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Island Eyepiece and Telescope Ltd

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](mailto: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](mailto:Bryon.Thompson) our Editor and master of Astronomy 101 basics.

1. Editor Greetings!

"Clear Skies" is put together by a small team of volunteers. We need you to help us. Your opinions on future content and stories of interest are crucial to keep 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!

Welcome to the Cowichan Valley StarFinders Astronomy Club's "Clear Skies" monthly newsletter. It is our Birthday! I am proud to report that our club is 24 years old this month. A testament to Frank and the other original Members of which many are still active in the club today.

Our CVSF fieldtrip to RASC and UVIC's Telescope on May 9th was fun and very informative. For those of you who could not make it, you can still catch the Astronomy Open House events on Wednesdays at UVIC. In next month's issue, we will have some pics of the telescope. Many thanks to Russ Robb for letting us "push the buttons" ☺.

We have our very own **Gilbert Beaudry** who will be speaking at **the next social on May 23rd**. Gilbert will help us discover how to interpret the output of electromagnetic spectrum energy detected from our universe using scientific methods and conclusions from experiments to make new laws and view a larger structural universe in the process.

For the past month the attention has been all on the Sun. We have just recovered from the "Partial Annular Solar Eclipse" on May 20th and coming up is the "**Transit of Venus**" on **June 5th**; where Venus will pass between Earth and the Sun. Events are slated with RASC <http://victoria.rasc.ca/events/Default.htm>, Nanaimo <http://www.nanaimoastronomy.com/> and with our members Gerry and Christina Rozema in Maple Bay. Directions from Gerry and Christina will follow shortly. Also, you can learn all about the transit before the event by reading "Your Guide to the Transit of Venus" in the Featured Articles section. And impress your friends and neighbours by knowing the measurements of the Sun. Find out how to do this in the Kreative Korner.

A delightful donation from Genevieve and Penny of "Girl Guide" cookies and Cupcakes were greatly appreciated at the last social.

Many thanks to this month's contributors: Moe R, Bryon T, Nancy K and Brian V.

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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 May 23rd**

Feature: "Scientifically Analyzing the Distribution of Electromagnetic Spectrum Energy detected from the Universe" by Gilbert Beaudry

Discover how to interpret the output of electromagnetic spectrum energy detected from our universe using scientific methods and conclusions from experiments to make new laws and view a larger structural universe in the process.

Come on out and enjoy an evening with friends.

As a registered Society, we must hold one meeting a year that is considered an AGM. Our AGM is on June 27 – 6:00pm, CVSF "Summer BBQ and Annual AGM"

There are three parts to the AGM, the Report of the Directors, the Financial Statement and election of Director positions (which take effect in September). As a member in good standing you are allowed to vote and hold director positions. For descriptions of the AGM Director positions see the website at <http://www.starfinders.ca/contact.htm>

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Social Highlights Apr 25th/12

By Nancy Kirshfelt

Bryon Thompson would like to remind everyone to check "The Upcoming Events" section of this month's Newsletter.

Brian Robillard gave us an update on Ed Maxfield who was hospitalized recently. A card was passed around so we could all send Ed our very best wishes for a speedy recovery. Brian also provided an update on the Shawnigan Lake School observatory project.

Many thanks for cookies and cupcakes for this meeting, brought by Genevieve and Penny.

Our speaker this month was Dr. Real Roy, PhD, Professor at UVIC in the Dept. Of Biology. His presentation was called, "Space Dust, Bugs and Tao: Beneficial Bacteria". He was able to explain where the constituents of life come from, whether life on Earth is possible without bacteria, and how it is possible to use bacteria to solve environmental problems. Dr. Roy gave us insight into his particular area of interest: methanotrophic bacteria and how it consumes methane through photosynthesis. He studies ways in which this could be used to reduce methane in our environment and the soil involved in the transformation of nitrogen and methane gas. Dr. Roy has conducted research at the Hartland Landfill on methane-eating bacteria. "Just as nebula are where stars are born and die, the forests and oceans are vast nurseries and cemeteries of living organisms in a sea of organic matter...continuously producing and recycling through the action of bacteria."

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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 More info: <http://astrowww.phys.uvic.ca/events/>

May 20, 4:30-7:00pm Partial Solar Eclipse Viewing in Nanaimo at Maffeo Sutton Park.

The Nanaimo Astronomy Society will have a few solar telescopes set up and we have a large number of eclipse glasses that people can use at the event to view the eclipse. Come out and see the moon move between us and the sun. More info:

<http://www.nanaimoastronomy.com/>

May 20, 5pm - 7:30pm "Annular Solar Eclipse" Victoria Centre will have solar observing events running in three locations to help the public see this partial solar eclipse: atop Mount Tolmie in Saanich, at Cattle Point in Oak Bay, in front of the Royal BC Museum in Victoria, and at Metchosin City Hall. This event will run weather permitting. More info: <http://victoria.rasc.ca/Default.htm>

May 23 - 7:30pm, CVSF "Scientifically Analyzing the Distribution of Electromagnetic Spectrum Energy detected from the Universe" by Gilbert Beaudry

Discover how to interpret the output of electromagnetic spectrum energy detected from our universe using scientific methods and conclusions from experiments to make new laws and view a larger structural universe in the process.

May 24, 7:00 - 9:00pm "Living And Working On The International Space Station" presented Dr. Robert Gifford Nanaimo Astronomy Club Location: Beban Social Complex Street: 2300 Bowen Road, Nanaimo What is life on board the International Space Station like? What does the whole ISS actually look like from end to end? Go beyond the usual "Hi Mom" video clip by astronauts to see where they eat, sleep, exercise, and work. This is the only known video of the entire ISS, using footage from NASA and the Canadian Space Agency, for a study commissioned by the CSA on how to best design future space vehicles for human well-being on long voyages to Mars. More info:

<http://www.nanaimoastronomy.com/>

June 5, - 3:00pm "Transit of Venus" RASC Victoria Centre

This is the last chance you get in your lifetime to observe the planet Venus moving across the face of the Sun (transiting). Here in Victoria, we will see the start of the transit at about 3PM in the southwest sky, and should be able to watch it until the Sun sets around 8pm. Victoria Centre is planning a public observing event. Don't forget, you must observe the Sun using special filters. Do not observe the Sun without using proper protection! More Info: <http://victoria.rasc.ca/events/Default.htm>

June 5 - "Transit of Venus" hosted by CVSF members Gerry and Christine Rozema. Time: 3pm until after sunset. Location: TBA

JULY 20 - JULY 22, 17 Annual Island Star Party hosted by CVSF

Cowichan Station known as the "Hub of the Universe" is the perfect setting for the Cowichan Valley StarFinders (CVSF) Astronomy Societies Annual Island Star Party (ISP). Join Astronomers and their telescopes for a fun family weekend with: A Guided Nature Tour, Guest Speakers, Tour the Universe, Camping, Swimming, Hiking and More at Bright Angel Park, Cowichan Station This is our club's annual outreach event and it is a rain or shine event. For more information check out our site: <http://www.starfinders.ca/starparty11.htm>

Aug 17-19 RASCals Star Party - Metchosin Cricket Field - a fun and easy-going camping and observing weekend which the whole family can enjoy

Nov 2-22, 2012 - South Pacific Eclipse Cruise 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: May 15

Assembly Flight: 30S

Mission: Expedition 31/32

Launch Vehicle: Soyuz TMA-04M

Launch Site: Baikonur Cosmodrome, Kazakhstan

Description: Soyuz TMA-04M will carry three Expedition 31/32 crew members to the International Space Station.

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4. This Month In Exploration

Courtesy of: NASA History Program Office

85 Years Ago - 1927

May 20-21: Charles A. Lindbergh made the first solo nonstop flight across the Atlantic Ocean. Lucky Lindy's single-seat, single engine Ryan monoplane named the Spirit of St. Louis began the flight from Roosevelt Field, NY and landed at Le Bourget Air Field, outside of Paris, France. This singular event was a major factor in awakening the nation to the full potential of aviation.

75 Years Ago - 1937

May: Peenemünde opened under the Command of, then, Captain Dr. Walter Dornberger.

65 Years Ago - 1947

May 29: In what may be the sole example of the US firing a missile at Mexico in peacetime, happened when a modified V-2 was launched by the United States from the White Sands Proving Grounds, NM. and flew in the wrong direction! It landed 1-1/2 miles south of Juarez, Mexico!

60 Years Ago - 1952

May 16: The International Geophysical Year (IGY) was created.

May 22: Two monkeys and two mice were carried 36 miles aloft by an Aerobee sounding rocket. The live cargo was recovered unharmed. White Sands Proving Grounds, NM.

55 Years Ago - 1957

May 31: Army's Jupiter IRBM was successfully fired 1,500 miles downrange, Cape Canaveral, Fla.

50 Years Ago - 1962

May 24: Mercury Atlas 7/Aurora 7 (MA-7) M. Scott Carpenter astronaut pilot was launched at 8:45 a.m., EDT, for three orbits of the Earth, Cape Canaveral, Fla.

45 Years Ago - 1967

May 4: Lunar Orbiter 4 was launched by Atlas Agena, 6:25 p.m., EDT, Cape Canaveral, Fla.

May 5: Ariel 3 launched by Scout, 12:00 p.m., Vandenberg AFB.

May 24: Explorer 34 (IMP-F) launched by Thor Delta, 10:06 a.m. EDT, Vandenberg AFB.

May 29: ESRO II-A launched by Scout, failed to orbit, 10:06 p.m., EDT, Vandenberg AFB.

40 Years Ago - 1972

May 24: U.S. President Richard M. Nixon and USSR Premier Aleksey N. Kosygin signed an agreement for cooperation in the exploration of outer space for peaceful purposes and included the docking in space of US/USSR spacecraft in 1975. Moscow, USSR.

May 25: The first flight of the F-8 (Modified F-8C Crusader aircraft) "digital-fly-by-wire," piloted by Gary E. Krier, Dryden Flight Research Center (DFRF), CA.

35 Years Ago - 1977

May 26: Launch of Intelsat 4A-F4 at 5:47:00 EDT by Atlas Centaur from Cape Canaveral.

30 Years Ago - 1982

May 11: First supersonic flight of the HIMAT aircraft, Dryden Flight Research Center (DFRF), CA.

May 13: USSR launches Soyuz T-5 at 09:58:00 UTC aboard Soyuz rocket, a Modified SS-6 (Sapwood) or Molniya, from Baikonur. Cosmonauts: Anatoli N. Berezovoy and Valentin V. Lebedev. Ferry flight to Salyut-7 space station.

25 Years Ago - 1987

May 15: First flight of the Energia rocket carrying the Polyus satellite from Baikonur. Failed to reach orbit. Energia rocket would launch the USSR's space shuttle, Buran.

20 Years Ago - 1992

May 7: STS-49 (Space Shuttle Endeavour) launched, 7:40 p.m., EDT, KSC. Crew: Daniel C. Brandenstein, Kevin P. Chilton, Richard J. Hieb, Bruce E. Melnick, Pierre J. Thuot, Kathryn C. Thornton, and Thomas D. Akers. Rendezvoused, repaired, and reboosted Intelsat VI communications satellite. Among the firsts on this mission were: First EVA involving three astronauts and first use of a drag chute during a shuttle landing. Landed May 16, 4:57 p.m., EDT, Edwards Air Force Base (EAFB),

CA. Mission Duration 8 days, 21 hours, and 17 minutes.

15 Years Ago - 1997

May 15: STS-84 (Space Shuttle Atlantis) launched 4:07 a.m. EST, KSC. Crew: Charles J. Precourt, Eileen M. Collins, C. Michael Foale, Carlos I. Noriega, Edward T. Lu, Jean-Francois Clervoy (France), and Elena V. Kondakova (Russia). 6th Shuttle/Mir docking mission. Landed May 24, 9:27 a.m., EDT at KSC. Mission Duration: 9 days, 5 hours, and 20 minutes.

10 Years Ago - 2002

May 4: Aqua (previously named EOS PM-1) launched by a Delta 2 rocket from Vandenberg AFB at 05:54 a.m. EDT to study the global water cycle in the oceans, ice caps, land masses and the atmosphere.

5 Years Ago - 2007

May: NASA and 13 space agencies from around the world released the framework for a global exploration strategy. The document, titled "The Global Exploration Strategy: The Framework for Coordination," reflects a shared vision of space exploration focused on solar system destinations where humans may someday live and work,

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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".

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6. Featured Articles

Articles

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2. [Your Guide to The Transit of Venus](#)
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4. [Japan's GCOM-W1 To Take the A-Train](#)
5. [Measuring Transient X-Rays with Lobster Eyes](#)

JUICE: Europe's Next Large Mission – May 3/12 Credit: ESA

Jupiter's icy moons are the focus of Europe's next large science mission, the European Space Agency (ESA) announced May 2.

The Jupiter Icy moons Explorer (JUICE) was selected over two other candidates: the New Gravitational wave Observatory (NGO) to hunt for gravitational waves and the Advanced Telescope for High-Energy Astrophysics (ATHENA).

JUICE is the first large-class mission chosen as part of ESA's Cosmic Vision 2015–2025 program. It will be launched in 2022 from Europe's spaceport in Kourou, French Guiana, on an Ariane 5, arriving at Jupiter in 2030 to spend at least three years making detailed observations.

Jupiter's diverse Galilean moons — volcanic Io, icy Europa, and rock-ice Ganymede and Callisto — make the jovian system a miniature solar system in its own right.

With Europa, Ganymede, and Callisto all thought to host internal oceans, the mission will study the moons as potential habitats for life, addressing two key themes of Cosmic Vision: What are the conditions for planet formation and the emergence of life, and how does the solar system work?

JUICE will continuously observe Jupiter's atmosphere and magnetosphere and the interaction of the Galilean moons with the gas giant planet.

It will visit Callisto, the most heavily cratered object in the solar system, and will fly by Europa twice. JUICE will make the first measurements of the thickness of Europa's



Icy crust and will identify candidate sites for future in situ exploration.

The spacecraft will finally enter orbit around Ganymede in 2032, where it will study the icy surface and internal structure of the moon, including its subsurface ocean. Ganymede is the only moon in the solar system known to generate its own magnetic field, and JUICE will observe the unique magnetic and plasma interactions with Jupiter's magnetosphere in detail.

"Jupiter is the archetype for the giant planets of the solar system and for many giant planets being found around other stars," said Alvaro Giménez Cañete from ESA. "JUICE will give us better insight into how gas giants and their orbiting worlds form and their potential for hosting life."

The Cosmic Vision 2015–2025 program identified four scientific aims: What are the conditions for life and planetary formation? How does the solar system work? What are the fundamental laws of the universe? How did the universe begin and what is it made of?

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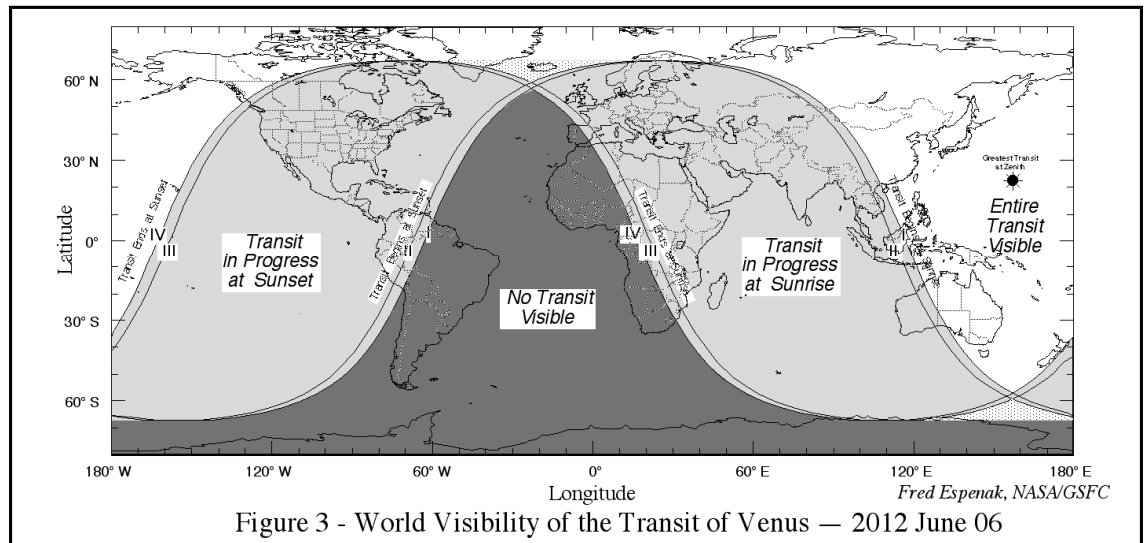
Your Guide to the Transit of Venus– May 10/12 Credit: oneminuteastronomer.com

On June 5-6 you get your last chance to see one of the rarest of astronomical events, the Transit of Venus, during which the black disk of Venus passes across the glowing disk of the Sun. This transit has happened just seven times since the invention of the telescope more than 400 years ago. The last transit was in 2004. There won't be another until December 21 17. Here's how and where to see next month's transit for yourself.

Where To See The Transit

The maps below show where the 2012 transit of Venus is visible...

2012 Transit of Venus



The western and central Pacific, including most of Australia, New Zealand, Fiji, and Hawaii can see the entire transit. Western and southern Africa, Spain and Portugal, and eastern South America will not see the transit at all because it occurs when the sun has set. And the rest of the world can see some of the transit after the Sun rises or before it sets.

The June 5-6 transit begins at 22:09 UT (GMT) on June 5, and ends at 04:50 UT on June 6. You can convert from GMT to your local time here: <http://www.greenwichmeantime.com/gmt-converter/>

Why It Happens

Like a solar eclipse, a transit occurs when Venus, rather than the Moon, passes between Earth and the Sun. And like a solar eclipse, the transit requires careful alignment of the Sun, Earth, and Venus. As seen from Earth, Venus usually passes over or under the Sun every 584 days, on average. But the geometry and periods of the orbits of two planets cause Venus to pass in front of the Sun at well-defined intervals of 121.5 and 101.5 years in either June or December. And the transits occur in pairs separated by eight years. The last transit occurred on June 8, 2004. The last pair of transits was on December 1874 and December 1882.

The Transit of Venus once held the key to understanding the size of the solar system. In the early 18th century, Edmund Halley determined a way to measure the distance from the Earth to the Sun by precisely timing the transit of Venus from widely separated parts of the Earth. Once this distance was known, the distances to other planets could be determined through Kepler's Laws.

These transits were so important that most advanced nations sent astronomers around the world to measure the events of 1761 and 1769. The transit of Venus in 1761 yielded few conclusive results despite hundreds of attempted measurements. But the transit of 1769 was measured precisely by, among others, the team led by Lieutenant James Cook, RN, who witnessed the event from Tahiti before sailing on to claim Australia for England. Astronomers used Cook's measurements to calculate a distance to the Earth of 150 million kilometers, close to the now-accepted value of 149,597,870.7 kilometers.

How To See The Transit

For this June 5-6 transit, Venus will traverse the northern half of the Sun's disk (see below)...

Transit of Venus of 2012 June 05/06

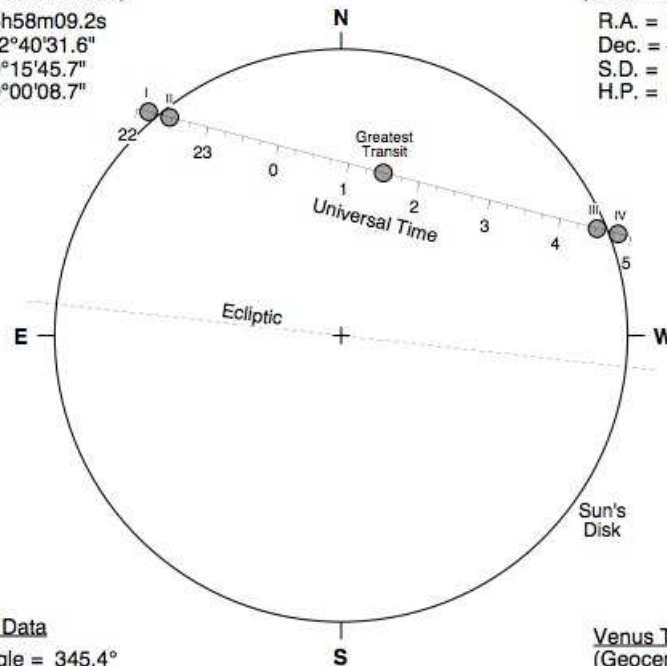
Greatest Transit = 01:29:36.3 UT J.D. = 2456084.562225

Sun at Greatest Transit (Geocentric Coordinates)

R.A. = 04h58m09.2s
Dec. = +22°40'31.6"
S.D. = 00°15'45.7"
H.P. = 00°00'08.7"

Venus at Greatest Transit (Geocentric Coordinates)

R.A. = 04h57m58.8s
Dec. = +22°49'25.9"
S.D. = 00°00'28.9"
H.P. = 00°00'30.5"



Geocentric Data

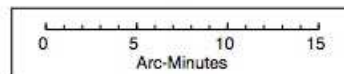
Position Angle = 345.4°
Separation = 554.4"
Duration = 06h40m

Ephemeris Data

Eph. = VSOP87
 ΔT = 66.7 s

Venus Transit Contacts (Geocentric Coordinates)

I = 22:09:38 UT
II = 22:27:34 UT
Greatest = 01:29:36 UT
III = 04:31:39 UT
IV = 04:49:35 UT



F. Espenak, NASA's GSFC - 2011 Jun
eclipse.gsfc.nasa.gov/OH/transit12.html

You'll get the best view of the transit with a telescope, but a telescope is not required. Telescope or not, you'll need a safe solar filter. Here's some advice on finding a solar filter suitable for observing this event. If you don't have your own filter, check if your local astronomy club is holding a public event during the transit. They'll have properly equipped scopes and other hardware to help you enjoy this rare event.

The transit of Venus unfolds in four stages. First, the leading edge of the planet contacts the Sun. Then the trailing edge makes contact, which is hard to time exactly because of the "black drop effect" that bleeds darkness from the limb of the planet as it moves onto the solar disk. The same two stages reverse themselves as the planet leaves the solar disk. The June 5-6, 2012 transit takes about 6 hours, which is a long time compared to the scant few minutes of a solar eclipse. This link gives you

precise timing for the four stages of the transit as seen from 121 cities throughout the world...

<http://eclipse.gsfc.nasa.gov/transit/venus/city12-1.html>

During the transit, the black disk of Venus, just 33x smaller than the solar disk, blocks enough light to measurably decrease the Sun's brightness. NASA's Kepler observatory, in fact, uses this same idea... a transiting planet blocking light from its home star... to look for Earth-like planets around nearby stars. Astronomers will use the 2012 transit of Venus to test new measurement techniques to find extra-solar planets using space-based telescopes.

The history and the rarity and the beauty of this event make it a compelling and memorable sight. Please... observe it for yourself if you can.

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Endeavour Powered Down 20 Years after First Launch – May 16/12 Credit: NASA



Technicians working inside space shuttle Endeavour's flight deck and controllers stationed in the Launch Control Center turned the lights out on the last powered shuttle May 11 as they switched off Endeavour's displays and systems for the final time.

"It is with a great sense of sadness that we say goodnight to Endeavour, and to the Space Shuttle Program as a whole today," said Mike Ciannilli, a NASA test director who stood at the integration console in Firing Room 3 during the procedure. "It is with a great sense of pride that we recognize the contributions of this amazing Team over the

last 30 years. And it is with a heartfelt 'thank you' to the American people for the honor of launching this vehicle 135 times; to not only explore outer space, but to make life better on Earth. Good night Endeavour."

The work was a milestone for the shuttle's retirement as crews at NASA's Kennedy Space Center in Florida continue to make the spacecraft suitable for a museum career.

Endeavour's power down, which is the process controllers follow to stop the electricity flow into the shuttle, came almost 20 years to the day of the spacecraft's first launch on May 7, 1992. NASA's youngest shuttle, Endeavour flew 25 times. Its crews posted notable accomplishments, including capturing and redeploying a stranded communications satellite during that first flight, flying the first construction mission of the International Space Station and conducting the landmark mission to repair NASA's Hubble Space Telescope.

"I'd like to dedicate this power down to those who are not so fortunate to be here today, to those who gave their blood, sweat and heart to the program," said Walter "Buddy" McKenzie of United Space Alliance, or USA. With that, some of the same people who ran endless checklists to make sure Endeavour was ready for space ran through a checklist in reverse to take key systems offline in careful order. When they finished, Endeavour's cockpit was lit only by work lights plugged in outside the shuttle. Discovery and Atlantis went through the same steps earlier as they, like Endeavour, were readied for public display. Discovery is already in place at the Smithsonian's Udvar-Hazy Center near Washington, D.C.

Endeavour will be flown across the country to Los Angeles where it will be displayed at the California Science Center. Several steps remain before Endeavour will be ready to leave Kennedy at the end of the summer. The payload bay doors must be closed permanently, three replica space shuttle main engines will be installed and the hatch to the crew compartment will be closed.

When that work is completed, an aerodynamic tail cone will be bolted over the engines and Endeavour will be mounted atop NASA's shuttle carrier aircraft, a 747 jet modified to carry a shuttle on its back. The flight to the west coast is expected in September and will take several days.

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Japan's GCOM-W1 To Take the A-Train – May 19/12 Credit Japan Aerospace Exploration Agency (JAXA)

The Japan aerospace Exploration Agency (JAXA) completed the critical operation period for the Global Change Observation Mission 1st - Water "SHIZUKU" (GCOM-W1) after we successfully performed essential events including the scheduled orbit insertion and the Advanced Microwave Scanning Radiometer 2 (AMSR2) initial run-up. The satellite is currently in good health.

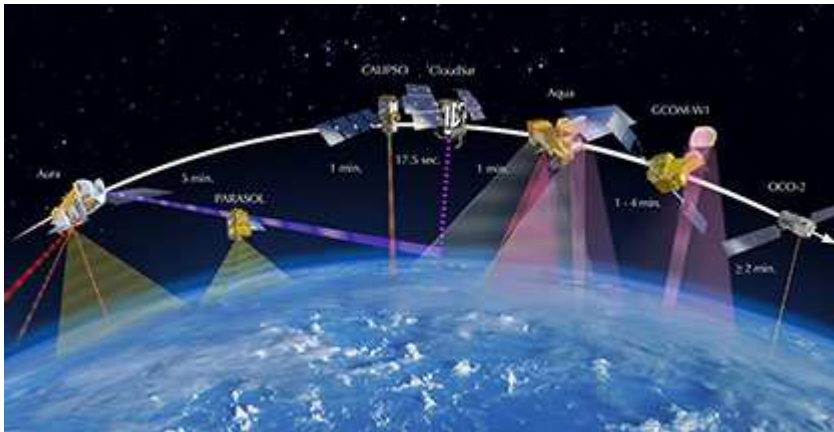
JAXA will take about 45 days to insert the satellite into the "A-Train" orbit, which is the SHIZUKU's observation orbit, in order to participate in an Earth observation mission called the "A-Train" in cooperation with satellites of other countries while performing the initial functional confirmation or about three months.

What is the A-Train?

The changing Earth environment is increasingly a focus of many societal concerns. Sound policy decisions are needed to address these issues. From their vantage point high above the Earth's surface, NASA's Earth observing satellite missions are uniquely positioned to obtain comprehensive global observations of our home planet. NASA's Earth Science Division shares these Earth Science data with various federal, state, local, and tribal partners, who incorporate the data into various models, databases, and other tools linked to a variety of practical applications for society. Policy makers use these decision tools to help them craft sound and equitable environmental policy.

Satellite constellations are groups of satellites that fly in close proximity to each other in a carefully planned formation that allows for synergy between the missions—synergy means that more information about the condition of the Earth is obtained from the combined observations than would be possible from the sum of the observations taken independently.

The Afternoon1 Constellation or A-Train² is one such satellite constellation, whose members all have equator crossings in the early afternoon at about 1:30 p.m. (and also in the middle of the night, at about 1:30 a.m.). At the present time the A-Train consists of four NASA missions and a French Centre National d'Etudes Spatiales (CNES) mission flying in close proximity to one another. In the future, two more NASA missions, as well as a Japan Aerospace Exploration Agency (JAXA) mission plan to join the formation.



Each one of these missions has (or will have) its own objectives and makes its own unique contribution to improving our understanding of aspects of the Earth's climate. The real advantage of constellation flying, however, is that the data from the various satellites are synergistic and can be combined together to allow for even more comprehensive studies of

climate.

A-Train (Satellite constellation) member satellites

Aura (NASA, USA) launched on July 15, 2004)

To acquire observation data for elucidating the composition of the earth atmosphere, its chemical react, and dynamics.

CALIPSO (NASA/CNES, USA/France) launched on April 28 2006)

An optical lidar satellite to acquire observation data to clarify impact of aerosol and clouds on the Earth's climate

CloudSat (NASA, USA launched on April 28, 2006)

A radio wave radar satellite to acquire observation data to study the impact of clouds on the Earth's climate

Aqua (NASA, USA launched on May 4, 2002)

The name came from the Latin word "Aqua" meaning water. The satellite acquires observation data on the Earth's various water circulations including water vapor in the atmosphere and from the ocean, clouds, precipitation, ocean ice, and ground water.

PARASOL POLDER December 18, 2004 CNES

Polarized light measurements will allow better characterization of clouds and aerosols in the Earth's

atmosphere.

OCO-2 2013 NASA/GSFC NASA/JPL

Three grating spectrometers will make global, space-based observations of the column-integrated concentration of CO₂, a critical greenhouse gas. Three grating spectrometers

Glory APS, TIM 2011 NASA/GSFC

Increase understanding of aerosols as agents of climate change and continue the total solar irradiance monitoring mission.

GCOM-W1 AMSR2 2012 JAXA

Observations of water circulation changes. Specifically it will observe precipitation, vapor amounts, wind velocity above the ocean, sea water temperature, water levels on land areas, and snow depths. Take a tour of the A-Train <http://atrain.gsfc.nasa.gov/atrainatsats.php>

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Measuring Transient X-rays with Lobster Eyes—May 21/12 Credit: NASA

A technology that mimics the structure of a lobster's eyes is now being applied to a new instrument that could help revolutionize X-ray astronomy and keep astronauts safe on the International Space Station.

Scientists at NASA's Goddard Space Flight Center in Greenbelt, Md., are developing the "Lobster Transient X-ray Detector," which they hope to deploy on the space station in three to four years. From its perch on the orbiting outpost, the cross-cutting instrument now being developed by Jordan Camp, Scott Barthelmy, and Gerry Skinner would detect with unprecedented accuracy transient X-rays — those fleeting, hard-to-capture high-energy photons produced during black-hole and neutron-star mergers, supernovae, and gamma-ray bursts created much farther away in the early universe.

But the lobster-eye technology also could carry out another much-needed job.

It could check for ammonia leaks on the International Space Station — a problem that engineers at NASA's Johnson Space Center in Houston, Texas, have identified as needing a solution. Anhydrous ammonia, a toxic compound of nitrogen and hydrogen, is used as a coolant that helps regulate the station's onboard temperatures. Currently, leaks are at acceptable levels, but a sudden increase could pose serious risks to astronauts, Camp said.

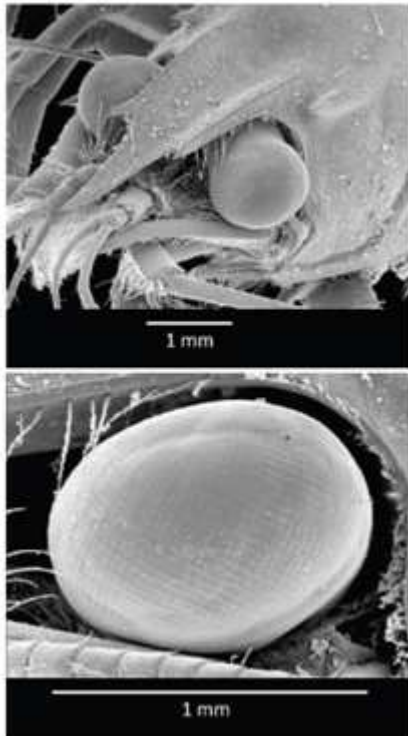


Photo of a lobster's head (top) and closeup of a lobster's eye (bottom). The Lobster Transient X-ray Detector borrows from nature. These images show views of a crustacean's orb, which are made up of long, narrow cells that each captures a tiny amount of light, but from many different angles. The new detector works the same way.

New Application for Established Technology

Lobster technology isn't new. First conceived as an X-ray all-sky monitor by University of Arizona scientist Roger Angel in the 1970s, it mimics the structure of the crustacean's eyes, which are made up of long, narrow cells that each captures a tiny amount of light, but from many different angles. Only then is the light focused into a single image.

The lobster X-ray instrument's optics would work the same way. Its eyes are a microchannel plate, a thin, curved slab of material dotted with tiny tubes across the surface. X-ray light enters these tubes from multiple angles and is focused through grazing-incident reflection, giving the technology a wide field of view necessary for finding and then imaging transient events that cannot be predicted in advance. The lobster detector is unique in that it is highly sensitive and provides a wide field of view and high-angular resolution, Camp said.

Since Angel first conceived the concept, astronomers at the University of Leicester in Leicester, England, have matured the technology and have built an instrument to fly on BepiColombo, a

mission to Mercury developed jointly by the European Space Agency (ESA) and the Japan Aerospace Exploration Agency. ESA plans to launch the spacecraft in 2014.

What's new is "what we want to do with it," Camp said. "The innovation is using the lobster technology for a cross-cutting application. We want to use the technology in a new way to promote both astrophysics and human spaceflight."

To advance the dual-use concept, the team is using Goddard Internal Research and Development and NASA Office of the Chief Technologist's Center Innovation Fund support to assemble and test a prototype equipped with a commercially available microchannel plate, a charged-coupled device detector, and associated electronics.

Wide Field Collection of Transient X-rays

With its increased sensitivity and wide field of view, Camp said the instrument would be able to detect transient X-ray emissions from a large portion of the sky, giving scientists an unprecedented view of black-hole mergers, supernovae, and even gamma-ray bursts in the very distant universe. Transient X-rays are now difficult to detect because these sources brighten without warning and then vanish just as quickly.

He also believes the instrument could work in conjunction with and even extend the sensitivity of the Laser Interferometer Gravitational-Wave Observatory (LIGO), a National Science Foundation-funded experiment that has searched for gravitational waves since 2002. Gravitational waves, first postulated by Albert Einstein, are faint ripples in space-time that theoretically happen during massively powerful events, such as black-hole or neutron-star binary mergers.

Gravitational-wave detectors don't localize well. Used in conjunction with the focusing Lobster detector, however, scientists would be able to zero in on the location of the source, Camp said.

Detection of Ammonia Leaks on Space Station

Just as exciting, Camp said, is how he could use the technology to detect ammonia leaks. Anhydrous ammonia runs through tubing connected to huge radiator panels located outside the space station. As the ammonia circulates through the tubing, it releases heat as infrared radiation. In short, it helps to regulate onboard temperatures. Possibly because of micrometeorite impacts or thermal-mechanical stresses, these lines currently leak.

The lobster technology could help, Camp said. With this application, however, the instrument would require the addition of a specialized device called an electron gun, which would bombard surfaces with electron beams at specific energy levels. Elements that come into contact with these electron beams are excited, producing X-rays at specific energy levels.

In this case, the instrument, once attached to the space station's robotic arm, would sweep over the coolant lines and radiator panels in search of nitrogen, and more specifically the X-rays generated by the element. If nitrogen X-rays are detected, their presence could indicate leaks since ammonia is a compound of nitrogen and hydrogen.

Skinner has taken the lead in assembling and testing a leak-checking detector prototype and has recently succeeded in producing an X-ray image of a small nitrogen leak in a laboratory vacuum system. Barthelmy, meanwhile, is studying the system issues involved in deploying a dual-use lobster system on the space station.

"Many people are excited about the possibilities of this quintessentially cross-cutting instrument," Camp said. "With help from our IRAD program, we plan to advance the technology-readiness levels of our proposed instrument. We'll see where it goes. We believe it has great potential."

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7. Community Affairs

By Brian Robilliard

Shawnigan Lake School Observatory Project

Shawnigan Lake had an Observatory and Telescope donated to them. They have requested our club's help in dismantling, moving and choosing on a site for the Observatory. Last month Brian and Bryon T did a presentation at Shawnigan Lake School to advise them further on what is required to

get the observatory up and running and then what is essential to keep it functioning.

No new update available.

Island Star Party (ISP) Planning Committee

This committee co-ordinates all the activities to put on our "Island Star Party". This will be our 17th Island Star Party taking place from July 20 - 22. If you think you may have the time to volunteer please contact the president@starfinders.ca or the vice-president@starfinders.ca. These are some of the areas where volunteers are needed the most: setup of site, tear down of site, sign placements, registration table, traffic control, raffles table, acquiring speakers, acquiring nature guide, kids activity co-ordinator, publicity activities (postering, tv or radio interviews).

I hope you take the time to consider helping out as more hands make light work and no one person can do this alone.

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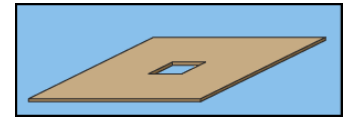
8. Kreative Korner

If you have any ideas that may spark a Kreative Korner, please send your submissions to the editor. Finding the Size of the Sun and Moon **courtesy of** berkeley.edu/AtHomeAstronomy

In this activity you'll learn how to build a simple pinhole viewer. When used to project an image of the Sun, the pinhole viewer can be used to determine the diameter of the Sun.

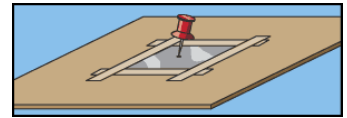
What to Do

1 Cut a square about 3/4 x 3/4-inch (2 x 2 centimeters) out of the center of the cardboard.

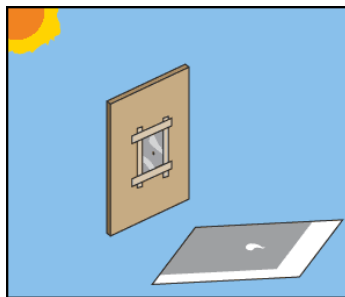


2 Place the piece of aluminum foil over the opening and tape it in place at the edges.

3 Using the pin or other sharp point, puncture the foil to produce a small hole. You now have a pinhole viewer.



Measuring the Size of the Sun



1 Hold the pinhole viewer so that the light from the Sun passes through the hole and falls on a sheet of white paper held behind the hole. Try to make the distance between the pinhole and the paper as large as possible.

2 Using your ruler, measure:

- The diameter of the image of the Sun on the paper =
- The distance from the pinhole to the paper =

3 You can calculate the diameter of the Sun using the following

formula:

Diameter of the image of the Sun

Distance from the pinhole to the paper

X

Distance from Earth to the Sun

=

Diameter of the Sun

Note: The distance from the Earth to the Sun is approximately 93,000,000 miles (149,600,000 kilometers).

Measuring the Size of the Moon

You can use the same procedure to measure the diameter of the moon. You'll need to pick a night with a full (or near full) moon.

Note: The distance to the Moon is approximately 239,000 miles (384,000 kilometers).

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9. The Sky This Month

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

1 May. Venus is close to its maximum brightness at magnitude -4.7. In a telescope, the planet's disk is a lovely crescent shape about 27% illuminated. Today, the planet lies about 35° above the horizon at sunset. By mid-month, it's about 25° above the horizon, and by the end of May just 6° above the horizon, though it remains quite bright. During this time, the planet moves closer to Earth and its crescent grows more slender but larger.

3 May. Bright Saturn and the slightly fainter star Spica lie just east of the waxing gibbous Moon. Saturn presents a splendid show this month. Its rings are tilted about 14° from edge on, more than any time in the past five years, so they are an excellent sight in a small telescope. The planet dims from magnitude 0.3 to 0.5 and remains near the bright star Spica in Virgo for the rest of the year.

6 May. Full Moon, 03:35 UTC. The Moon is at perigee, the closest point in its orbit, and lies just 220,160 miles away. That's about 30,000 miles closer than at apogee. This Full Moon will be the largest of 2012.

6 May. The Eta Aquariid meteor shower peaks in the early morning hours. This is usually the best meteor shower of the year for observers in the southern hemisphere, although the Full Moon will wash out the faintest meteors this year. The radiant of this shower is at a point near the star eta Aquarii. This shower is a close cousin of the Orionid meteor shower in October. Both occur when the Earth passes through a debris stream from Comet Halley.

12 May. Last Quarter Moon, 21:47 UTC.

13 May. Jupiter is in conjunction behind the Sun and remains invisible from our skies. By month's end, Jupiter swings around the Sun and rises about 45 minutes before sunrise.

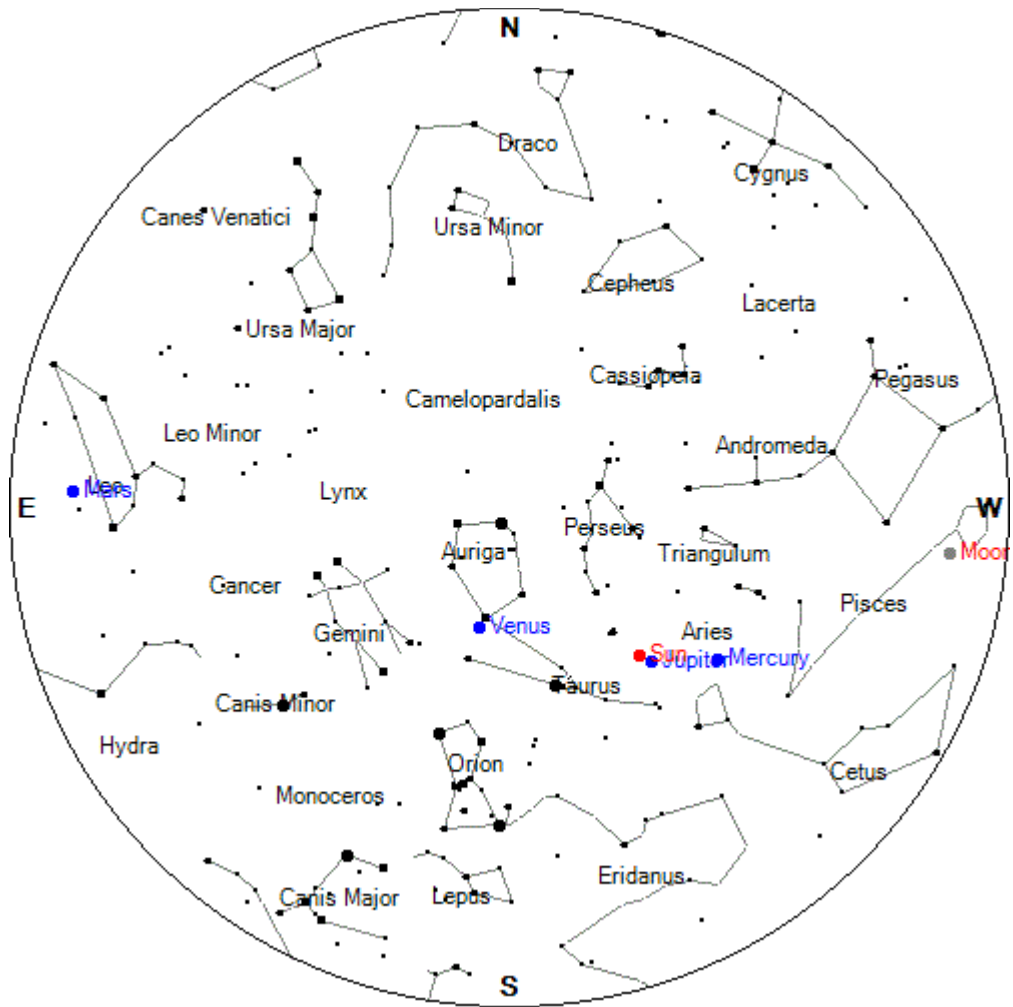
May 20. New Moon, 23:47 UTC. Today also an annular solar eclipse is visible from the coast of China and southern Japan, across the northern Pacific, and across a narrow-band through the western United States, including southern Oregon, northern California, Nevada, northern Arizona and southern Utah, New Mexico, and western Texas. In an annular eclipse, the Moon passes in front of the Sun but is too small to entirely cover the solar disk (see image above). This means you still need a safe solar filter to observe the eclipse.

21 May. Look for a very thin crescent Moon just below brilliant Venus in the west-northwest about half an hour after sunset. Today Venus shines at magnitude -4.5. The planet is 51" across and just 8% illuminated. For the rest of the month, try to look for the crescent shape in binoculars. To learn more about the phases of Venus, [click here...](#)

22 May. A thin crescent Moon lines up with Venus and the star Alnath just after sunset. Through a telescope, you'll see the Moon passing very close to 3rd-magnitude star zeta Tauri. In the western U.S. and southwestern British Columbia, observers will see the Moon pass in front of this star.

28 May. First Quarter Moon, 20:16 UTC. The planet Mars lies just northeast of the Moon. Mars is well-placed for viewing this month, but it's growing smaller. It has an apparent diameter of just 10" so use high magnification in steady sky to glimpse the north polar cap and a few dark surface features.

Sky Chart —Here's your mid-May 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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