POLARIS

Royal Astronomical Society of Canada
London Centre Newsletter
March 2015

Aurora Borealis

Patrick Whelan

The technical term is aurora borealis, but most people call them the Northern Lights. Aurora borealis, the lights of the northern hemisphere, means ‘dawn of the north’. Aurora australis means ‘dawn of the south’. The name comes from the Roman myths, Aurora was the goddess of the dawn. Earlier this week there was a particularly strong showing of them. You could see aurora if you went out of the city to darker skies and had a good view to the north. On the internet and in the news there was talk of a Coronal Mass Ejection (CME) and that it meant there would be intense Northern Lights.

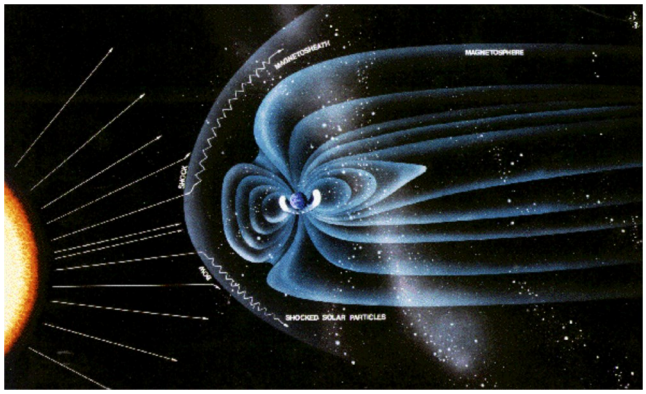
So what are the Northern Lights and what causes them? And what is a CME?

The light we see in an aurora are collisions of charged particles from the sun that enter Earth’s atmosphere. The charged particles collide with gas particles in Earth’s atmosphere. This was first discovered in 1960, when a pioneering rocket flight from Fort Churchill in Canada revealed a flux of electrons entering the atmosphere from above. When these collisions occur light is given off. Usually the light is green from collisions with oxygen molecules roughly 100km above the Earth. Red auroras are caused by collisions with high altitude oxygen, 320km or more above Earth. Blue or purple-red auroras are caused by collisions with nitrogen.

There is also a connection between sunspots and auroras. When there are more sunspots, there will be more intense Northern Lights. This is because increased sunspot activity creates more particles (protons and electrons) in the ‘solar wind’ that blows toward Earth and create aurora. Free electrons and protons are thrown from the sun's atmosphere by the rotation of the sun and escape through holes in the magnetic field. Or they are generated during a CME.

On March 15th 2015 a long duration C9 solar flare was observed on the Sun near sunspot region 2297. It launched a CME into space towards Earth. This meant there was a large increase in the protons and electrons that would impact Earth’s atmosphere. It was determined it would arrive at Earth on March 17th (St. Patrick’s day) and was thought to cause a minor G1 geomagnetic storm. (storm levels range from 0 which is not a storm, to 9 which is a severe storm) It caused a G2 moderate storm instead!

The charged particles are mainly deflected by Earth’s magnetic field but the field is weaker at the poles and some of the particles enter the atmosphere. It is when they enter the atmosphere that they cause collisions and we see aurora. The region that displays aurora is called the auroral oval. As I write this article the auroral oval looks like a giant capital “C” or a broken ring surrounding the north pole. The solar wind pushes the Earth’s magnetic field, compressing it into a teardrop shape. Sometimes the magnetic field lines reconnect on the side of the Earth opposite the Sun. They snap back like an elastic band, sending large amounts of energy back towards the Earth's poles. This phenomenon, called magnetic reconnection, creates stunning displays of aurora. Canada is a partner in NASA's THEMIS mission to help solve this mystery.



Many cultural groups have legends about the auroras. In medieval times, auroral displays were seen as harbingers of war or famine. The Maori of New Zealand shared a belief with many northern people of Europe and North America that the lights were reflections from torches or campfires.

The Menominee Indians of Wisconsin believed that the lights indicated the location of manabai'wok (giants) who were the spirits of great hunters and fishermen. The Inuit of Alaska believed that the lights were the spirits of the animals they hunted: the seals, salmon, deer and beluga whales. Other aboriginal peoples believed that the lights were the spirits of their people.

Moon Phases

March 5 2015

March 13 2015

March 20 2015

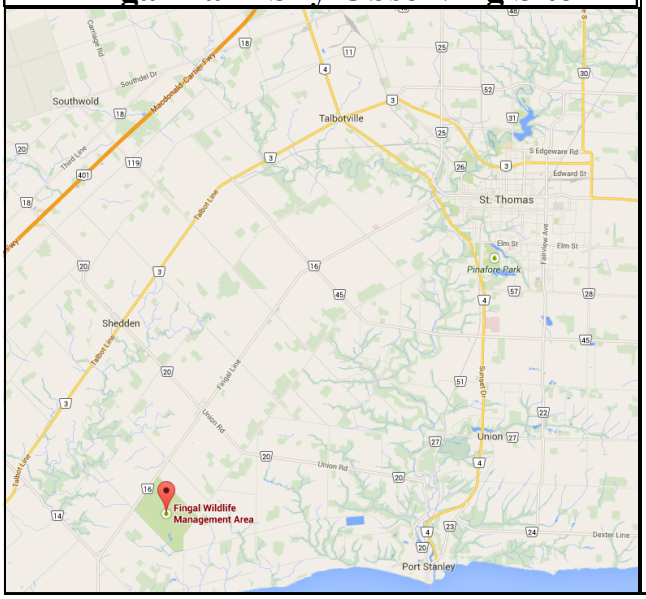
March 27 2015

March

Our guest speaker for March will be Dr. Alison Sills from McMaster University. Her talk is titled "Stellar Mergers and Interactions: Yes, Virginia, Stars Do Collide".

She will discuss strong interactions between stars in a variety of environments. "Despite the vast (average) interstellar distances, stars are social creatures and tend to live in pairs, multiples, or groups."

Fingal Dark Sky Observing Site



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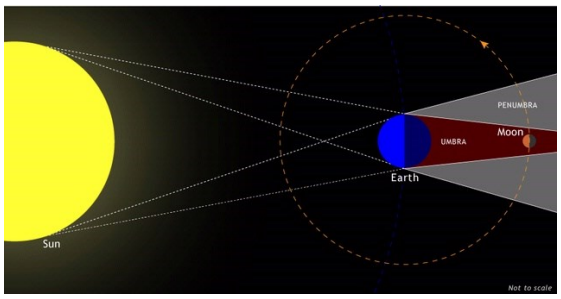
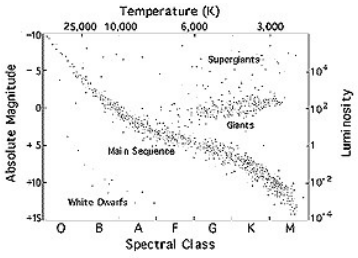
Sky Events for Late March and Early April

March 20 Total solar eclipse (not visible in Canada, well a bit in Nunavut)
March 20 Vernal equinox
March 21 Uranus 0.1 S of Moon
March 21 Mars 1.0 N of Moon
March 25 Aldebaran 0.9 S of Moon
April 4 **Total Lunar Eclipse**



Mercury well placed in the morning sky
Venus in the WSW evening twilight
Mars low in the SW evening sky
Jupiter well placed for northern observers, rises near sunset, visible all night
Saturn well placed in the dawn sky in Scorpius
Uranus low in the western evening sky in Pisces
Neptune vanishes into the evening twilight



R.A.S.C. London Centre Library
Books of the Month March 2015
By Robert Duff

As always, these "Books of the Month" are available for loan to members, to be returned at the following monthly meeting. The books for March 2015 are as follows:

Foundations of Astronomy, by Michael A. Seeds. – 7th Edition, c2003.

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

The Science of Shakespeare: A New look at the Playwright's Universe, by Dan Falk. c2014

For a complete listing of our library collection please go to the Main Menu on the left side of the RASC London Centre Web site main page and click on Club Library: http://www.rasclondon.ca/index.php/library-and-rentals

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

Exploring the Stars & Cronyn Observatory Public Nights, February 14th—March 14th, 2015

By Robert Duff

Cronyn Observatory Public Night, Saturday, February 14th, 2015

By Mark Tovey, Edited and Revised with Additions by Robert Duff

Cloudy skies and cold temperatures greeted 9 visitors to the Western University's Cronyn Observatory Public Night, Saturday, February 14th, 2015, 7:00 p.m. Graduate student Tony Martinez made the digital slide presentation "Our Active Sun."

RASC London Centre was represented by Tricia Colvin and Mark Tovey, later joined by Peter Jedicke. Wind and blowing snow ruled out opening the dome. Tricia and Mark set up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) inside the dome for display since there was too much blowing snow for observing outside.

One of the visitors and her child came upstairs into the dome early in the evening, while Tony was still giving his slide presentation downstairs in the lecture room. Tricia and Mark gave a joint talk to them with Tricia speaking primarily to the technical aspects of the big 25.4cm refractor and Mark to the history of the Cronyn Observatory. When everybody else arrived upstairs in the dome graduate student Shannon Hicks gave a brief talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor.

The sky cleared somewhat towards the end of the evening. Although it was still too snowy to support using a telescope on the deck, graduate student Emily McCullough showed visitors Jupiter on the deck using the Observatory's 10 X 50mm binoculars. Tony Martinez recalled that Mark, Tricia, Emily and Shannon along with 3 of the visitors observed Jupiter through the binoculars. Mark showed them how to steady the binoculars on their forearms but it was difficult to keep the image of Jupiter steady. Tony looked for Jupiter's Galilean moons but did not see them. Tony thought this was primarily due to the diffuse clouds and backscattering of blowing snow, which contributed to the bright sky. The visitors were gone by 8:45 p.m. It was an enjoyable and informative evening of astronomy for the visitors, despite the clouds and cold weather.

Cronyn Observatory Public Night, Monday, February 23rd

Clear skies and very cold temperature greeted 28 visitors to Western University's Cronyn Observatory Public Night, Monday, February 23rd, 2015, 7:00 p.m. The event was especially intended for students on campus, with observing only and no slide presentation.

Visitors were greeted by graduate students Dilini Subasinghe and Tony Martinez. RASC London Centre was represented by early arrivals Tricia Colvin and Bob Duff, later joined by Mark Tovey and Peter Jedicke. Ice and snow prevented opening the dome and use of the big 25.4cm refractor. Dilini directed everybody outside where Tricia had set up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). Tricia was already showing visitors Jupiter by 7:00 p.m. Tricia then showed them the 2-day-prior-to-first-quarter Moon and was soon joined by Mark. The 25.4cm Dobsonian was redirected to Jupiter once again and Tricia later located Comet C/2014 Q2 Lovejoy much to the delight of the visitors. Many of the students and children were very interested when Tony showed them the sky charting software "Starry Night Pro" on the computer in the dome. Bob talked to several visitors in the dome and explained the Standard and Sidereal Time clocks on the east wall.

The 25.4cm Dobsonian was brought indoors before 9:00 p.m. as the visitors were mostly gone due to the cold weather. However, Tony brought out the Observatory's 10 X 50mm binoculars to show one late arriving couple the Moon and was joined by Bob to show them Jupiter. Everybody departed for home around 9:00 p.m. after an enjoyable evening of astronomy despite the extremely cold weather.

Exploring the Stars, Science Students' Council, March 4th, 2015

Cloudy skies greeted 48 visitors for the Science Students' Council Wellness Wednesday Event with Exploring the Stars at Western University's Cronyn Observatory, Wednesday, March 4th, 2015, 6:00 p.m. Graduate student Shannon Hicks made the digital slide presentation "Life in the Universe" and fielded questions.

RASC London Centre was represented by Tricia Colvin, Bob Duff and Mark Tovey. Tricia arrived early and shovelled some of the snow off the roof patio outside the dome before setting up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). When everybody arrived upstairs in the dome Bob gave a talk about the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor (32mm Erfle eyepiece, 137X). Bob also explained the Standard and Sidereal Time clocks on the east wall. Shannon then opened the dome and directed the big 25.4cm refractor towards the red lights on the communications tower in south London. Bob assisted at the bottom of the ladder as the visitors climbed up to view the red lights on the tower.

Tricia and Mark showed them the wind turbine on the roof of the Engineering building to the south through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). The Moon made a bright patch in the clouds for a while but never revealed itself. Most everybody was gone by 7:30 p.m. Bob showed a couple of girls the amateur telescopes stored in what used to be the dome "dark room" for developing film, including the 8-inch (20.3cm) Meade Schmidt-Cassegrain, sometimes used for public nights, and the 90mm Coronado Hydrogen-Alpha Solar Telescope. The last visitors left by 8:00 p.m. after a very enjoyable and informative evening of astronomy, despite the cloudy sky.

Exploring the Stars, 17th London Brownies, March 10th, 2015

Generally clearing skies with some hazy clouds greeted 41 visitors (26 children and 15 adults—not including one little boy in a stroller) from the 17th London Brownies for Exploring the Stars at Western University's Cronyn Observatory, Tuesday, March 10th, 2015, 6:30 p.m. Graduate student Parshati Patel made the digital slide presentation "The Scout / Guide Astronomy Badge" and fielded questions. Parshati followed this with the activity "Crater Experiment," inviting the children to the front of the room where she demonstrated how meteor craters on the Moon were formed by dropping various size balls into a pan placed on the floor and filled with flour and chocolate powder.

RASC London Centre was represented by Tricia Colvin and Bob Duff. Tricia set up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) on the roof patio outside the dome and, since it was still daylight, directed it towards the wind turbine on the Engineering building. Tricia then rotated and opened the dome while Bob directed the big 25.4cm refractor (32mm Erfle eyepiece, 137X) towards the white light on the communications tower in south London. When everybody arrived upstairs,

Bob gave a brief talk on the history of the Cronyn Observatory and some technical aspects of the big 25.4 cm refractor.

By now the sky had darkened revealing Jupiter high in eastern sky and Venus towards the west. Bob advised everybody to divide into 2 groups with one going outside to view Jupiter through the 25.4cm Dobsonian, supervised by Tricia. Bob rotated the dome towards the west and located Venus in the big 25.4cm refractor (32mm Erfle eyepiece, 137X). Parshati supervised at the top of the observing ladder as children and adults climbed the steps to view Venus through the 25.4cm refractor. Jupiter was a splendid sight with its cloud belts and 4 Galilean moons visible as viewed through the 25.4cm Dobsonian. By the end of the evening people in both groups had the opportunity to view Venus and Jupiter through the big 25.4cm refractor and the 25.4cm Dobsonian, respectively. The visitors were gone by around 8:30 p.m., after expressing their thanks for a very enjoyable evening of astronomy.

Exploring the Stars, 1st Kintore / Thamesford Cub Scouts, March 11th, 2015

Clear skies greeted 26 visitors (13 children and 13 adults) from the 1st Kintore / Thamesford Cub Scouts for Exploring the Stars at Western University's Cronyn Observatory, Wednesday, March 11th, 2015, 6:30 p.m. Graduate student Dilini Subasinghe began with the activity "Telescope Kits," with the Cubs assembling small telescopes from reusable kits. Dilini then made the digital slide presentation "Cub Scout Astronomy Badge" and fielded questions.

RASC London Centre was represented by Bob Duff and Mark Tovey, later joined by Tricia Colvin. Mark set up the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) on the east side of the roof patio outside the dome. At Mark's suggestion Bob and Mark also set up the Observatory's 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain on the roof patio's west side. Mark then opened and rotated the dome towards the south and Bob assisted as Mark directed the big 25.4cm refractor (32mm Erfle eyepiece, 137X) towards the flashing white lights on the communications tower in south London. It was an opportunity for Mark to become familiar with setting up and operating the big 25.4cm refractor. When everybody arrived upstairs, Bob gave a brief talk on the history of the Cronyn Observatory and some technical aspects of the big 25.4 cm refractor. As the sky darkened the dome was rotated towards the west and Mark centred Venus in the big 25.4cm refractor's field of view (32mm Erfle eyepiece, 137X).

Bob suggested everybody divide into 2 groups with one group going outside to view Jupiter through the 25.4cm Dobsonian, supervised by Tricia, and the 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain, supervised by Mark; and the other group remaining inside to view through the big 25.4cm refractor. Dilini supervised from the top of the observing ladder as the visitors climbed the steps to view Venus through the big 25.4cm refractor. Jupiter was a splendid sight in the 25.4cm Dobsonian, supervised by Tricia, with all 4 Galilean moons visible in the field of view of the 17mm Nagler eyepiece (66X). Mark began by showing visitors Jupiter and its 4 Galilean moons through the 8-inch (20.3cm) Meade Schmidt-Cassegrain using the 18mm Tele Vue Radian eyepiece (111X), which was soon replaced with the 12.5mm Ortho eyepiece (160X) at Bob's suggestion. The higher magnification of 160X made Jupiter a spectacular sight in the Schmidt-Cassegrain, although only 3 of the Galilean moons were visible in the narrower field of view. Bob opened up "Starry Night Pro" on the dome computer, finding Jupiter; with Dilini later finding Mars and showing some of the Cubs its moons, Phobos and Deimos, and a few features on Mars, including Valles Marineris and some craters.

When everybody in both groups had viewed Venus through the big 25.4cm refractor and Jupiter through the 25.4cm Dobsonian and 20.3cm Schmidt-Cassegrain, the telescopes were redirected towards other sky objects. Mark showed visitors the Pleiades (M45) star cluster in the 20.3cm Schmidt-Cassegrain (26mm Plossl, 77X) and Bob located the Orion Nebula in the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). Tricia took over supervision of the 25.4cm Dobsonian as Bob went inside to redirect the big 25.4cm refractor towards the double-star Castor, which was nicely split in the 32mm Erfle eyepiece (137X). Bob explained the nature of the double-star Castor to several interested visitors. Towards the end of the evening Bob redirected the 25.4cm refractor again, this time towards Jupiter, which made a splendid sight in the 32mm Erfle eyepiece (137X) field of view, with its cloud belts and all 4 Galilean moons visible. It was an enjoyable sight for the few remaining visitors to view Jupiter through the big 25.4cm refractor.

Everybody in both groups had a chance to view through all 3 telescopes and most of the visitors were gone by 8:30 p.m. after expressing their thanks for what was an excellent evening of astronomy. A few people remained behind until around 8:50 p.m., by which time the telescopes were being put away and the Observatory closed down.

Exploring the Stars, Jeanne Sauvé French Immersion Public School, March 12th, 2015

Clear skies greeted 27 visitors from Jeanne Sauvé French Immersion Public School Grade-6 class, including 13 students and one younger (Grade-4) sibling and 13 adults for Exploring the Stars at Western University's Cronyn Observatory, Thursday, March 12th, 2015, 7:00 p.m. Graduate student Parshati Patel made the digital slide presentation "Our Solar System + The Small Bodies in Our Solar System" and fielded questions. Parshati followed this with the activity "Kitchen Comet," inviting the students to the table set up at the front of the lecture room where she made a comet from dry ice and other materials.

RASC London Centre was represented by Everett Clark, Mark Tovey, Tricia Colvin and Bob Duff. Tricia, Mark and Everett made ready and directed the big 25.4cm refractor (32mm Erfle eyepiece, 137X) in the dome towards Venus. They also set up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) and Observatory's 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain on the east and west sides, respectively, of

the roof patio outside the dome—directing them towards Jupiter. When everybody arrived upstairs in the dome, Bob gave a brief talk about the Cronyn Observatory, including some technical aspects of the big 25.4cm refractor, and explained the Standard and Sidereal Time clocks on the east wall.

Bob suggested that everybody split into 2 groups and this was accomplished with the girls remaining inside to view Venus through the big 25.4cm refractor (32mm Erfle eyepiece, 137X) and the boys heading outside on the roof patio to view through the 2 amateur telescopes. The 2 groups circulated inside and outside the dome so that everybody had the opportunity to view through all 3 telescopes. Tricia supervised observing through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), showing the visitors splendid views of Jupiter and later the Orion Nebula (M42).

The Galilean moon Io was transiting Jupiter and Bob noticed the tiny dark spot of Io's shadow on Jupiter through the 20.3cm Schmidt-Cassegrain early in the evening. Bob swapped in the 12.5mm Ortho eyepiece (160X), in place of the 20mm Plossl (100X), for a better view through the 20.3cm Schmidt-Cassegrain for the visitors. Mark then supervised observing Jupiter through the 20.3cm Schmidt-Cassegrain. Mark had a lot of fun showing visitors Jupiter, telling them the name of each Galilean moon and making sure they saw Io's shadow. The visitors were gone by 9:00 p.m. after expressing their thanks for an excellent evening of astronomy.

Cronyn Observatory Special Event, March 12th, 2015

Clear skies greeted 6 medical students from Western University's Schulich School of Medicine & Dentistry for a Special Event at Western University's Cronyn Observatory, Thursday, March 12th, 2015, 9:00—10:00 p.m. (This was following the Exploring the Stars event, 7:00—9:00 p.m.)

There was no digital slide presentation for the medical students and graduate student Parshati Patel hosted the observing session. RASC London Centre was represented by Mark Tovey, Tricia Colvin and Bob Duff. (London Centre member Everett Clark, having assisted with Exploring the Stars earlier in the evening, headed home.) Parshati and Bob operated the big 25.4cm refractor (Radian eyepiece, 244X) in the dome and showed the visitors Jupiter and the double-stars Castor (in Gemini) and Algieba (in Leo). On the roof patio outside the dome, Tricia and Mark showed them the Pleiades (M45) star cluster in the Observatory's 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain (26mm Plossl eyepiece, 77X); and Jupiter, the Orion Nebula (M42), Betelgeuse, the Pleiades (M45), Aldebaran and Sirius in the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). The medical students were gone by around 10:00 p.m. after a very enjoyable evening of astronomy under clear skies.

Cronyn Observatory Public Night, Saturday, March 14th, 2015

Cloudy skies greeted visitors to Western University's Cronyn Observatory Public Night, Saturday, March 14th, 2015, 7:00 p.m. Graduate student Parshati Patel made the digital slide presentation "Telescopes" and fielded questions. Graduate students Dilini Subasinghe and Emily McCullough worked in the dome. Dilini counted 26 people in Parshati's slide presentation and, with 7—8 people arriving later in the dome, the estimated total was 33—34 visitors.

RASC London Centre was represented by Tricia Colvin, Mark Tovey and Peter Jedicke, later joined by Bob Duff, arriving 7:55—8:00 p.m. London Centre member Richard Gibbens was also there and listened to the slide lecture. Following up on Parshati's slide presentation "Telescopes," Peter gave a talk about different types of telescopes including the big 25.4cm refractor in the dome and the history of the Cronyn Observatory. He also explained the Standard and Sidereal Time clocks on the east wall. Dilini showed visitors the flashing red lights on the communications tower in south London through the big 25.4cm refractor (52mm Erfle eyepiece, 84X). On the roof patio outside the dome, Tricia and Mark showed people the wind turbine on the roof of the Engineering building through the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X).

Peter also spent some time talking with another couple downstairs in the lecture room about astronomy. The visitors were gone by around 9:00 p.m. after an interesting evening of astronomy despite the cloudy weather.

RASC London Centre Star Nights & Public Outreach, March 2015

By Robert Duff

Slide Presentation, St. Kateri Catholic School, March 3rd, 2015

By Robert Duff, as Reported by Peter Jedicke

RASC London Centre Honorary President Peter Jedicke visited St. Kateri Catholic School and spoke to 27 students and their teacher in the Grade-6 class on Tuesday, March 3rd, 2015, 10:30 a.m.—12 noon. Peter showed them slides about the solar system and space travel and touched on key concepts in the Ontario Science Curriculum such as the seasons and the relative sizes of the planets. Peter reported that he children were very enthusiastic and asked some interesting questions.