COWICHAN VALLEY STARFINDERS ASTRONOMY CLUB

Clear Skies

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Quick Links

1. Greetings!

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

March was a busy month, so busy that I thought I would just make note of some events to keep in mind:

March 8th the100th anniversary of International Women's Day. I would like to mention Canada's first ladies of astronomy. Here they are:
Harriet Brooks: From Exeter Ontario became Canada's first woman nuclear physicist in 1888
Roberta Lynn Bondar: from Sault Ste Marie, Ontario became Canada's first woman astronaut in 1992
Julie Payette: from Montreal, Quebecis the first Canadian to visit and work on board the international space station 1999. For more famous Canadian women click on the link http://famouscanadianwomen.com/index.htm

March 11 Japan Earthquake - NASA geophysicist Richard Gross calculated that Earth's rotation sped up by 1.6 microseconds. That is because of the shift in Earth's mass caused by the 8.9-magnitude earthquake. A microsecond is one-millionth of a second. *It* moved the island of Honshu 8 feet to the east and may have shifted the Earth's rotation axis by 3.937 inches, said Antonio Piersanti, researcher of the Rome-based institute,

March 15 "Beware the Ides of March" is a day of infamy.
refering to the date in time that Julius Caesar was betrayed by his closest of friends and assasinated in 44 B.C.

March 20 Vernal Equinox when night and day are nearly the same length and Sun crosses the celestial equator (i.e., declination 0) moving northward. The vernal equinox marks the first day of the season of spring. Yeh winter is officially over!

Maybe we will have better luck with our Socials. February was snowed out so we re-scheduled Dr. Arkos until May. Apologies to all you folks who showed up for our Jan social to find Dr. Diacu was not coming. Guess what? He's here this Wednesday March 23rd with his "Theory of Chaos" talk. I'm sure Dr. Diacu could probably compute the odds of both socials of 2011 being re-scheduled ☺.

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

By Freda Eckstein

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

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2. Socials

ABOUT THE CLUB
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Socials are held on the 4th Wednesday of each month 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
3rd house on the left across from Springbank road and Mail boxes.
Look for the STAR sign
Please park on Huckleberry or Springbank Rd's.
Call Brian 743-6633 if you need directions

Our next Social will be held at **7:30** on **WEDNESDAY March 23rd**
Feature: '"**Theory of Chaos**" **Dr. Florin Diacu.** Dr. Diacu (Univ. of Victoria, Canada) is a mathematician who uses his professional and outstanding literary skills to provide a remarkable analysis of the "science" of prediction. His chapter topics range from tsunamis, earthquakes, volcanic eruptions, and cosmic impacts to financial crashes and pandemics.

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3. Social Highlights – January 26th,2011

By Nancy Kirshfelt

Announcements:
- Jan 27 in Nanaimo, a talk on telescope buying tips given by Garland Coulson.
- Feb 1 at UVIC in the Farquhar Auditorium, Dr. Brian Green will talk about the hidden reality and a book signing will follow.
-Next month on Feb. 23 at 7:30 pm, Dr. Gregory Arkos will speak on apocalyptic prophecy....fact or fiction?
We missed hearing Dr. Diacu speak at this meeting as he was sick, and so we look forward to hearing him speak in March. We did, however, get to watch a documentary (thanks to Moe) about the theory that some people have that the Apollo moon missions were a hoax. Following the video, we had an exciting discussion finding flaws in this theory. I believe the consensus is....the Apollo moon missions were real!

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4. Upcoming Events

Every Wednesday from 8-10 UVIC Open House: In The Sky Above, at UVic (until April 2011)
The University of Victoria's newest stellar acquisition is the largest telescope on a university campus in Canada; members of the public are invited to take in the view every Wed. night at UVic. The telescope is on the roof of UVic's new science building and is the country's fifth largest overall. Visitors can expect to observe visible planets, double stars, open clusters, nebulae and even the Andromeda Galaxy.

Weekly viewings continue through April 2011, except last two Wed. in Dec.
Bob Wright Centre, fifth floor (use main lobby elevator on east side of building)
Admission is free. All ages and levels of cosmological knowledge are welcome.
Evening parking is $2.
Campus maps are available at www.uvic.ca/visitors/explore/maps.
For event info, contact the astronomy department at the numbers below.

Contacts: Russell Robb (Senior Lab Instructor, Department of Physics & Astronomy) at 250-721-7750 250-721-7750 or robb@uvic.ca

March 16th, 8 – 9 pm Planets, Planets Everywhere by Dr. JJ Kavelaars UVIC WRIGHT CENTRE SCI A104
Astronomy Public Lecture by Dr. JJ Kavelaars. Followed by star gazing with the new 0.8 metre telescope (weather permitting). Admission: Free. For more info visit:
http://www.astro.uvic.ca/~pritchet/publiclecture/

March 23rd, 8:30 pm Earth Hour Show your Support, Turn off your lights for one whole hour.
WWF is calling on Canadians to think about how we use and produce energy. To create the best possible future for Canadians and for the planet, let's stop wasting energy. You can do lots of fun things in the dark! Plan a candlelight dinner for your sweetie or a group of friends. Play board games, tell

stories, and sings songs with your kids and your neighbours. Whatever you're doing, we want to hear about it! Share your plans and post to http://wwf.ca/earthhour/

March 23rd , 7:30pm CVSF Social
Feature is "The Theory of Chaos" by Dr. Florin Diacu. You don't need a crystal-ball or psychic abilities to predict the future. In fact, there is a much more scientific approach to making predictions about what the future holds. Florin Diacu, an author and mathematician, uses his knowledge of mathematics to investigate possible future outcomes. For more info visit:
http://www.math.uvic.ca/faculty/diacu/index.html

March 24th 7:00 – 9:00 pm Nanaimo Astronomy Event
"From Chicken Livers To The Quadrivium - The Place of Astronomy in Ancient Worldviews by Dr. Chris Mundigler Beban Social Complex, 2300 Bowen Road, Nanaimo
To really appreciate how far we've comein terms of understanding space and our place in it, we have to go back further in time, much further, to cultures who revered astronomy (aka.astrology) not for its wonders but for the necessary order it kept in our daily lives. In this talk, we'll briefly explore that reverence from its roots to the Middle Ages. For more info visit:
http://www.nanaimoastronomy.com/events/regular-meeting-presentation-1

March 24th 10:30 – 12:30pm Space-The High Frontier with Dr. Parvez Kumar UVIC HICKMAN BUILDING
How space-related activities have had an impact on our daily lives. Join us on a space odyssey to bring this "high frontier" closer to you. Summary lecture notes will be distributed to all participants so you may refer to them during the lecture or in the future. Instructor Dr. Parvez Kumar, has been involved in Canada"s Space Station Program and its astronauts since inception in the early 1980s. Admission: $22.40 (includes HST). For more info visit:
http://www.uvcs.uvic.ca/aspnet/Course/Detail/?code=ASSC222

March 29th 6:30 – 9:30pm Café Scientifique-Turn Up the Heat Using the LHC by Bob Kawalewski, The Strathcona Hotel - 919 Douglas Streetm, Maple Room.
Using the Large Hadron Collider to recreate the conditions one nanosecond after the big bang. Admission: Free. For more info visit: http://cbr.uvic.ca/ Hosted by: The Centre for Biomedical Research and the Department of Physics and Astronomy

NASA Launches credit NASA.Com:
No launches for March

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5. This Month In History

Courtesy of: Windows2universe.org

March 13
1781 - William Herschel discovered Uranus
English astronomer William Herschel discovered Uranus. It was the first planet to be discovered with the aid of a telescope.

March 14
1835 - Giovanni Schiaparelli's birthday
Gioavanni Schiaparelli was an Italian astronomer who lived between 1835-1910. He observed patterned straight lines on the surface of Mars, and called them "canali", Italian for channels, later misinterpreted as "canals."

1879 - Birthday of Albert Einstein
Albert Einstein was a German physicist who lived between 1879-1955. Probably the most well-known scientist of the twentieth century, Einstein came up with many original theories and invented modern physics. He is most famous for his theory of relativity,

March 16
1750 - Caroline Herschel's birthday
Caroline Lucretia Herschel was a German astronomer who lived between 1750-1848. She worked in England most of her life along side her brother, William Herschel, helping him make astronomical observations and then making her own.

1926 - Robert Goddard uses first liquid rocket fuel.

Robert Goddard was a pioneer of modern rocketry who discovered that liquid fuel is more efficient than solid fuel. Although Goddard's first rocket flew for only 2 1/2 seconds, it made him believe that travel into space and to the Moon was possible.

March 17
1853 - Death of Christian Doppler
Christian Doppler was an Austrian mathematician who lived between 1803-1853. He is known for the principle he first proposed in Concerning the coloured light of double stars in 1842. This principle is now known as the Doppler Effect.

March 23
1912 - Wernher von Braun's birthday
Wernher von Braun was a German engineer who lived between 1912-1977. He is considered the father of the space age for his work in rocketry.

March 27
1845 - Birthday of Wilhelm Roentgen
Wilhelm Roentgen was a German physicist who lived between 1845-1923. His accidental discovery of x-rays in 1895 changed the fields of physics and medicine. For his brilliant experimental work, Roentgen received the first Nobel Prize, in 1901.

March 31
1727 - Death of Isaac Newton
Isaac Newton was an English scientist and mathematician who lived between 1642-1727. Newton's contributions to science include the universal law of gravitation, the development of a whole new field in mathematics called calculus, and his famous three laws of motion.

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6. 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".

A passenger on a flight from Orlando caught Discovery's final launch as it embarks on STS-133.
http://www.youtube.com/watch?v=GE_USPTmYXM

Hold the Universe in Your Hand - Keeping up with the latest space news has just become a whole lot easier thanks to the new Portal to the Universe app, which gives iPhone and iPod Touch [1] users direct access to the Universe wherever they go. You can install the application here

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7. Featured Articles

Articles

RETURN TO CATEGORIES

1. Eye on the Sky
2. Leonardo Attached to Space Station
3. Rocket Carrying NASA Satellite Crashes into Ocean
4. The UFO Galaxy
5. Probe Set for Arrival at Mercury
6. Physicists Creation of Optical Knots Offer Potential Power Source

Eye on the Sky– Feb 6/11 credit *Times Colonist, Victoria*

Imagine a telescope so powerful that it would let you see a loonie coin being held by someone in Calgary-from Victoria. Sound far-fetched? The technology is closer to reality than you think.

An international team of scientists and engineers is currently building the world's largest and most advanced optical telescope-the Thirty Meter Telescope (TMT)-and University of Victoria researchers are playing a key role in its development.

When the TMT starts observing the sky in 2019, astronomers will be able to detect and study light from the earliest stars and galaxies, analyze planets around nearby stars, and test many of the fundamental laws of physics.

The TMT project team has selected the summit of Mauna Kea on the Big Island of Hawaii as its preferred site. With its 30-metre diameter mirror, the TMT will have nine times the light-gathering power of the largest telescopes in use today and more than 10 times the resolution of the Hubble Space Telescope.

"TMT will be 200 times more powerful than the largest telescope currently in operation," says Dr. Luc Simard, an astronomer with UVic's Department of Physics and Astronomy and the Herzberg Institute of Astrophysics. "It will literally show us the birth of galaxies, stars and exoplanetary systems."
The TMT project is a partnership among the California Institute of Technology, the University of California, and the Association of Canadian Universities for Research in Astronomy (ACURA).

Simard is the science instruments group leader for the TMT project. "We currently have three main teams spanning 15 different institutions-not to mention industry-and two continents," he explains. "It's already a big job, and it will get bigger as our new partners-Japan, China and India-get integrated into the instrument teams and we get started on actual construction."

Another key UVic contributor to the telescope project is mechanical engineer Dr. Colin Bradley and his adaptive optics team, which is developing a solution to one of the main challenges facing TMT observations-turbulence from the Earth's atmosphere.

The TMT will have a set of deformable mirrors that "will basically change shape in real time to compensate for image distortions caused by the Earth's atmosphere," says Bradley. "In terms of the engineering, this is an extremely complex system. Canada is a world leader in this kind of work."

Simard's research interests are the formation and evolution of distant galaxies. "I'm an astronomer who has learned to translate science into engineering and engineering into science. You can't take courses for this. It has to come by osmosis, although others call it 'baptism by fire,'" he laughs.

Simard's TMT experience is reflected in course material he prepares for his graduate course in instrumentation, and it is often a focus of class discussions.

"We talk about everything from creating artificial stars up in the atmosphere using powerful lasers, to developing deformable mirrors that can change shape hundred of times a second."

The telescope isn't just about the discoveries that it will help make, stresses Simard. It's also about taking astronomical instruments to the next level.

"TMT represents a change of scale for astronomers," says Simard. "We're used to building instruments that are the size of a small car. Now we're talking about instruments that are the size of a house."

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Leonardo Attached to Space Station– Mar 1/11 Credit *ESA News*

After a flawless launch last Thursday and a textbook docking on Saturday, the Space Shuttle today delivered the European-built Leonardo Permanent Multipurpose Module to the International Space Station.

This final flight of Discovery marks the eighth and final trip of Leonardo to the orbiting complex. This visit will be longer: the module will be left attached to the Station as a permanent extension. Originally built to ferry cargo to and from the Station in the Shuttle cargo bay, Leonardo's modifications include improved debris shielding and easier access by the crew to its internal equipment.

Leonardo flew into space for the first time in 2001, also on Discovery, as the first of three Multipurpose Logistics Modules built by the Italian space agency, ASI, under an agreement with NASA.

Left: Discovery as seen from ISS
Its final cargo for the Station includes an experiment rack and a range of stowage facilities. Leonardo can also support microgravity research into fluid physics, materials science, biology and biotechnology.

Leonardo was removed from the Shuttle's cargo bay using the Station's robotic arm and mated to the Earth-facing port of the Unity node. Attachment was called complete at 16:05 CET.

Discovery returned to Earth on 9 March.

Crews of Expedition 26 and STS-133 inside Leonardo

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Rocket Carrying NASA Satellite Crashes into Ocean–Mar 5/11 *credit NASA and About.com*

The past couple days have not been good for the Orbital Sciences Corporation or NASA. For the second time in two years one of Orbital Sciences Corporation's Taurus XL failed to successfully carry one of NASA's environmental monitoring satellites into space.

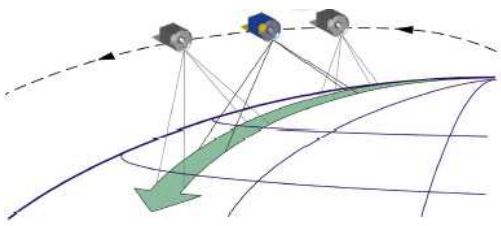
On Friday afternoon the rocket lifted off from Vandenberg Air Force Base and promptly crashed into the Pacific Ocean after the rocket's fairing, which protects the satellite during ascent, failed to separate. As a result NASA's Glory satellite met its demise.

Glory was a low Earth orbit (LEO) scientific research satellite designed to achieve two major goals:
+ Collect data on the properties of aerosols, including black carbon, in the Earth's atmosphere and climate system. It will enable a greater understanding of the seasonal variability of aerosol properties.
+ Collect data on solar irradiance for the long-term effects on the Earth climate record. Understanding whether the temperature increase and climate changes are by-products of natural events or whether the changes are caused by man-made sources is of primary importance.

Glory's Instruments
The Glory spacecraft was equipped with the following scientific instrumentation: The Total Irradiance Monitor (TIM); and the Aerosol Polarimetry Sensor (APS), along with its two supporting Cloud Cameras.

Total Irradiance Monitor
The Total Irradiance Monitor (TIM) instrument built by the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder, Colorado. The instrument measures the amount of solar energy that enters the Earth's atmosphere. This information will help researchers understand any long-term changes in the amount of energy coming from the Sun and how those changes affect Earth's climate. The accuracy of Glory's TIM instrument is expected to be better than that of any other solar irradiance instruments currently in space. It will follow a record of observations made by an earlier TIM instrument flown on the Solar Radiation and Climate Experiment (SORCE) mission, and continue an uninterrupted series of solar observations that span the past 30 years. The TIM instrument will monitor the Sun during the daylight portion of each Glory orbit. Data acquired in 50-second intervals will track changes in the total solar energy, which will then be averaged to provide both 6-hourly and daily values. This virtual continual monitoring will help diagnose short-term solar mechanisms causing energy budget changes and will contribute to the vital long-term solar record.

Aerosol Polarimetry Sensor
The Aerosol Polarimetry Sensor (APS) instrument built by Raytheon Inc. in El Segundo, California. This instrument will measure the size, quantity, refractive index, and shape of aerosols. This is the first space-based instrument to be able to identify different aerosol types, which will help researchers distinguish the relative influence of natural and human-caused aerosols on our global climate. The aerosol characterization capabilities of APS, coupled with the



cloud identification function performed by the two on-board Cloud Cameras will allow scientists to determine, with very high accuracy, the global distribution of aerosols and cloud properties. The Glory Cloud Cameras are built by Ball Aerospace and Technologies Corporation (BATC) in Boulder, Colorado.

Glory was to complete a series of 233 orbits of the Earth along differing ground tracks to create a net of observations. This pattern was to be repeated every 16 days. Such complete coverage of the Earth will help scientists learn about aerosols and their impacts across the globe.

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The UFO Galaxy–March 7/11 *credit National Research Council Canada*

Let's peer into intergalactic space today at a pretty little spiral galaxy in the constellation Lynx, just above Gemini and Cancer. Few stargazers bother with this galaxy because it lies in patch of sky with few bright stars. But it's well placed right now for northern observers. And, because it's near two zodiacal constellations, it's accessible to southern stargazers too. The constellation Lynx was created by Johannes Hevelius in the 17th century. It takes its name not because it resembles a wildcat, but because Hevelius noted an observer needs the keen eyes of a lynx to see its faint stars. But Lynx is flecked with distant galaxies, and the brightest and prettiest is NGC 2683. Its visual appearance in a telescope resembles a UFO in flight, so some call it the "UFO Galaxy" (see image Left).

NGC 2683 is as spiral galaxy seen just 11 degrees from edge-on, which explains its oblong shape. In a small telescope, it looks like a frosty silver needle. In a larger scope, say 10" or more, it's much more impressive, and you may see some texture and mottling from the dust lanes. In long-exposure photographs, you'll see fabulous structure from dust in the spiral arms, along with pink patches of emission nebulae and yellowed starlight from old stars near the galaxy's nucleus.
At a distance of 23 million light years, NGC 2683 is fairly close (for a galaxy). It spans 38,000 light-years across, about ⅓ the diameter of the Milky Way. And the galaxy is receding from Earth at 415 km/s, along with the other galaxies in the so-called "Leo Spur" in this part of the sky.

How to find the UFO Galaxy? The star ι (iota) Cancri guides the way to the UFO Galaxy NGC 2683 First, look for the bright star Pollux in Gemini, and the star epsilon Leonis in the tip of the Sickle of Leo. Halfway between the two, you'll see the fainter star iota Cancri. It's a fine double star… we've met it before. About 10° north of iota Cancri, look for the star alpha Lyncis, the brightest star in Lynx. Between these two stars, and a little northwest, you'll see a hazy patch of stars called the "sigmas" of the constellation Cancer. The galaxy is nestled in this patch. With the help of the second image below, look for NGC 2683 at the apex of an equilateral triangle with σ1 and σ2 at the base.

As always, scan for the galaxy at low power. Once you find it, work your way up to higher magnification. While a 3-inch scope in dark sky is all you need to find the galaxy and enjoy its needle-like shape, a bigger scope will give you a much better view.

While finding NGC 2683 is not as easy as finding the Pleiades, it's worth the effort. So give it a try this month, and enjoy the smell of the fresh night air as the seasons change.

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Probe Set for Historic Arrival at Mercury This Week–Mar 10/11 *credit Space.com*

NASA's Messenger probe is poised to make history Thursday (March 17), when it will become the first spacecraft in history to orbit the planet Mercury. At 8:45 p.m. EDT Thursday (0045 GMT March 18), the Messenger spacecraft will fire its main thruster for 14 minutes to slow itself down enough to enter orbit around Mercury. If all goes well, Messenger is expected to spend the next year studying the solar system's innermost planet, mapping Mercury's surface and investigating its composition and magnetic environment, among other features.

Learning more about Mercury should help scientists better understand how the solar system — and, in particular, the rocky planets Mercury, Mars, Venus and Earth — formed and evolved, researchers said. The Messenger spacecraft has been making its way toward Mercury for more than six years. "The cruise phase of the Messenger mission has reached the end game," Messenger principal investigator Sean Solomon, of the Carnegie Institution of Washington, said in a statement. "Orbit insertion is the last hurdle to a new game level, operation of the first spacecraft in orbit about the

solar system's innermost planet." [Photos: New Views of Mercury From NASA's Messenger]

A long road to Mercury
The $446 million Messenger (MErcury Surface, Space ENvironment, GEochemistry and Ranging) spacecraft launched in August 2004. Over the past 6 1/2 half years, the probe has taken a circuitous, 4.9 billion-mile (7.9 billion-kilometer) route through the inner solar system, completing one flyby of Earth, two flybys of Venus and three flybys of Mercury in the process.

These Mercury close encounters have already produced some amazing photos, returning the first new spacecraft data from the planet since NASA's Mariner 10 mission more than 30 years ago. But Messenger hasn't even broken a sweat yet, mission managers said. The probe's real work begins late Thursday, when the probe drops into a highly elliptical orbit around desolate, scorched Mercury.

Messenger is expected to circle the planet once every 12 hours, researchers said. At times, it will come as close as 124 miles (200 km) from the planet's surface; at others, it will drift off to more than 9,300 miles (15,000 km) away on its long, looping circuit. The spacecraft's science mission will last one Earth year. Because Mercury rotates on its axis so slowly — just once every 176 Earth days — Messenger's mission covers just two Mercury days, researchers said.

Six big questions
Scientists hope Messenger will help them answer six key questions about Mercury. According to NASA officials, they are:

•Why is Mercury so dense? (The tiny planet is far denser than Earth, suggesting that a metal-rich core constitutes at least 60 percent of Mercury's mass — a figure twice as high as that for Venus, Mars or Earth.)
•What is the structure of Mercury's core?
•What is Mercury's geologic history?
•What is the nature of Mercury's magnetic field? (Mercury has a global internal magnetic field, as does Earth; Venus and Mars do not.)
•What are the strange materials at Mercury's poles? (Radar studies have found highly reflective materials inside permanently shadowed craters at the planet's poles. Even though Mercury is so close to the sun — on average, about 2.6 times closer than Earth is — this stuff might be water ice, researchers said.)
•What is Mercury's "atmosphere" like? (The blanket of volatile gases hugging Mercury is so thin and tenuous that the planet technically has an exosphere, not a thick atmosphere like Earth.)
That's a long and ambitious list, but mission scientists are excited that they're just about to begin tackling it.

"The Messenger team is ready and eager for orbital operations to begin," Solomon said. You can follow SPACE.com senior writer Mike Wall on Twitter: @michaeldwall. Follow SPACE.com for the Messenger mission to Mercury news on Twitter @Spacedotcom and on Facebook

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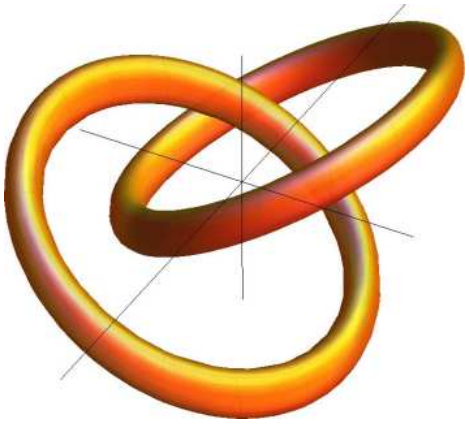
Physicists' Creation of Optical Knots Offer Potential Power Source –Mar 15/11

credit New York University



New York University physicists have invented a new method to create extended and knotted optical traps in three dimensions. The method for producing these "optical knots," described in the Optical Society of America's journal Optics Express, offers the potential to enable fusion energy as a practical power source.

The work, conducted in the laboratory of David Grier, chair of NYU's Department of Physics, builds on an earlier Grier creation, "holographic optical traps," which use computer-generated holograms to trap and move microscopic objects in three dimensions.

Unlike Gaussian laser beams, which focus to a spot, the holographically modified beams being used to create extended optical traps focus to curves, much like the bright patterns on the bottom of swimming pools. These bright curves, in turn, can be tied in knots.

Knotted traps are made by imprinting a computer-generated hologram on the wavefronts of an ordinary beam of light. When the modified beam is brought to a diffraction-limited focus with a high-power lens, the region of maximum intensity takes the form of a three-dimensional curve. This curve can cross over and through itself to trace out a knot. Moreover, the same hologram can redirect the light's radiation pressure to have a component along the curve, so that the total optical force "threads the knot."

Holographic optical traps can be used to confine and manipulate small objects—ranging in size from a few nanometers to several hundred micrometers—in 3D. This is a highly desirable capability for a wide range of research applications, including medical diagnostics and drug discovery.

Elisabeth Shanblatt, as an undergraduate student in NYU's College of Arts and Science and one of the paper's co-authors, was working on a project with Grier to create extended optical traps that follow arbitrary curves in 3D, when they discovered that the extended traps could cross through each other and thus form knots.

Extended holographic optical traps are especially useful, for example, for moving small objects such as biological cells through microfluidic lab-on-a-chip devices. They can also be used to measure small interactions among such objects, which is a useful basis for medical diagnostic tests.

To project their holograms, Shanblatt and Grier used a device called a "liquid-crystal spatial light modulator," which is similar to a conventional LCD television screen. The spatial light modulator imprints a calculated pattern of phase shifts onto the wavelengths of the light. Rather than focusing to a spot of light, the modified beam focuses to a 3D curve that crosses over itself to form a knot.

The method has to potential to create knotted current loops of charged particles in high-temperature plasmas—a long-sought goal for developing fusion energy as a practical power source.

Fusion reactors work by smashing light atomic nuclei into each other so hard that the nuclei fuse into heavier elements, releasing lots of energy in the form of hot neutrons. The best way to accomplish this, Grier says, is to heat the light atoms to a high enough temperature so that their kinetic energy can overcome all of the barriers to fusion during random collisions. At these temperatures, the atoms' electrons ionize and the gas becomes a plasma.

In addition, Grier adds, by passing large electric currents through the plasma, you can heat the plasma to greater temperatures. He notes that it's possible to manipulate the currents with magnetic fields to contain the hot plasma, preventing it from destroying its physical container.

Typically, problems occur when currents flowing through plasma in a fusion reactor become unstable; this is similar to what occurs when the currents flowing through the plasma in a neon sign flicker. The currents thrash around, cool the plasma, damage the container, and generally prevent the process from generating useful energy.

"If the currents in a plasma are tied into a knot, the knot can eliminate most, if not all, of these instabilities because the magnetic field lines generated by the knotted current can't pass though each other," explains Grier.

Shanblatt and Grier believe that projecting a knotted optical force field into a plasma might prove to be a good way to initiate a knotted current loop.

The work was funded, in part, by a grant from the National Science Foundation.

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7. Buy and Sell

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

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8. Ask an Expert

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

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

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9. Kids Korner

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

The Astronomical League Needs You! The Young Astronomers editing team is expanding and we want you. Yes you!

If you would like to be part of The Young Astronomers blogging staff it couldn't be simpler.

All you have to do is write a sample post on anything to do with space or astronomy. It can be as long as you want but we ask that it is at least around 300 words so we can get a flavour for your writing.

Once accepted into the team this will be your first post on the site, so there is no need to worry about writing another for a little while.

Whilst we understand that personal commitments can limit the number of posts anyone can write in a set period of time, we want to make it clear that the Young Astronomers is a commitment too, so we would like each editor to produce at least one post a month. Don't feel that you have to wait a month between writing though, the more posts the better

Joining the Young Astronomers will bring many benefits including being a part of the site's development and making new friends. It doesn't matter how you or old you are as long as you are willing and able to contribute to the site

If you are interested in becoming a pat of the organisation send your post and a little information about yourself to the – youngastros@gmail.com We look forward to reading them! We don't bite, honest

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10. The Sky This Month

By Bryon Thompson

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

If March comes in like a lion it goes out like a …. Oh well you know. It certainly came in with a bluster of lion like weather but the night skies promise to be rewarding all the same.

Jupiter is slowly giving way to other planets as it steadily exits stage left. It starts March evenings low in the western sky and its beacon-like shine is impossible to miss. Glowing brightly at magnitude -2.1, much more brilliant than Sirius' -1.5, the night's brightest star. By the second week on the month Jupiter is joined by innermost mercury. You will need a clear unobstructed view of the horizon to glimpse this little planet's -1.3 magnitude glow in the twilight glare of the setting sun. By mid month the two planets are only 2° apart and hover a full 9° above the horizon. Jupiter keeps heading off stage setting earlier each night but Mercury continues to climb higher until it reaches its greatest angular separation from the sun on the **22nd** of the month. Now it lies a full 12° high and although it has faded to magnitude -0.1 it remains visible for an hour after the sun sets. Other than its changing phase and size, Mercury looks unremarkable through the eyepiece. This month however heralds a

satellite visit to the little enigmatic Mercury. MESSENGER is the NASA satellite that will reach its destination this month and start mapping the surface of Mercury. (see the article "NASA Probe Set for Historic Arrival at Mercury This Week" in the Featured Articles section of the newsletter for more details).

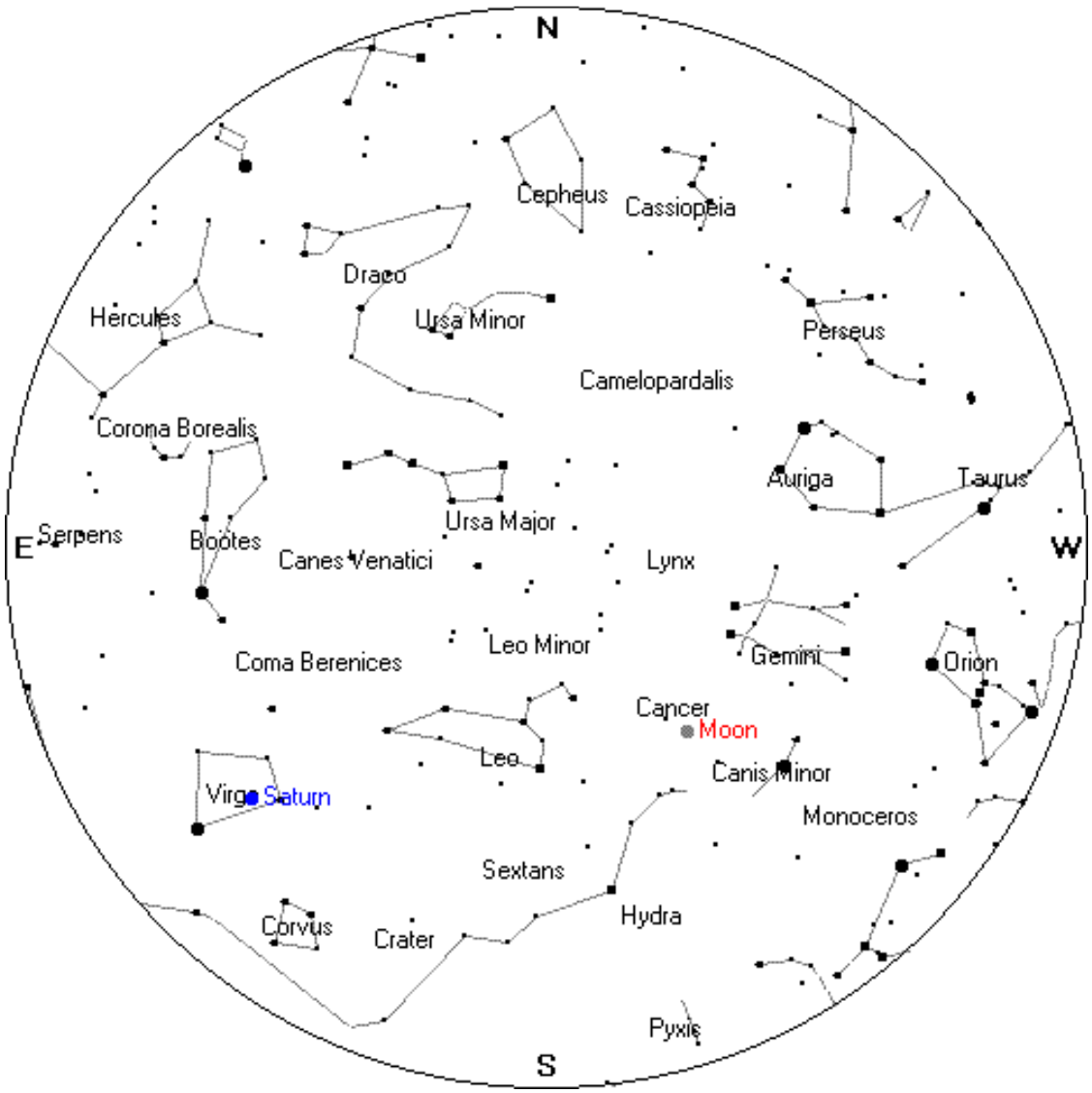
About an hour after sunset, Saturn peaks over the horizon. Glowing at magnitude 0.4 it is a little brighter than Spica and a little dimmer than Arcturus, two stars within 10° and 30° of Saturn respectively. Although Saturn will appear best in April it gives us a good show in March as well. Saturn lies in Virgo about half way between Gamma Virginis and Theta Virginis. By the middle of March, Saturn will appear to be 19" across, and the rings, now at a tilt of 9°, a full 43" wide. A great target for telescopes is the shadow the gas giant casts on the rings. Look on the planet's western limb. By month's end this shadow will all but disappear due to the angle of view from Earth.

Venus rises two hours before the sun at the beginning of March but only a little more than an hour before the sun by months end. The planet's phase grows slightly and its apparent size shrinks this month. The phase goes from 16" to 13" and the phase increases from 71 to 80%. Watch for the month to close with magnitude -4.0 Venus only 5° to the lower left of the 9° lit crescent moon.

The Vernal equinox occurs on March **20th** at 4:21pm PDT and heralds the return of spring skies. Until then remember; Astronomy is looking up.

Mar 4	12:46 PM PDT	New Moon
Mar 12	03:45 PM PDT	First Quarter Moon
Mar 19	11:10 AM PDT	Full Moon
Mar 20	04:21 PM PDT	Vernal Equinox
Mar 22	06:00 PM PDT	Mercury at greatest Eastern elongation
Mar 26	05:07 AM PDT	Last Quarter Moon
Mar 31	06:00 AM PDT	Moon 6° North of Venus

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



SkyChart Courtesy of Heavens-Above

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