



# Clear Skies

Volume 18 Issue 2

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President: [president@starfinders.ca](mailto:president@starfinders.ca)  
Web: [www.starfinders.ca](http://www.starfinders.ca)  
Editor: [newsletter@starfinders.ca](mailto:newsletter@starfinders.ca)

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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](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.

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](mailto:president@starfinders.ca)

## 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.

First and foremost lets clear up the Social dates. The Board of Directors thought that it would be a good idea to have the Summer BBQ and AGM on a weekend rather than a week day. So, we did some creative juggling and here's what happening:

**June 27 @7:30 (WED)** we will watch "**Oasis Earth HD**" as our regular Social and if time permits talk a bit about the ISP Planning.

**June 30 @4:00pm (SAT)** we will have our Summer BBQ and AGM. This way we have more time for more socializing ☺. And there is more time for our **Call for Nominations to the Board of Directors**. Check out the positions, responsibilities and how to vote or be considered, in the "Socials" section.

The Venus Transit on June 5 was a fun time for all that came out. Before the weather cleared we had members planning to travel all sorts of places to see the "lifetime" event. But Mill Bay proved to be a great place to see it. Thanks to the hospitiatily of Brian and Joanne. Check out some photo's in the "Cool Pics /Videos" section and while you there watch the video on "Robot's that Can Fly" Scarry....remember Big Brother.

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

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## 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 **7:30pm** on **Wednesday June 27th**

**Feature: "Oasis Earth"** Ever imagine what it feels like to look at Earth from space? Join the crew of the space shuttle Endeavour and take a thrilling journey to experience the beauty – in awesome High Definition – of our planet from 233 kilometres above Earth.

Our last Social will be held at **4:00pm** on **Saturday June 30th**

**Feature: "Summer BBQ and Annual AGM"** hosted by CVSF

This is our last Social of the season. Socials will resume again in September at our regular location. This Social is hosted by CVSF, which means that the club pays for the goodies and drinks to celebrate the clubs birthday (24 years) and to elect our next "board of directors" for the club during our AGM portion of the evening.

As a registered Society, we must hold one meeting a year that is considered an AGM.

There are three parts to the AGM:

Report of the Directors,

Financial Statement Disclosure, and,

Election of Director positions (which take effect in September).

**Call for Nominations to the Board of Directors:**

As a "member in good standing" you are allowed one vote and hold to hold any of the director positions below:

**President:**

Chairs the Annual AGM, directs the Society in all matters of its business, co-signs financial and business transactions of the Society, Co-ordinates the annual ISP, Sets up annual speaker series features and, Hosts monthly socials.

**Vice-President:**

Fills-in with Presidential duties if the President is unavailable

**Treasurer:**

Keeps the official seal of the Society, co-sign's any financial and business transactions of the Society, maintains financial accounts, prepares an audit of the Society's books for the Annual General Meeting. In addition, the Treasurer has responsibility for all financial and administrative matters concerning membership and, co-ordinates new memberships with Editors.

**Secretary:**

Responsible for the official correspondence of the Society, record minutes of the annual AGM, and provides monthly social highlights to Newsletter Editors.

**Public Outreach Officer:**

Sets up sidewalk astronomy sessions with the public, Helps in promoting the ISP and, maintains the "Reach For the Stars" school telescope loner program.

**Webmaster:**

Keeps the club website current, Administers CVSF Listserve members, and Resolves any website errors with the host webmaster.

**Newsletter Editor:**

Elicits from club members and Web noteworthy news, Compiles and edits information, Produces monthly "clear skies" newsletter and, Notifies club members of newsletter postings and Social events

If you wish to be considered in any of the above positions, please email the [president@starfinders.ca](mailto:president@starfinders.ca) and/or the [vice-president@starfinders.ca](mailto:vice-president@starfinders.ca) prior to the AGM on June 30<sup>th</sup>. If you are currently holding a director position and want re-election, please email the president and vice-president and advise

them that you wish to "stand" in your position. All emails will be included at the AGM and voting will be done by a "show of hands".

Please consider adding your ideas and creativity to the Club, we welcome all.

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## Social Highlights May 23<sup>rd</sup>/12

By Bryon Thompson

Gilbert Beaudry was our feature presenter last month;"Scientifically Analyzing the Distribution of Electromagnetic Spectrum Energy detected from the Universe." Gilbert is a member of CVSF and we were the first to hear his presentation. He is challenging "the Red Shift Theory" and had some thought provoking ideas. Thanks Gilbert.

*Editor: this is an excerpt from Gilbert's talk and website.*

There is the present hypothesis that space is expanding and that light gets stretched into the red. This hypothesis has been developed from Hubble's Law which is considered to be the measurement of light being stretched into the red as space is expanding. Gilbert suggests a new hypothesis (for testing) gained from understanding the LED experiment results: The red shift is not caused from space expanding but because the energy detected is weaker and weaker.

Weakest energy for colour is red – that is why the further out we look the more it shifts into the red. The light energy seen is weaker thus redder. It is our detection of weaker and weaker energy that is the cause of the red shifting for very distance objects.

Yes the Doppler Effect can be observed for nearby stars and galaxies but the Doppler Effect energy is weak and does not extend pass a certain point of influence. Due to the long distances involved after a certain point its effect is no longer detectable. The stronger measurement is instead affected by the energy level detected by the Earth observer and not the Doppler Effect. The light has not been stretched but the longer waves are the recording of weaker energy levels from distances light sources.

Gilbert challenges us to try and disprove the new hypothesis above. For more information on this and other topics visit: <http://physicsfuniverse.com>

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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 (5<sup>th</sup> 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](mailto:mshen@uvic.ca) to confirm. Admission: Free More info: <http://astrowww.phys.uvic.ca/events/>

**June 27<sup>th</sup> – 7:30pm, CVSF Feature: "Oasis Earth"** Ever image what it feels like to look at Earth from space? Join the crew of the space shuttle Endeavour and take a thrilling journey to experience the beauty – in awesome High Definition – of our planet from 233 kilometres above Earth.

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**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:** June 13

**Window:** 11:30 a.m. - 3:30 p.m. EDT

**Mission:** NuSTAR

**Launch Vehicle:** Pegasus XL

**Launch Site:** Reagan Test Site, Kwajalein Atoll

**Description:** The Nuclear Spectroscopic Telescope Array (NuSTAR) is an Explorer mission that will allow astronomers to study the universe in high energy X-rays.

**Date:** June \*

**Mission:** Orbital Sciences Corporation

**Launch Vehicle:** Antares

**Launch Site:** Wallops Flight Facility

**Launch Pad:** 0A

**Description:** The Antares is scheduled for a test flight under NASA's Commercial Orbital Transportation Services agreement with the company.

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## 4. This Month In Exploration

*Courtesy of: NASA History Program Office*

### **95 Years Ago – 1917**

June 28: Langley Research Center, authorized by NACA as an experimental field, Hampton. VA.

### **70 Years Ago -- 1942**

June 13: The first attempted launch of an A-4 (V-2) took place at Peenemünde. The rocket rose about .8 miles then crashed.

### **60 Years Ago -- 1952**

June 18: H. Julian Allen, NACA-Ames scientist, conceived the blunt nose concept for reentry vehicles, which was later used in ICBM's and Mercury, Gemini, and Apollo spacecraft.

### **55 Years Ago -- 1957**

June 11: Atlas ICBM No. 1 exploded at two miles altitude, Cape Canaveral, Fla.

### **50 Years Ago -- 1962**

Jun 19: Tiros 5 (meteorological satellite) launched by Thor Delta, 8:19 a.m., EDT, Cape Canaveral, Fla.

June 27: The X-15 unofficial world speed record of 4,104 mph was set with pilot Joseph A. Walker at the controls, DFRF. CA.

### **45 Years Ago -- 1967**

June 12: Venera 4 launched by Modified SS-6 (Sapwood) or Molniya, 0238 UTC, Baikonur, USSR. Direct atmospheric studies of Venus.

June 14: Mariner 5 (Venus flyby) was launched by Atlas Agena, 2:01 a.m. EDT, Cape Canaveral, Fla.

### **40 Years Ago – 1972**

June 13: Intelsat 4 F5 is launched at 5:53:00 EDT by Atlas from Cape Canaveral, Fla.

### **35 Years Ago -- 1977**

June 16: Dr. Wernher Von Braun died, Alexandria, VA.

June 16: GOES-2 launched by Delta, 6:51 a.m., EDT, Cape Canaveral, Fla.

June 21: Robert A. Frosch took office as the fifth NASA Administrator.

### **30 Years Ago -- 1982**

June 8: Westar 5 launched by Delta, 8:24 pm, EDT, Cape Canaveral, Fla.

June 24: USSR launched Soyuz T-6 aboard Soyuz rocket to Salyut 7 space station at 16:30:00 UTC.

Launch from Baikonur. Cosmonauts: Vladimir A. Dzhanibekov; Alexander S. Ivanchenko; Jean-Loup Chrétien (France).

June 27: STS-4 (Space Shuttle Columbia) launched, 11:00 a.m., EDT from KSC. Crew: Thomas K. "Ken" Mattingly and Henry W. "Hank" Hartsfield. Final Space Transportation System research and development flight. Landed July 4, 12:09 p.m., EDT, Edwards Air Force Base (EAFB), CA. Mission Duration 7 days, 1 hour, 9 minutes.

#### **25 Years Ago -- 1987**

June 30: NASA submitted to President Reagan a report on the agency's implementation of the recommendations of the Presidential Commission on the Space Shuttle Challenger Accident. The report describes the ongoing Shuttle recovery effort -- relative to the nine recommendations made by the commission -- as well as other return-to-flight activities.

#### **20 Years Ago -- 1992**

June 7: Extreme Ultraviolet Explorer (EWE) launched by Delta 2 from Cape Canaveral, Fla, 12:40 p.m. EDT.

June 25: STS-50 (Space Shuttle Columbia) launched, 12:12 p.m., EDT, KSC. Crew: Richard N. Richards, Kenneth D. Bowersox, Bonnie J. Dunbar, Ellen S. Baker, Carl J. Meade, Lawrence J. DeLucas, and Eugene H. Trinh. U.S. Microgravity Laboratory-I carried in the shuttle cargo bay. Landed July 9 at 7:43 a.m., EDT, KSC. Mission Duration 13 days, 19 hours, and 30 minutes.

#### **10 Years Ago -- 2002**

June 5: STS-111 (Space Shuttle Endeavour) launched 5:23 p.m. EDT, KSC. Crew: Paul S. Lockhart, Kenneth D. Cockrell, Franklin Chang-Díaz, Peggy Whitson, with cosmonauts Valery G. Korzun and Sergei Y. Treschev and French astronaut Philippe Perrin. International Space Station flight UF-2. The crew delivered more payload and experiment racks to the Destiny Laboratory. The Mobile Base System was also installed completing the Station's Mobile Servicing System, which includes the Canadarm2 and the Mobile Transporter. Delivered the Expedition Five crew and returned the Expedition Four crew. Landed June 19, 1:58 p.m. EDT at EAFB. Mission Duration: 13 days, 20 hours, 35 minutes.

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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".

### **Transit of Venus Gallery**

We had a great time in Mill Bay watching the transit of Venus. After the sunset in Mill Bay some of us went to Cowichan Bay and Cobble Hill to catch the last of the rays. While others were watching from their homes in Maple Bay. Here are a couple of teasers for you. Thanks to Bryon T, Brian R, Miles W and Christine R for the fine shots. Check out the rest of the photos in the gallery at



**Vijay Kumar: Robots That Can Fly:** in his lab at Penn, Vijay Kumar and his team build flying quadrotors, small, agile robots that swarm, sense each other, and form ad hoc teams -- for construction, surveying disasters and far more. Very cool TED talk check it out:

[http://www.ted.com/talks/vijay\\_kumar\\_robots\\_that\\_fly\\_and\\_cooperate.html](http://www.ted.com/talks/vijay_kumar_robots_that_fly_and_cooperate.html)

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## 6. Featured Articles

### Articles

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**Russian's to Colonize the Moon**– May 23/12 Credit: POPSCI



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3. [ALMA Eyes Centaurus A](#)
4. [How Space Animates Hollywood](#)
5. [NuSTAR Opens X-Ray Eyes](#)



Yesterday (May 23), the heads of the space agencies for Europe, Canada, Russia, India, and Japan met in Washington D.C. (without NASA, which had all hands on deck for the SpaceX launch in Florida). The most interesting topic of conversation? The moon, which seems to be the destination on everyone's agenda except for NASA. And for Russia, it's less a destination and more a frontier for colonization.

"We're not talking about repeating what mankind achieved 40 years ago," Roscosmos (that's Russia's space agency) head Vladimir Popovkin said through a translator. "We're talking about establishing permanent bases." Japanese space agency JAXA openly stated that it a manned moon mission is its next human spaceflight priority as well.

Rumblings of permanent moon bases and manned missions to Earth's orbiting neighbor have been present for some time now in the international space community, but to hear the heads of agencies state so boldly their intentions marks something of a significant shift in the timbre of the dialogue. NASA is setting a course for a manned asteroid landing sometime in the next decade, followed by a manned Mars mission in the decade following that. But it seems that in the meantime more than one spacefaring nation aims to establish a presence on the lunar surface. Also absent was China, which also has designs on a manned lunar mission as well as its own orbiting space station in the works. The agencies involved spoke of increasing collaboration with China. Less so with NASA, which has proven an unreliable partner as of late.

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### **SpaceX Dragon Docks to Space Station** – May 29/12 *Credit: NASA Headquarters*

The International Space Station's Expedition 31 crew grappled and attached SpaceX's Dragon capsule to the space station Friday, May 25. This is the first time a commercial company has accomplished this type of space operation.

"Today marks another critical step in the future of American spaceflight," NASA Administrator Charles Bolden said. "Now that a U.S. company has proven its ability to resupply the space station, it opens a new frontier for commercial opportunities in space — and new job creation opportunities right here in the U.S. By handing off space station transportation to the private sector, NASA is freed up to carry out the really hard work of sending astronauts farther into the solar system than ever before. The Obama administration has set us on an ambitious path forward, and the NASA and SpaceX teams are proving they are up to the task."

Following a series of system tests and a successful fly-under of the space station Thursday, the Dragon capsule was cleared by NASA to approach the station Friday. Dragon then performed a series of intricate test maneuvers as it approached the orbiting laboratory. These maneuvers were required to demonstrate the maneuvering and abort capability of Dragon prior to approaching and moving into a 65-foot (20 meters) "berthing box" where it was grappled by NASA astronaut Don Pettit using the station's robotic arm at 9:56 a.m. EDT.

European Space Agency astronaut Andre Kuipers installed the capsule on the bottom of the station's Harmony node at 11:52 a.m. NASA astronaut Joe Acaba completed berthing operations by bolting the Dragon to Harmony at 12:02 p.m.

Left: The SpaceX Dragon is seen berthed to the International Space Station's Harmony module. Credit: NASA TV

"Congratulations to the SpaceX and NASA teams," said William Gerstenmaier, associate administrator for NASA's Human Exploration and Operations Mission Directorate at the agency's headquarters in Washington, D.C. "There is no limit to what can be accomplished with hard work and preparation. This activity will help the space station reach its full research potential and open up space-based research to a larger group of researchers. There is still critical work left in this test flight. Dragon-attached operations and cargo return are challenging and yet to be accomplished."



The Dragon capsule lifted off May 22 from the Cape Canaveral Air Force Station in Florida aboard a SpaceX Falcon 9 rocket. The demonstration mission is the second under NASA's Commercial Orbital Transportation Services program, which provides investments intended to lead to regular resupply missions to the space station and stimulate the commercial space industry in America.

"The investments made by the United States to stimulate the commercial space industry are paying off," said Philip McAlister, director for Commercial Spaceflight Development at NASA Headquarters. "SpaceX achieved what until now was only possible by a few governments, and the company did it with relatively modest funding from the government."

The Dragon capsule is delivering 1,014 pounds (460 kilograms) of supplies to the station, which includes noncritical experiments, food, clothing and technology. Crew members opened the hatch to the capsule Saturday and will unload the cargo during a four-day period. Dragon then will be loaded with 1,367 (620kg) pounds of hardware and cargo no longer needed aboard the station in preparation for the spacecraft's return to Earth. Dragon and station hatches will be closed May 30.



On May 31, the Expedition 31 crew members will detach Dragon from Harmony, maneuver it to a 33-foot (10m) release point, and ungrapple the capsule. Dragon will deorbit approximately four hours after leaving the station, taking about 30 minutes to reenter Earth's atmosphere and landing in the Pacific Ocean about 250 miles (400 kilometers) west of Southern California.

Today (May 31) at 11:42 AM EST, SpaceX's Dragon spacecraft boldly smacked into the Pacific Ocean, just as planned. Here it bobs, waiting for recovery by boats, which will tow it back to land.

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### ALMA Eyes Centaurus A— May 31/12 Credit: ESO

A new image (right) of the center of the distinctive galaxy Centaurus A, made with the Atacama Large Millimeter/submillimeter Array (ALMA), shows how the new observatory allows astronomers see through the opaque dust lanes that obscure the galaxy's center with unprecedented quality.

ALMA is currently in its early science phase of observations and is still under construction, but it is already the most powerful telescope of its kind. The observatory has just issued the "Call for Proposals" for its next cycle of observations in which the growing telescope will have increased capabilities.

Centaurus A is a massive elliptical radio galaxy — a galaxy that emits strong radio waves — and is the most prominent, as well as the nearest, radio galaxy in the sky. Centaurus A has therefore been observed with many different telescopes. Its very luminous center hosts a supermassive black hole with a mass of about 100 million times that of the Sun. In visible light, a characteristic feature of the galaxy is the dark band that obscures its center. This dust lane harbors large amounts of gas, dust, and young stars. These features, together with the strong radio emission, are evidence that Centaurus A is the result of a collision between a giant elliptical galaxy and a



smaller spiral galaxy whose remains form the dusty band. To see through the obscuring dust in the central band, astronomers need to observe using longer wavelengths of light. This new image of Centaurus A combines observations at wavelengths around one millimeter, made with ALMA, and observations in near-infrared light. It provides a clear view through the dust toward the galaxy's luminous center.

The new ALMA observations, shown in a range of green, yellow, and orange colors, reveal the position and motion of the clouds of gas in the galaxy. They are the sharpest and most sensitive such observations ever made. ALMA was tuned to detect signals with a wavelength around 1.3 millimeters emitted by molecules of carbon monoxide gas. The motion of the gas in the galaxy causes slight changes to this wavelength due to the Doppler effect. The motion is shown in this image as changes in color. Greener features trace gas coming toward us while more orange features depict gas moving away. We can see that the gas to the left of center is moving toward us, while the gas to the right of center is moving away from us, indicating that the gas is orbiting around the galaxy.

The ALMA observations are overlaid on a near-infrared image of Centaurus A obtained with the SOFI instrument attached to the European Southern Observatory's (ESO) New Technology Telescope (NTT). The image was processed using an innovative technique that removes the screening effect of the dust. We see a clear ring of stars and clusters glowing in a golden color, the tattered remains of the spiral galaxy being ripped apart by the gravitational pull of the giant elliptical galaxy.

The alignment between the ring of stars seen by the NTT in infrared light and the gas seen by ALMA at millimeter wavelengths highlights different aspects of similar structures in the galaxy. This is an example of how observations with other telescopes can complement these new observations from ALMA.

Construction of ALMA, on the Chajnantor Plateau in northern Chile, will be completed in 2013 when 66 high-precision antennas will be fully operational. Half of the antennas have already been installed. Early scientific observations with a partial array began in 2011 and are already producing outstanding results.

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### How Space Animates Hollywood – June 5/12 Credit ESA Portal

If you've been to see *Wrath of the Titans*, then you've watched it in action. A computer programmer is using software he developed to control spacecraft to help animators make more realistic computer games and movies.



Originally designed to help guide satellites, the software now helps computers to render human movements smoothly and realistically.

It turns out that movements controlled effortlessly by our brains – picking up a cup, touching our toes or doing a little dance – take a lot of computing power.

“If you want to move your arm, you have to compute the angle of all the joints and the movement of the muscles,” says Alexandre Pechev, CEO of IKinema.

The human brain makes this happen near-instantaneously. But animators creating computer games or movies must often break the body down into parts, calculate their moves and then put the components back together – often resulting in choppy, unrealistic animation.

Using the mathematical routine he developed, the program at the heart of IKinema's software crunches the numbers much more efficiently. “If you have a human, you don't have to cut the body into six individual chains and then stitch it together later,” Alexandre says. “What we do is move the whole body.” The result, he says, is a program that can create realistic moving bodies in video games or on the movie screen. “It works on any chain. Horse, cat, alien, scorpion, face or flower – it doesn't matter what you're animating.” The software can be incorporated into video games and Hollywood studios like 20th Century Fox, Disney and ILM have all worked with IKinema's software.

Left: One of four control moment gyroscope for the International Space Station



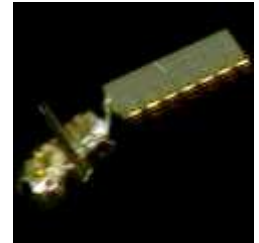


### Spin-off from spacecraft guidance

The software was originally intended to guide spacecraft that use 'control moment gyroscopes' for attitude control. They consist of spinning flywheels, tilted using gimbals, to produce torque that can turn a spacecraft. The best-known application of these gyroscopes is the International Space Station, which has four big units. Less well known is the Turkey's first remote sensing satellite Bilsat-1, launched in 2003. It includes an

experimental payload of two small control moment gyroscopes developed by Surrey Satellite Technology Ltd. together with Surrey Space Centre, supported via ESA study contracts.

"We recently participated in the development of a complete control moment gyroscope hardware and software system for medium-size satellites, done by the French space agency CNES in cooperation with EADS Astrium SAS," René Seiler from ESA's Mechanisms Section in ESTEC explains. "The first result was for the Pléiades-1 satellite launched in December 2011 by CNES. Here, two gyroscopes give the spacecraft exceptional agility." So even though Pléiades-1 was designed for picking out targets on Earth's surface, the gyros can easily turn the spacecraft to snap other overflying satellites. On 15 April 2012, it took a picture of ESA's Envisat orbiting 90 km higher.



Right: Pleiades image of Envisat.

But in a twist that researchers are still puzzling over, there are a few positions where the gyros hit dead spots, called 'singularities'. "In some particular orientations, you can't generate torque to rotate the spacecraft," explains Alexandre. As a graduate student at Surrey Space Centre, he wrote software that would coordinate the motion and eliminate these singularities. Yet his software, developed for use in space, has never left Earth. "Satellites with gyros are exotic creatures," he says. Most satellites still rely on reaction wheels to adjust their attitude. But Alexandre had the idea to use his software to control a different type of motion: robot movements on screens. With the help of a technology transfer demonstrator grant from ESA's Technology Transfer Programme (TTP), he was able to confirm it worked. "The funding was crucial to verify that my idea to spin off the space software had real commercial potential," Alexandre adds. "Then a Royal Society of Edinburgh Fellowship from STFC made it possible for me to develop it into a near-commercial product, which was the baseline for starting IKinema. STFC is the UK member of ESA TTP Broker Network responsible for promoting terrestrial use of European space technologies.



"Today, our Action product is used by many film and computer game makers." Most recently, IKinema Action was used to produce accurate and realistic animation for complex visual effects sequences in the film Wrath of the Titans, a fantasy film sequel to the 2010 film Clash of the Titans.

### ESA's Technology Transfer Programme Office (TTPO)

The main mission of the ESA Technology Transfer Programme is to facilitate the use of space technology and systems for non-space applications to take advantage of Europe's investments in space research and developments to strengthen the competitiveness of European industry, and at the same time demonstrating the benefit of the European space programmes to Europe's citizens.

ESA TTPO is responsible for defining the overall approach and strategy for the transfer of space technologies and systems, including the incubation of start-up companies at ESA business incubation centres and related funding. The office has transferred over 260 technologies since the programme start and is supporting directly and indirectly around 100 new start-ups a year. TTPO has also initiated as a limited partner the Open Sky Technology Fund, a €100 million venture fund which invests in start-ups using space technology.

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### NuSTAR Opens X-ray Eyes – June 7/12 Credit: NASA Headquarters

NASA's next observatory is about the size of a refrigerator, but it is expected to uncover some of the most powerful structures in the universe.



The Nuclear Spectroscopic Telescope Array (NuSTAR) is to launch June 13 aboard an Orbital Sciences Pegasus rocket from the Reagan Test Site at Kwajalein Atoll in the Pacific Ocean. It will be the first spacecraft able to focus high-energy X-rays, the same kind of X-rays dentists use to penetrate teeth. Researchers say the instrument represents a huge advance in what they will be able to see in space. "We are going to open up the high-energy window on the universe," said Daniel Stern from NuSTAR. "It's going to teach us a lot about the universe, from what heats the atmosphere of the Sun to understanding black holes."

Some of the highest-energy objects in the universe have been invisible to astronomers because they didn't have an instrument that could focus high-energy X-rays from black holes and stars that recently exploded. NuSTAR is expected to allow a complete count of the black holes in the universe and measure how fast black holes rotate. "We think two out of every three black holes in the universe are hidden," Stern said.

Left: The NuSTAR spacecraft undergoes preparations by technicians before it is connected to the Pegasus rocket slated to carry it into orbit.

Right: Pegasus-rocket

The Pegasus rocket hangs beneath its L-1011 carrier aircraft at Vandenberg Air Force Base, California, before the rocket and NuSTAR spacecraft are flown to Kwajalein Atoll for launch.

NuSTAR will not leave Earth orbit as it looks out on the universe. It will ride aboard a winged Pegasus rocket to an orbit close to the equator and extend a solar array for power.



"Compared to a Juno or an MSL (Mars Science Laboratory), it's not very big. It's about 775 pounds (350 kilograms), about the size of a refrigerator," said Garrett Skrobot from NuSTAR. "But it only has one basic instrument on the spacecraft itself, whereas the other spacecraft have multiple instruments on them."

After about a week in space, it will extend a 33-foot-long (10 meters) span with sensors at one end that will focus the X-rays the spacecraft sees. The span is similar to the one extended during space shuttle mission STS-99 for the Shuttle Radar Topography Mission.

Part of NASA's "Small Explorers" program, the NuSTAR mission takes advantage of numerous technological advances of the past decade, said Yunjin Kim from NuSTAR.

NASA opted to launch the spacecraft from Kwajalein because the horseshoe-shaped island is close to the equator. A launch team from NASA's Launch Services Program will head to the Pacific atoll about a week ahead of launch and return after NuSTAR is in orbit.

The Pegasus is NASA's only rocket that launches from an airplane, a modified L-1011 aircraft called Stargazer. "Pegasus is our most unique rocket, period," said Omar Baez, launch director for NASA's Launch Services Program (LSP). "First off, it has a wing. The way we launch it is we drop it like a weapon or a bomb, and a few seconds later this thing lights off and scoots in front of the L-1011. It's unique in all kinds of aspects." The airliner flies a racetrack pattern as the countdown timed to coincide with the moment the aircraft is in the right position. "Your launch pad is moving at 500 mph (800 km/h), so that puts us in a critical timing situation," Baez said. "You've got to be at the right place, the right point, at the right time, and everything's got to mesh to be able to do that correctly. This is one of our most challenging types of missions, but it's also more fun because of that."

Kwajalein is one of five launch sites LSP uses. Cape Canaveral Air Force Station in Florida, Vandenberg Air Force Base in California, Kodiak Launch Complex in Alaska, and Wallops Flight Facility in Virginia are the others. LSP is based at NASA's Kennedy Space Center in Florida.

"It's a very tight community there in Kwajalein," Baez said. "These folks are basically 3,000 miles (4,800 kilometers) removed from any conventional civilization. But it's also in the South Pacific, so it's a very nice place to be. It's as close to what you'd imagine an island in the Pacific is."

After NuSTAR is orbiting and returning data, astronomers expect to team up with other observatories already in orbit, such as NASA's Chandra X-ray Observatory. That can mean anything from the two spacecraft looking at an object at the same time and comparing the results to having Chandra confirm theories sprouting from NuSTAR observations.

"We have planned observations of things we're safely sure we're going to see," Stern said, "but the big excitement is we might see things that are unexpected."

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## 7. Community Affairs

By Brian Robilliard

### Shawigan Lake School Observatory Project

*Shawigan 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 Shawigan 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 17<sup>th</sup> Island Star Party taking place from July 20 - 22. If you think you may have the time to volunteer please contact the [vice-president@starfinders.ca](mailto: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 (posting, tv or radio interviews). The first meeting of the ISP Planning Committee was held on June 13 at Brian's home in mill bay.

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. Thank you Joanne and Jacob for this craft.

### Pierced Sun Catcher – credit: familyfun.go.com

I just received my Sun Catcher from a wonderful friend. Maybe you can make one and brighten up someone's day too! These colorful, perforated window decorations can really brighten up a room when sunlight shows through all the pinholes.

#### Materials

- Card stock
- Corrugated cardboard
- Pushpin
- Thin string or thread

#### Instructions

To create one, simply cut a sun shape out of the paper or card stock and place it atop the cardboard.



Pierced Sun Catcher - pierce the paper with the pushpin, creating a pattern of straight lines or swirls.

Loop a piece of string or thread through one of the holes near the top edge of the sun catcher, and it's ready to hang.

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## 9. The Sky This Month

By *oneminuteastronomer.com*

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

**4 June.** Full Moon, 11:12 UT. The Moon also undergoes a partial eclipse from 10:00 UT to 12:07 UT. The eclipse is visible in the Americas (except for eastern North America), the Pacific (including Australia and New Zealand), and east Asia. In the Americas, the eclipse is visible at moonset. No eclipse is visible in Europe or Africa. At its peak, about 38% of the Moon's disk will be darkened. See map below for visibility...

**5-6 June.** The planet Venus transits the face of the Sun. This is the last transit of Venus for 105 years. The disk of Venus first contacts the solar disk within 2 minutes of 22:05 UT, and its full ingress occurs about 18 minutes later. The transit lasts for about six and a half hours. As seen from Earth, the dark disk of Venus spans about 3% of the solar disk. To learn more about the transit and where and how to see it, [click here...](#)

**11 June.** Last quarter Moon, 10:41 UT

**15-30 June.** While Venus is now lost from the sky after sunset, Mercury takes its place for the latter half of June. Look for the small planet nearly 10 degrees above the west-northwestern horizon about half an hour after sunset.

**16 June.** In the predawn hours, the planet Jupiter, the waning crescent Moon, and the Pleiades star cluster form an elongated triangle.

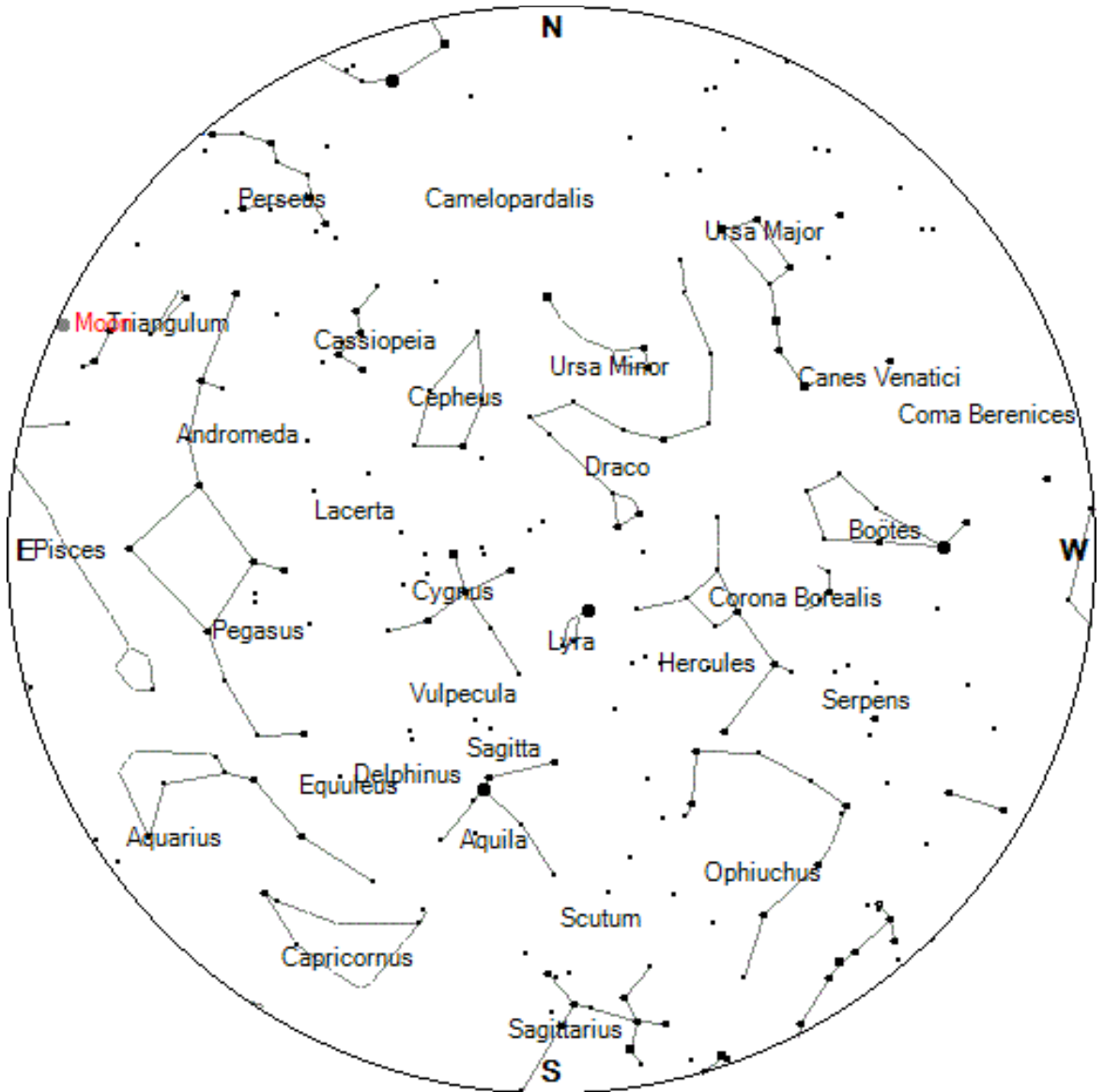
**19 June.** New Moon, 15:02 UT.

**20 June.** Summer at last in the northern hemisphere! And winter in the south. The Sun reaches its most northerly point on the ecliptic at 23:09 (UT).

**27 June.** The planet Mars, which finally left the constellation Leo and enters the constellation Virgo on June 20, lies just 1/4 degree from the star Zavijava (beta Virginis).

**27 June.** The waxing crescent Moon passes below the bright star Spica and the planet Saturn, the two of which are just 5 degrees apart for most of June and July.

**27 June.** First quarter Moon, 3:30 UT.



SkyChart Courtesy of Heavens-Above

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