

# POLARIS



Royal Astronomical Society of Canada  
London Centre Newsletter  
January 2009

## News from 2008

Patrick Whelan

I was looking around on the internet for news stories from 2008. I found a great site called <http://news.redshift.de>. I used the various news links on that site to create the following article.

Messenger spacecraft flew past Mercury on Jan. 14th at a distance of only 124 miles. The historic flyby netted 500 megabytes of data (now safely downloaded to Earth) and more than 1200 photos covering nearly six million square miles of previously unseen terrain. (NASA)

January 23: Detailed analysis of two continent-sized storms that erupted in Jupiter's atmosphere in March 2007 shows that Jupiter's internal heat plays a significant role in generating atmospheric disturbances. Understanding this outbreak could be the key to unlock the mysteries buried in the deep Jovian atmosphere. (NASA)

NASA's Stardust mission swung by comet Wild 2 in 2004 to capture particles shed by the 5-kilometre object and returned them to Earth in 2006. Since then, scientists have been carefully analyzing the microscopic fragments it collected. Now, scientists have been surprised again as further study suggests Wild 2 is made mostly of material from the inner solar system, and that the object has a composition more like that of an asteroid than what was expected of a comet. (New Scientist)

February 19: Astronomers using NASA's Hubble Space Telescope have compiled a large catalog of gravitational lenses in the distant universe. The catalog contains 67 new gravitationally lensed galaxy images found around massive elliptical and lenticular-shaped galaxies. This sample demonstrates the rich diversity of strong gravitational lenses. If this sample is representative, there would be nearly half a million similar gravitational lenses over the whole sky. The COSMOS project, led by Nick Scoville at the California Institute of Technology, used observations from several observatories including Hubble, the Spitzer Space Telescope, the XMM-Newton spacecraft, the Chandra X-ray Observatory, the Very Large Telescope, and the Subaru Telescope. (Hubblesite)

February 22: The joint NASA and European Space Agency Ulysses mission to study the sun and its

influence on surrounding space is likely to cease operations in the next few months. The venerable spacecraft, which has lasted more than 17 years or almost four times its expected mission lifetime, is succumbing to the harsh environment of space. Ulysses was the first mission to survey the space environment above and below the poles of the sun. The reams of data Ulysses returned have forever changed the way scientists view our star and its effects. Science findings and discoveries from the mission were numerous and unprecedented. Examples include taking the first direct measurements of interstellar dust particles and interstellar helium atoms in the solar system and the discovery that the magnetic field leaving the sun is balanced across latitudes. (NASA)

February 23: Huge filaments of dark matter have been detected in a survey of thousands of distant galaxies. The discovery supports the idea that dark matter drove the formation of galaxies and larger cosmic structures and resolves a discrepancy in previous studies about how much dark matter the universe contains.

The survey, which is still ongoing, has already covered an area of the sky around 300 times the size of the Full Moon. Astronomers led by Liping Fu of the Institute of Astrophysics in Paris, France, have analysed data gathered by the 340-megapixel MegaCam - the largest astronomical camera in the world - attached to the 3.6-metre Canada France Hawaii Telescope (CFHT) in Hawaii, US.

The observations reveal dark matter via a subtle effect called weak lensing, which studies galaxies' apparent shapes. The shapes can be distorted by the gravity of any intervening matter, which deflects the galaxies' light.

The pattern of those distortions points to a web of vast dark-matter filaments, some stretching at least 270 million light years across space. (New Scientist)

February 24: ESA's Integral has made the first unambiguous discovery of high-energy X-rays coming from a rare massive star at our cosmic doorstep, Eta Carinae. It is one of the most violent places in the galaxy, producing vast winds of electrically charged particles

*(Continued on page 4)*

## Moon Phases



January 26 2009



February 2 2009



February 9 2009



February 16 2009

### Astronomer's Lament

**Little quasar in the sky**  
**Why no photons for my eye?**  
**I look up and see no sky!**  
**Clouds, just clouds**  
**Meet my eye....**

Patrick Whelan

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Find the Polaris newsletters on the internet at: [www.patusratus.ca/Polaris](http://www.patusratus.ca/Polaris)

## LONDON RASC MONTHLY MEETINGS

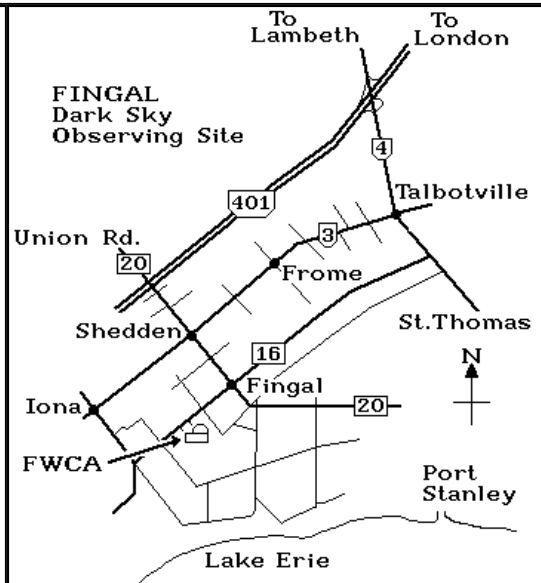
The London RASC group meets at Fanshawe college in London Ontario, September through July on the third Friday of the month at 19:00. They meet in room B1073.

Everyone interested in astronomy is invited to attend and enjoy our guest speaker, member activity and observing reports, announcements of new discoveries and upcoming events, telescopes and telescope accessories show and tell, and other fun activities. Have a look at our future and past activities on our website to see what we are doing.

Parking is free on Friday evenings, and there is plenty of room in the east parking lot off Oxford St. and parking spaces on the south side of B building. Enter the college by B building doors near Oxford Street, just west of the bus stop. College signs at key hallway locations will help you find us. The London RASC webpage can be found at:

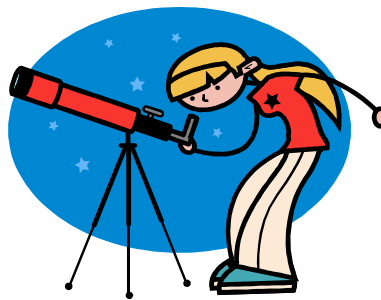
[www.rasc.ca/London](http://www.rasc.ca/London)

They have a preferred observing site at Fingal Wildlife Management area.



## Sky Events for December 2008 and January 2009

January 21 Antares 0.02° S of Moon  
 January 26 Annular solar eclipse  
 January 30 Venus 3.0° S of Moon  
 February 4 Moon 0.9° N of Pleiades (M45)  
 February 9 Penumbral lunar eclipse  
 February 12 Zodiacal light  
 February 13 Mercury greatest elongation West  
 February 17 Mars 0.6° S of Jupiter  
 February 17 Antares 0.04° S of Moon  
 February 19 Venus greatest illuminated extent



**Jupiter is hard to see as it approaches conjunction with the Sun on the 24th**  
**Saturn is in Leo and transits around 4:30am. The rings are only inclined .81°**  
**Venus is the evening star and dominates the evening sky**  
**Mars is hiding behind the sun**

### R.A.S.C. London Centre Library Books of the Month December 2009 *By Robert Duff*

In order to make our library collection available to members, I bring three books to our general monthly meetings. These “Books of the Month” are available for loan, to be returned at the following monthly meeting.

The books for January 2009 are as follows:

Looking Up: a History of the Royal Astronomical Society of Canada , by R. Peter Broughton. c1994.

Relativity: the Special and the General Theory, by Albert Einstein; authorized translation by Robert W. Lawson; introduced by Roger Penrose. London: The Folio Society, 2004.

Universe on a T-shirt: the Quest for the Theory of Everything, by Dan Falk. c2002.

For a complete listing of our library collection please see our RASC London Centre Web site at: <http://www.astro.uwo.ca/~rasc/>

If there is a particular book or video you wish to borrow, please feel free to contact me by telephone at (519) 439-7504 or by e-mail at [rduff@sympatico.ca](mailto:rduff@sympatico.ca)



### Sky and Telescope Subscriptions

Sky & Telescope subscriptions are available at a discounted rate through the London Centre. The cost is \$39.95USD instead of the normal \$49.95USD subscription rate. Please see Bill Gardner for details.

**Exploring the Stars**  
**Cronyn Observatory January 6th, 2009**  
**Home Schoolers, Grades 3—9,**  
**Exploring the Stars, January 6th**

By Robert Duff

It was cloudy when I arrived at the Cronyn Observatory for an evening of Exploring the Stars around 6:30 p.m. on Tuesday, January 6th. I brought the RASC London Centre's photographic display, which I had created for the 2008 General Assembly, and set it up on the table near the east wall of the lecture room.

Graduate student Ryan Marciniak began his digital slide presentation, "Comets & Asteroids" before a Home Schoolers group of 22 visitors, including 14 children from grades 3—9 and 8 adults. This was followed by questions from the group. Ryan then proceeded with the activity, "Earth, Moon

& Sun," using the projector as the Sun and directing the students to simulate eclipses with balls representing the Earth and the Moon.

This was followed by an activity called "Telescopes" in which the students assembled telescopes from kits consisting of cardboard tubes and lenses. We then went upstairs to test the telescopes out on the Observatory's roof patio. People commented on the image being upside down and Ryan explained that this was characteristic of a simple telescopes.

We then went into the dome where Ryan explained the big 25.4cm refractor to the group. We opened the dome to demonstrate how the dome worked but did not look through the telescope.

Everybody was gone before 8:30 p.m. after what was a successful evening of astronomy education. I took the RASC London Centre's photographic display, created for 2008 General Assembly, home with me.

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colliding at speeds of thousands of kilometers per second. The only astronomical object that emits gamma rays and is observable by the naked eye, Eta Carinae is monstrously large, so large that astronomers call it a hypergiant. It contains between 100 and 150 times the mass of the Sun and glows more brightly than four million Suns put together. Astronomers know that it is not a single star, but a binary, with a second massive star orbiting the first. (Astronomy)

March 26: NASA's Cassini spacecraft tasted and sampled a surprising organic brew erupting in geyser-like fashion from Saturn's moon Enceladus during a close flyby on March 12. Scientists are amazed that this tiny moon is so active, "hot" and brimming with water vapor and organic chemicals. New heat maps of the surface show higher temperatures than previously known in the south polar region, with hot tracks running the length of giant fissures. Additionally, scientists say the organics "taste and smell" like some of those found in a comet. The jets themselves harmlessly peppered Cassini, exerting measurable torque on the spacecraft, and providing an indirect measure of the plume density. (NASA)

April 23: A small motor in the robotic arm of NASA's Mars Exploration Rover Opportunity that began stalling occasionally more than two years ago has become more troublesome recently.

The motor controls sideways motion at the shoulder joint of the rover robotic arm. Other motors provide up-and-down motion at the shoulder and maneuverability at the elbow and wrist. A turret at the end of the arm has four tools that the arm places in contact with rocks and soils to study their composition and texture.

Opportunity and Spirit landed on Mars in January 2004 to begin missions originally planned for three months. They have continued operating for more than four years, though each with some signs of aging. (NASA)

April 24: Galaxy collisions produce a remarkable variety of intricate structures, as 59 new images from the NASA/ESA Hubble space telescope show.

Interacting galaxies are found throughout the universe, sometimes dramatic collisions that trigger bursts of star formation, on other occasions as stealthy mergers that form new galaxies. A series of 59 new images of colliding galaxies, the largest collection ever published simultaneously, has been released from archived raw Hubble images to mark the 18th anniversary of the telescope's launch. <http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=42690> (ESA)

May 25: NASA's Phoenix spacecraft landed in the northern polar region of Mars today to begin three months of examining a site chosen for its likelihood of having frozen water within reach of the lander's robotic arm.

Radio signals received at 4:53:44 p.m. Pacific Time (7:53:44 p.m. Eastern Time) confirmed the Phoenix Mars Lander had survived its difficult final descent and touchdown 15 minutes earlier. The signals took that long to travel from Mars to Earth at the speed of light. (NASA)

May 22: In what's beginning to look like a case of planetary measles, a third red spot has appeared alongside its cousins — the Great Red Spot and Red Spot Jr. — in the turbulent Jovian atmosphere. This third red spot, which is a fraction of the size of the two other features, lies to the west of the Great Red Spot in the same latitude band of clouds. The visible-light images were taken on May 9 and 10 with Hubble's Wide Field and Planetary Camera 2. (Hubblesite)

May 21: Thanks to a fortuitous observation with NASA's Swift satellite, astronomers for the first time have caught a star in the act of exploding. Astronomers have previously observed thousands of stellar explosions, known as supernovae, but they have always seen them after the fireworks were well underway. A typical supernova occurs when the core of a massive star runs out of nuclear fuel and

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collapses under its own gravity to form an ultradense object known as a neutron star. The newborn neutron star compresses and then rebounds, triggering a shock wave that plows through the star's gaseous outer layers and blows the star to smithereens. Astronomers thought for nearly four decades that this shock "break-out" will produce bright X-ray emission lasting a few minutes. But until this discovery, astronomers have never observed this signal. Instead, they have observed supernovae brightening days or weeks later, when the expanding shell of debris is energized by the decay of radioactive elements forged in the explosion. "Seeing the shock break-out in X-rays can give a direct view of the exploding star in the last minutes of its life and also provide a signpost to which astronomers can quickly point their telescopes to watch the explosion unfold," says Edo Berger, a Carnegie-Princeton Fellow at Princeton University. (NASA)

May 20: In the May 20 issue of *The Astrophysical Journal*, Charles Danforth and Mike Shull (University of Colorado, Boulder) report on NASA's Hubble Space Telescope and NASA's Far Ultraviolet Spectroscopic Explorer (FUSE) observations taken along sight-lines to 28 quasars. Their analysis represents the most detailed observations to date of how the intergalactic medium looks within about four billion light-years of Earth. The astronomers say they have definitively found about half of the missing normal matter, called baryons, in the space between the galaxies. The missing baryonic matter helps trace out the structure of intergalactic space, called the "cosmic web." (Hubblesite)

May 28: Not so long ago, anyone claiming to see flashes of light on the Moon would be viewed with deep suspicion by professional astronomers. Such reports were filed under "L" ... for lunatic. Not anymore. Over the past two and a half years, NASA astronomers have observed the Moon flashing at them not just once but one hundred times. "They're explosions caused by meteoroids hitting the Moon," explains Bill Cooke, head of NASA's Meteoroid Environment Office at the Marshall Space Flight Center (MSFC). "A typical blast is about as powerful as a few hundred pounds of TNT and can be photographed easily using a backyard telescope." (NASA)

June 30: NASA's Cassini mission is closing one chapter of its journey at Saturn and embarking on a new one with a two-year mission that will address new questions and bring it closer to two of its most intriguing targets—Titan and Enceladus. On June 30, Cassini completes its four-year prime mission and begins its extended mission, which was approved in April of this year. Among other things, Cassini revealed the Earth-like world of Saturn's moon Titan and showed the potential habitability of another moon, Enceladus. These two worlds are primary targets in the two-year extended mission, dubbed the Cassini Equinox Mission. This time period also will allow for monitoring seasonal effects on Titan and Saturn, exploring new places within Saturn's magnetosphere, and observing the unique ring geometry of the Saturn equinox in August of 2009 when

sunlight will pass directly through the plane of the rings. (NASA)

August 1: The Moon will pass in front of the Sun, casting a shadow across the Earth. Much of the northern hemisphere will see a partial eclipse, but the total eclipse will only be visible in a narrow band as the shadow tracks from Canada to China. Totality is expected to be relatively short, lasting at most about two and a half minutes. In contrast, a total eclipse in 2009 will last more than six and a half minutes in some places.

August 18: First object seen from solar system's inner Oort cloud. Add yet another new class of objects to the solar system's growing bestiary - the first known visitor from the inner part of the Oort cloud. Many comets originate in the outer Oort cloud, a shell of icy bodies that surrounds the solar system. The object, thought to measure between 50 and 100 kilometres wide, was first discovered two years ago in a search for faint supernovae (watch it move against the sky here.). Called 2006 SQ372, it travels on an extremely elongated, 22,500-year orbit around the Sun. (New Scientist)

August 22: The Visual Monitoring Camera (VMC) is mounted on Mars Express, ESA's deep-space probe now orbiting the Red Planet. It originally provided simple, low-tech images of Beagle lander separation, and is now back in action as the 'Mars Webcam'. It's not a scientific instrument, but it does provide fantastic views of Mars - including crescent views of the planet not obtainable from Earth. (ESA)

September 29: China celebrates success of third crewed spaceflight. A small crowd of schoolchildren waved flags as three Chinese astronauts rode into Beijing on Monday after completing the nation's first spacewalk, seen as key to longer-term plans for a space station and a lunar landing. Their Shenzhou ("sacred vessel") spacecraft parachuted down on Sunday after a 68-hour voyage and spacewalk that showcased the country's technological mastery. (New Scientist)

September 29: Private rocket achieves orbit on fourth try. After three failed attempts, the private space firm SpaceX successfully launched a rocket into orbit on Sunday, marking what may be the beginning of a significant drop in the cost of spaceflight. The two-stage Falcon 1 rocket launched at 1115 GMT from Omelek Island on the Kwajalein Atoll in the Pacific Ocean, roughly 4000 kilometres southwest of Hawaii. PayPal entrepreneur Elon Musk has said he founded SpaceX with the aim of driving down the cost of space access. The firm estimates that Falcon 1 flights will cost as little as \$7.9 million a piece, roughly three times less expensive than current launches. (New Scientist)

Sept. 23: In a briefing today at NASA headquarters, solar physicists announced that the solar wind is losing power. "The average pressure of the solar wind has dropped more than 20% since the mid-1990s," says Dave McComas of the Southwest Research Institute in San Antonio, Texas. "This is the weakest it's been since we began monitoring solar wind almost 50 years ago." McComas is principal

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investigator for the SWOOPS solar wind sensor onboard the Ulysses spacecraft, which measured the decrease. Ulysses, launched in 1990, circles the sun in a unique orbit that carries it over both the sun's poles and equator, giving Ulysses a global view of solar wind activity. (NASA)

October 24: Safe Soyuz landing ends a run of bumpy rides. A capsule carrying a US space tourist and two Russians landed safely in Kazakhstan on Friday, ending a run of less than perfect landings that have raised concerns about the safety of the Soyuz spacecraft. "I feel great. I feel very good. Re-entry was perfectly smooth," a smiling Richard Garriott, told reporters after a Russian recovery team extracted him from the capsule as the first rays of sun lit up the Kazakh steppe. He paid \$35 million for his 12-day journey into space. (New Scientist)

October 27: India's First Moon Shot. Parking in lunar orbit is about to get a little more crowded. On Wednesday the Indian Space Research Organization (ISRO) launched Chandrayaan 1, its first deep-space mission, from the Satish Dhawan Space Center in Sriharikota. In Hindi, Chandrayaan means "Journey to the Moon" (Chandra is Moon, and yaan is ship). The space agency's proven Polar Satellite Launch Vehicle initially placed the spacecraft in a looping orbit that carried it 14,100 miles (22,860 km) from Earth. But a rocket firing yesterday nearly doubled the orbit's apogee, or high point. More maneuvers in the coming days will deliver Chandrayaan 1 to the Moon, where it should eventually settle into a low polar orbit only 60 miles (100 km) high. (Sky and Telescope)

October 19: NASA Launches IBEX Mission to Outer Solar System. NASA's Interstellar Boundary Explorer mission, or IBEX, successfully launched from the Kwajalein Atoll in the Pacific Ocean at 1:47 p.m. EDT, Sunday. IBEX will be the first spacecraft to image and map dynamic interactions taking place in the outer solar system.

"After a 45-day orbit raising and spacecraft checkout period, the spacecraft will start its exciting science mission," said IBEX mission manager Greg Frazier of NASA's Goddard Space Flight Center in Greenbelt, Md. Just as an impressionist artist makes an image from countless tiny strokes of paint, IBEX will build an image of the outer boundary of the solar system from impacts on the spacecraft by high-speed particles called energetic neutral atoms. These particles are created in the boundary region when the 1-million mph solar wind blows out in all directions from the sun and plows into the gas of interstellar space. This region is important to study because it shields many of the dangerous cosmic rays that would flood the space around Earth. (NASA)

November: Another Direct Exoplanet Image. Last week two teams of astronomers, one using the Hubble Space Telescope and the other using giant ground-based scopes with adaptive optics, released what they called the first direct images of extrasolar planets orbiting other stars. Not to be outdone, a French team today released their image of a tiny but definitely real speck glowing in the infrared 0.4 arcsecond from Beta Pictoris, a young star 63 light-years away. The speck is just inside the inner edge of Beta Pic's

enormous, famous debris disk — a wide platter of dust that we see nearly edge-on. (Sky and Telescope)

November: Massive fireball lights up Alberta and Saskatchewan! It wasn't a bird, and it sure as heck wasn't a plane, but whatever was in the sky over western Canada on Thursday night was very exciting for the people who saw it. In Edmonton and across the Prairies, hundreds of people reported seeing a bright flaming object light up the sky around 5.30 PM local time. It was variously described as green, yellow, purple or blue, and appeared as either an explosion or an object streaking through the sky. Sightings came from across the Prairies; from as far south as Medicine Hat, Alberta, to as far north as Beauval, Saskatchewan - 600 kilometres from Edmonton. (Global TV)

November 19: Akari infrared space telescope: latest science highlights. The Akari infrared surveyor, a Japanese Aerospace Exploration Agency mission with ESA participation, has returned a host of new results. From splashes in cosmic rivers of dust and gas to supernova remnants, the mission has been uncovering secrets of the cold and dusty Universe. supergiant star located in the constellation Orion about 640 light-years from Earth, show the star making a big splash by creating a bow shock as it crosses the interstellar medium. Researchers have found a strong flow of the interstellar medium around the star which originates from star-forming regions in Orion's Belt. (ESA)

December 22: PS3's help astrophysicists solve mystery of black hole vibrations. Using only the computing power of 16 Sony Playstation 3 gaming consoles, scientists at The University of Alabama in Huntsville and the University of Massachusetts, Dartmouth, have solved a mystery about the speed at which vibrating black holes stop vibrating. It may be the first time this kind of research has been conducted exclusively on a PS3 cluster: A related 2007 UMass Dartmouth/UAHuntsville project using a smaller PS3 cluster also used a "traditional" supercomputer to run its simulations. The biggest advantage of the console cluster — the PS3 Gravity Grid — at UMass Dartmouth was the cost saving, said Dr. Lior Burko, an assistant physics professor at UAHuntsville. "If we had rented computing time from a supercomputer center it would have cost us about \$5,000 to run our simulation one time. For this project we ran our simulation several dozens of times to test different parameters and circumstances, so you can see how much that would have cost us. "You can build a cluster like this for perhaps \$6,000, and then you can run the simulation as many times as you like at no additional cost." "Science budgets have been significantly dropping over the last decade," said UMass Dartmouth Physics Professor Gaurav Khanna, who built the PS3 cluster. "Here's a way that people can do science projects less expensively." Khanna recently launched a website — [www.ps3cluster.org](http://www.ps3cluster.org) — which includes step-by-step instructions for building a supercomputing PS3 cluster. (U of Alabama)

This list was by no means comprehensive of all the news that happened in 2008. I am sure there were great stories that I have left out. Of the stories I left out, if there were any you really liked, write an article about them for the February *Polaris*!