exists when more than one telescope is used. Once there is no delay, the light is combined into a single beam - and the image astronomers get is what would have been produced by one telescope with a gigantic mirror and a

much better zoom. In the case of the VLT, the zooming capability becomes almost 20 times better, said Mr Berger. He explained that although the biggest "virtual" mirror of 130m in diameter has already been achieved by linking the two telescopes farthest from each other at Paranal, using all four units gives astronomers several advantages. "The more telescopes the better - you want to generate a plane to fill that virtual mirror, to increase the efficiency to reconstruct an image, in order to observe more complex objects in the sky," he said.

"With two telescopes, you typically observe round stars, for which you're only interested in the diameter, or binary stars, where you can measure the separation between the two stars. "With four telescopes, you can start thinking about triple stars or young stars surrounded by a protoplanetary disc - a disc of dust and gas that forms planets.""Now, the zoo of objects accessible to us will be much bigger."

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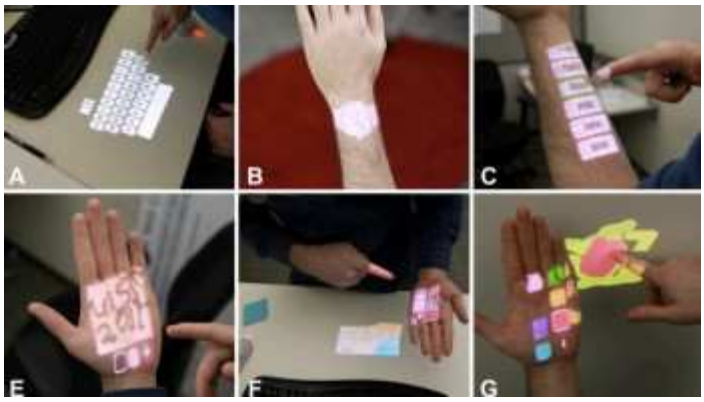
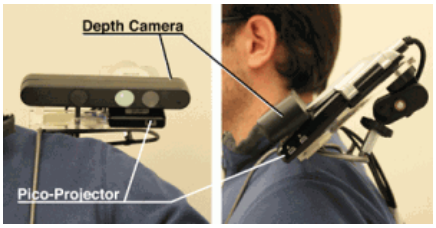
Microsoft OmniTouch–*credit ExtremeTech*



For those who prescribe to the axiom that bigger is always better, and as a result struggle with the small size of the screen of their mobile device, your pain is shared. It seems that finding real estate to work and operate with on mobile devices is a constant battle and a hindrance on productivity. There is hope, however, as some researchers have heard the cries of the frustrated users who simply do not have enough space.

Meet OmniTouch and PocketTouch, technologies that use projection and sound harmonics to create touchscreens out of any surface in the world. Coming out of their Redmond-based labs, Microsoft researchers using Kinect technology and pico projectors created the two applications because they wanted to take advantage of the vast amount of flat spaces in the world. They asked their people to imagine what it would be like to have the biggest touchscreen they could think of, only limited by the size of the physical space they could project onto. It was out of this visioning that OmniTouch was born.



OmniTouch shoulder pico projectorUsing a shoulder mounted pico projector, and a Kinect-like depth of field sensor, OmniTouch creates a multitouch surface that users can interact with using their hands (video demo below). Say you were paying bills or trying to split a tab with a large part at a restaurant, you could project a calculator on the table for everyone to see, or use a whiteboard to figure out your cash flow. A user could even make a part of their body touchable for making phone calls or sending an email. Right now the shoulder mount is a bit bulky, but can be brought down to a manageable size in future releases.

PocketTouchPocketTouch is a more discreet application, in the fact that it allows users to interact with the screens of their mobile devices while in their pockets. Using a set of sensors that can detect touch even through cloth, PocketTouch makes it possible to send a text or to interact with a music application by making gestures or tracing symbols through a pocket. For example, if you're on a crowded plane or train and can't get to your pocket to pull your phone out, you could fast forward the song by swiping your pant leg.

Both technologies have exciting applications: Perhaps we will see a Xbox game or remote that uses the shoulder mount to allow users to interact with their games. To be able to hack consoles in Deus Ex on a wall or hand would be sublime. Being able to change your ringer settings in a meeting without taking the handset out of a pocket would be a life saver in several instances. Making this useful for today's computing needs is

not something that is way off in the distance, but something that is going to have an impact sooner or later.

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7. Community Affairs

By Brian Robilliard

Shawnigan Lake School Observatory Project

We (CVSF) were contacted in the early fall by the Shawnigan Lake School because they had a donation from King Island that required our know how. They were offered an observatory complete with telescope mount and other accessories. They needed our help in re-locating it to Shawnigan Lake School.

In late November, Miles Waite and myself, caught the 9:10 Ferry from Swartz Bay and arrived at Saturna around 10am. Then we loaded our tools into an aluminum skiff and headed to King Island , ten minutes ride away. The weather was absolutely perfect for the move, even though it was November 28th it looked like late August.

The Move

At the location, we set to work labelling and dismantling the scopes, mount and dome in preparation for moving. Steve Housser (Shawnigan Lake School) helped above as Pat (the islands caretaker) nosed his boat directly below the observatory as we lowered each piece down the rock slope and into the boat.

It took two trips back and forth from King Island to move all the equipment and load it snugly into a waiting cube van on Saturna Island.

We made good time and had only one hour to spare while we waited for the 4:20 ferry to Maine Island, then on to another ferry to Swartz Bay. From Swartz Bay we delivered it to Shawnigan Lake School with no incidents.

Location, Location, Location

In early November, I looked at about four possible locations for the dome. Steve Housser and the school are now considering these location sites within the school property. We wait to hear of their final decision. Once that decision is made, we will be called again to help set-up the new dome and collimate the scope.

Shawnigan Lake School and the Starfinders are quite excited about the possibilities for a joint venture with this observatory.

Stay tuned for more to come on this project.

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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.

Available through its own Facebook page, Space Race Blastoff pits players in remote locations in a test of their knowledge of NASA history, technology, science and pop culture. Players who correctly answer questions earn virtual

badges depicting NASA astronauts, spacecraft and astronomical objects. Players also earn points they can use to obtain additional badges to complete sets that earn premium badges. Once in the game, players can choose an avatar and answer 10 multiple-choice questions. Each correct answer earns 100 points, with a 20-point bonus to the player who answers first. The winner advances to the bonus round to answer one additional question for more points. Answering the bonus question earns the player a badge, which may depict an astronaut, a spacecraft, a planet or other person or object. Additional badges can be obtained for 1,500 points.

To start the game click on the icon or the link: http://apps.facebook.com/spacerace Test your knowledge today and let us know how you did!

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9. The Sky This Month

By oneminuteastronomer.com

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

"It's Venus!" "No, it's Jupiter!"

Actually, it's both! The two bright planets move closer together in the western sky after sunset, confusing and bedazzling stargazers all over the world. The two planets are 40 degrees apart at the start of the month, and just 12 degrees apart by month's end. To tell which is which, remember Venus is always brighter. The Moon brushed past the two bright planets in late January, and will do so again later this month. And the planet Mars is just four weeks from its closest approach to Earth for the next two years.

Here's what's happening in the sky this month…

7 Feb. Full Moon (21:54 Universal Coordinated Time)

9 Feb. Mars appears just northeast of a waning gibbous Moon. The Red Planet rises in the early evening and is well positioned to view before midnight.

After hovering in the late-night and early morning sky for the past month, Mars becomes visible in the constellation Leo in the late evening sky. It reaches magnitude -1.2 by month's end on the way to its closest approach to Earth this year on March 5. This isn't a great apparition… the planet is not as close as past years… but you can see large surface markings and the polar caps with a small telescope at high magnification.
9 Feb. In a telescope, you can see the tiny disk of Uranus just 1/3 of a degree south of bright Venus.

12, 13 Feb. The Moon passes the bright star Spica and the planet Saturn over these two days in the southeastern sky well after mighnight. Spica shines with a bright white light, and may twinkle a little. Saturn shines with steadier sand-colored glow. Saturn will reach its closest to Earth in mid-April. This month, it's best seen after midnight.

14 Feb. Last Quarter Moon (17:04 UTC)

21 Feb. New Moon (22:35 UTC)

22 Feb. A very thin 1-day old crescent Moon lies near the bright planet Mercury just after sunset. Use binoculars to see the pair.

23, 24 Feb. A waxing crescent Moon climbs in the western sky after sunset towards brilliant Venus.

25, 26 Feb.The Moon moves past Venus and towards Jupiter over these two days. Venus is brighter, with magnitude -4.3 this month, while Jupiter shines at magnitude -2.2

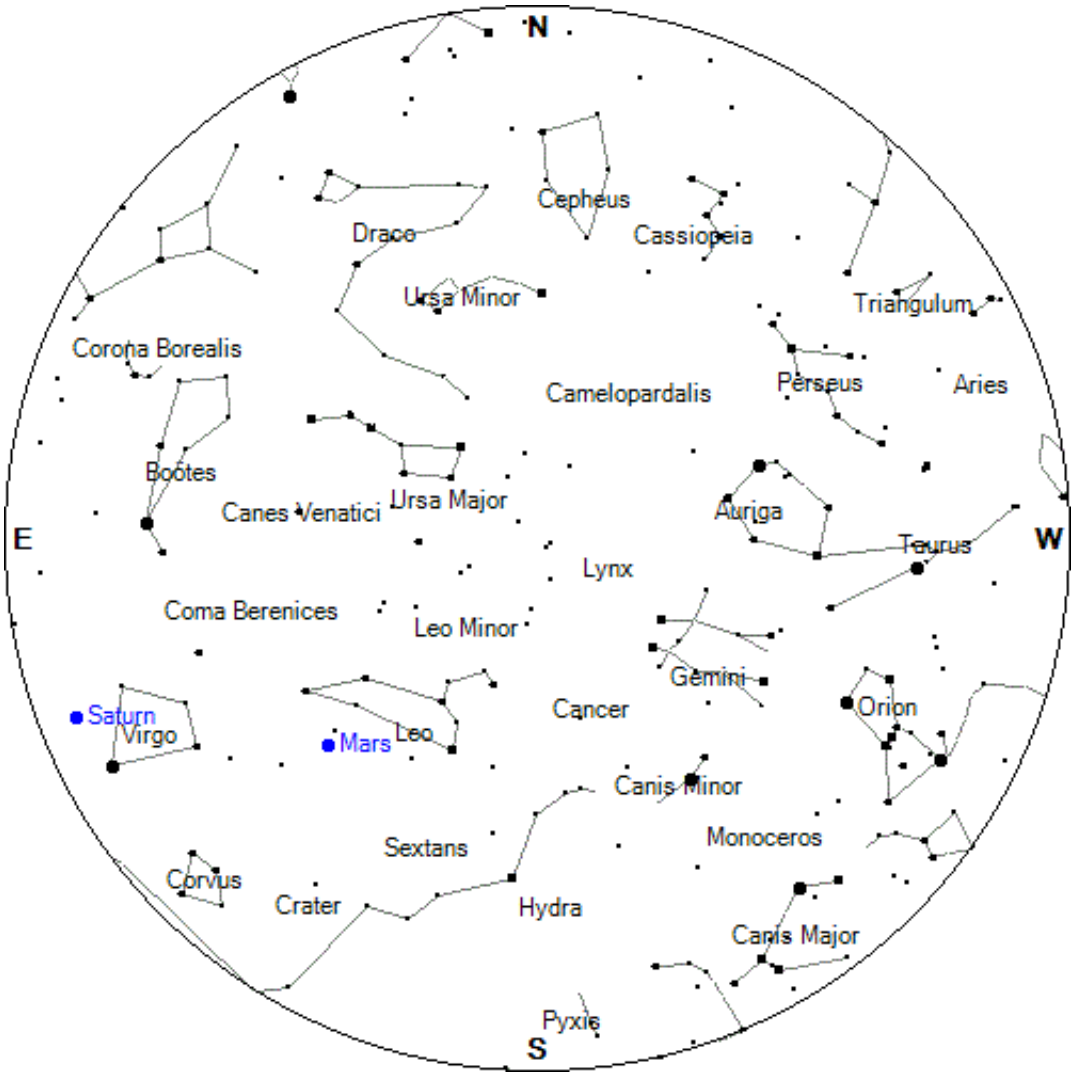
28, 29 Feb. The Moon moves towards the Pleiades and Hyades star clusters.

28 Feb. through March 7. Mercury lies 10 degrees above the western horizon after sunset. This is the best chance to see Mercury in the evening sky this year.

29 Feb. This is a "leap day", the extra day added to the calendar every four years. Most years have

365 days, but it takes the Earth 365 days, 5 hours, 49 minutes, and 16 seconds to move all the way around the Sun. To keep the calendar aligned to the Sun's position, we add one full day every four years. There are no leap days in years divisible by 100, unless the year is divisible by 400.

Sky Chart —Here's your mid-February 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

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