POLARIS

Royal Astronomical Society of Canada
London Centre Newsletter
March 2017

The Magic of Filters

Compiled By Norman McCall

Every astronomer is looking for magic; the mystical moment they capture that extra special view of something hoped for — yet unexpected.

No doubt we all have memories of our first sighting of a distinctive astronomical object in the night's sky. For some these experiences are a kind of ecstasy, for others, the wonder of artistic beauty or possibly, a moment to appreciate their spiritual belief's. For me it is simply magic.

This is the magic of filters; the hope that they will deliver something extra, even a small visual improvement that reveals some beauty hidden in and beyond the reach of the unaided eye.

Introduction to Filters

While the best accessory for a telescope is a good set of eyepieces, **the best accessory for eyepieces is a set of good filters**. Although the difference a good filter makes can be dramatic, more often it is subtle, requiring a trained eye to appreciate.

It is easy to understand that you need a filter to observe the Sun. However, in large telescopes, planets such as Venus, Mars and Jupiter can sometimes be too bright to view comfortably. A filter cuts down the glare without decreasing resolution.

Another application for filters is for monochrome CCD cameras to create color images. When using filters with these CCD cameras you would normally take exposures to capture the red, green and blue wavelengths separately, followed by an IR block filter which acts as Luminescence (or brightness), a full colour photograph can be then created with mono cameras by combining the images.

Why Use a Filter?

Simply put, a filter can greatly enhance the human eye's perception of small details on solar system and deep sky objects. Some amateur observers maintain that they never use filters and that one doesn't need them. To this argument, I would say; no pair of human eyes is perfect. If a filter helps you get better use out of yours, then use them. Judicious use of photo visual filters can greatly enhance an observing session.

Filters work by blocking a specific part of the color spectrum, thus significantly enhancing the remaining wavelengths. Color filters work by absorbing all but the desired color of the filter which is transmitted. Therefore, for Mars, a red filter would accentuate the red components of the spectrum of light being reflected from Mars. The so-called light-pollution reduction and nebulae filters are very selective in the wavelengths they transmit. For these it is best to refer to the manufacturer's specifications on a given filter.

General Guideline

For the best viewing experience, you want to use the darkest filter your telescope will handle. Light color filters are recommended for small telescopes up to about 5" in aperture. The larger the telescope, the darker your filter can be. Color filters can sometimes be used in conjunction with a Neutral Density or Polarizing filter to aid in glare reduction. The more you use filters the more you appreciate them and their affect.

Types of Filters

There are three main types of filters for amateur astronomy: **solar, lunar and planetary and deep sky**. There are also speciality filters designed for a specific type of observation, for example **comet filters**. Although very different in construction, filters work by blocking a specific part of the color spectrum, thus significantly enhancing the remaining wavelengths. Although the image may be dimmer, the contract enhancement improves the view of the image.

Filters come in 1.25" or 2" sizes and will screw into the focuser end of the eyepiece. Astronomy filters can also be screwed into other filters.

Solar Filter

A Solar filter is ESSENTIAL for viewing the Sun. You should not even consider using any other filter, other than one specifically designed for the Sun. These full aperture filters fit over the front of the telescope and are designed to eliminate 99.9% of the Suns energy by blocking all visible, infrared and ultraviolet wavelengths, making it suitable for direct solar observations. The filter will show either a yellow-orange image of the Sun's surface or a white image if you use a Baader solar film. These filters are good for "white-light" observation of sunspots and limited granulation.

Hydrogen-alpha filtering systems, unlike continuum "white light" observations of the sun, enable observation of the sun's chromosphere and flares. Using a very narrow bandwidth filter centered on the Hydrogen Alpha spectral line (656 nanometers), it not only reduces the intensity of the sunlight

to a safe level, but eliminates much of the photosphere's contribution to the image giving spectacular views.

Planetary Filters

Beginners are attracted to planetary filters due to their low cost ($20 to $50). The main purpose of these filters is to enhance planetary markings by improving contrast between regions of different colors. They come in every color of the rainbow and are labeled with the same Kodak Wratten numbers used in photography. Although tempting to purchase the whole set, only a few are recommended.

The most useful are: Wratten # 12, yellow for the Moon, # 23A, light red to increase the contrast between dark and light areas of Mars, # 56, light green to enhance the features of the Great Red Spot and the dark cloud bands on Jupiter and #80A, blue for occasional glimpses of subtle features in Venus's clouds.

For planetary viewing to the untrained eye the improvements may be small, however, with experience knowing what to look for is key.

Lunar Filters

The Moon – even in a small scope - is often too bright to view comfortably. Either a #12 yellow or a neutral-density can cut the glare and eye strain significantly. The transmittance of Neutral Density filters are is available in a variety of fixed values including 13%, 21% and 25%.

A Variable Polarizing filter is also very useful as simple neutral-density filters. The filters consist of two filters which allow polarization to be adjusted by rotating one of the filters varying the transmittance from 1% to 45%. They are made from high quality optical glass and allow for maximum contrast of lunar detail for both day and nighttime viewing.

I believe a Lunar filter is a must-have addition to the amateur astronomy kit.

Deep-Sky & Nebula Filters

For deep sky objects, the primary goal is to increase the amount of light captured by using a larger diameter scope. So how does a filter which decrease the available light help? Light from deep-sky objects is usually accompanied by ambient light from sky glow and light pollution. Nebula filters block the unwanted wavelengths and admit those from the deep-sky target improving the contrast between the object then the unwanted background noise.

For imaging Lumicon recommends their Deep Sky filter because it has the widest band-width among Lumicon's nebula filters. The wide band-width of the Deep Sky allows for shorter exposure times, which makes for easier astrophotography of deep -sky objects.

This however is not a recommendation against narrower band-width filters, such as the UHC or OIII, which can be used to produce higher contrast pictures. These narrower filters are more "challenging," however, because they require longer exposure times. If you are new to astrophotography, a difficult art, start with a Deep Sky filter. In terms of exposure time required, from shortest to longest, Lumicon's nebula filters progress as follows: Deep Sky <UHC <Comet <OIII <H-Beta.

Types of Deep-Sky Filters

Ultra High Contrast (UHC) Filters

The UHC filter is a narrow band pass (NBP) filter (24nm) which isolates the two doubly ionized oxygen lines (496 and 501nm) and the hydrogen-beta line (486nm) emitted by planetary and most emission nebulae. It provides superb views of the Orion, Lagoon, Swan and other extended nebulae. The UHC is one of best all-around dark-sky nebular filter available, highly recommended.

Deep Sky Filter

A Deep Sky filter is intended for viewing nebulae from light-polluted skies. It blocks all mercury vapor and high & low pressure sodium vapor lamp light, neon lights and airglow, while transmitting the rest of the visible spectrum. It is the best all-around visual light pollution filter for use in urban skies. The filter also provides high-contrast views of the Martian polar caps.

Hydrogen Alpha

A hydrogen-alpha filter is an optical filter designed to transmit a narrow bandwidth of light generally centred on the H-alpha wavelength. They are characterized by a band pass width that measures the width of the wavelength band that is transmitted. These filters are VERY expensive, but if you want to observe and photograph solar prominences, this filter is required.

Oxygen III (OIII)

The OIII is a narrow band pass filter (11nm) which filters out all wavelengths apart from those in the doubly ionised oxygen wavelengths. Suited only for emission nebulae where the predominant emission is OIII such as the Veil, Ring, Dumbbell and Orion nebulas. It can also be used to resolve double stars where one is much brighter than the other such as Antares.

Hydrogen Beta

The Hydrogen Beta filters is also known as the Horsehead Nebula filter, H-Beta filters isolate the hydrogen-beta line of the spectrum (486nm) in a narrow pass-band just 9 nm wide. The result is extreme contrast between the black background of space and the delicate Hydrogen - Beta emission of extended nebulae. Particularly effective when used on the Horsehead, Cocoon and California Nebulae. It is best used under clear skies with large apertures.

Speciality Filters

A good example of a speciality filter is the Comet filter. It is a narrow band-pass filter (25nm wavelength) used to isolate the 501nm Oxygen III line and both Cyanogen lines at 511nm and 514nm. The high contrast of the filter reveals the delicate ionized tail of gaseous comets, allowing you to see their full extent. The comet filter also helps you better distinguish gaseous comets from dusty comets, which normally show little contrast gain.

Although a less common filter, it is a valuable addition to your kit for enhancing your appreciation of comet viewing.

Conclusion

Hopefully the next time you are outside observing, after a good bit of hard work and patience, the use of one of these filters will bring you some **magic.**

London Centre Executive

President
Rick Saunders
prez@rasclondon.ca

Vice-President and Newsletter Editor
Norman McCall
vp@rasclondon.ca

Treasurer
Bill Gardner
treasurer@rasclondon.ca

Secretary
Everett Clark
secretary@rasclondon.ca

National Representative
Mike Hanes
nat_rep@rasclondon.ca

Observer's Chair
Dale Armstrong
observing@rasclondon.ca

Honorary President and once National President
Peter Jedicke
pastpresident@rasclondon.ca

Past President

Public Outreach Coordinator
Dave McCarter
outreach@rasclondon.ca

Higher Education Liaison and Librarian
Robert Duff
uni_liaison@rasclondon.ca

ATM Chair
Mike Hanes
atm@rasclondon.ca

Observatory Committee Chair
Pete Raine
observatory@rasclondon.ca

Youth Programs/Women's Programs
Heather MacIsaac
youth@rasclondon.ca
programs@rasclondon.ca

Councilor at Large
John Rousom
councilor2@rasclondon.ca

System Administrator
Jeff Harrison
admin@rasclondon.ca

Moon Phases

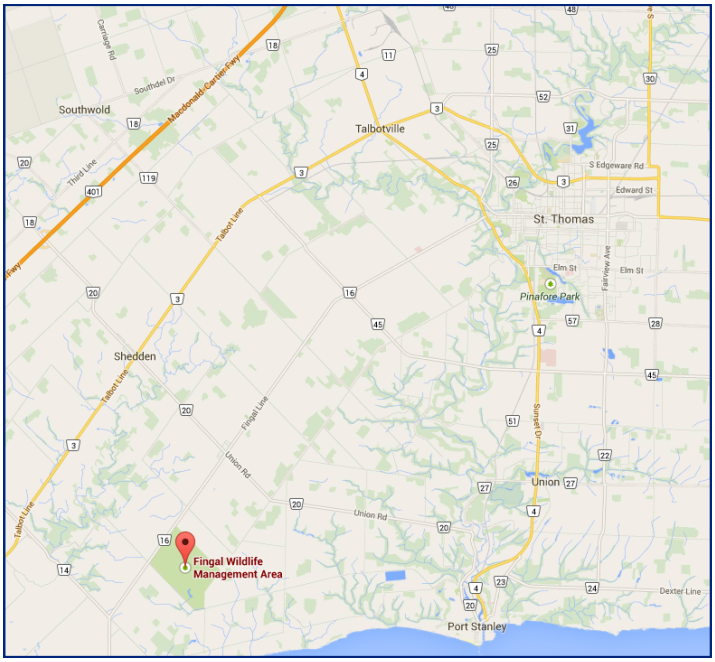

Last Quarter: March 20, 2017


New Moon: March 28, 2017


First Quarter: April 3, 2016


Full Moon: April 11, 2017

Fingal Dark Sky Observing Site



Sky Events for Late February and March

Sunday, March26 – Neptune 0.005° N of Moon
Friday, March 28 – Albebaran 0.3^0 S of Moon
Sunday, March 29 – Venus greatest illuminated extent of Moon, occultation
Thursday, April 4 – Regulus 0.5° N of Moon
Friday, April 12 – Double shadow transit on Jupiter
Monday, April 15 – Double shadow transit on Jupiter
Wednesday, April 17 – Mercury greatest elongation
Friday, April 19 – Double shadow transit on Jupiter

Mercury is at greatest eastern elongation on the 1st and well placed in the evening sky night to night.
Venus grows ever more prominent in the morning sky throughout the month.
Mars passes within 4^0 of the Pleiades late in the month. Binoculars may be required to pull both out of the bright evening twilight.
Jupiter is a opposition on April 7th in Virgo.
Saturn reaches its first stationary point on the 6th beginning retrograde motion thereafter.
Uranus to close to the Sun to be seen.
Neptune returns to the morning sky early in the month for observers of the Southern Hemisphere.

R.A.S.C. London Centre Library
Books of the Month, March 2017
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 2017 are as follows:

Foundations of Astronomy, by Michael A. Seeds. – 7th Edition, c2003
Universe on a T-shirt: the Quest for the Theory of Everything, by Dan Falk. c2002
Sky & Telescope [compact disc]: January—December, 2015 (1 DVD-ROM disc) – c2016

For a complete listing of our RASC London Centre Library collection please click on the **Library** menu at the top of the RASC London Centre main web page: **http://www.rasclondon.ca/**

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**

Cronyn Observatory Public Night & Exploring the Stars Event, February 13th—March 9th 2017
By Robert Duff

Cronyn Observatory Public Night, Monday, Feb. 13th, 2017

Clear skies greeted some 30 visitors to Western University's Cronyn Observatory Public Night, Monday, February 13th, 2017, 7:00 p.m. Since there was no slide presentation, visitors simply went upstairs into the dome where they were greeted by graduate students Robin Arnason and Kendra Kellogg and RASC London Centre members Everett Clark, Paul Kerans and Bob Duff.

Robin, Kendra and Everett operated the big 25.4cm refractor in the dome. Kendra located and showed visitors the planet Venus in the 25.4cm refractor (28mm Meade Super Wide Angle eyepiece, 157X) and Mars was observed later. The London Centre's 25.4cm Dobsonian, along with the home-built 30.5cm (f/5) Dobsonian donated by Matt Neima to the RASC London Centre for use at the Cronyn Observatory, were both set up on the roof patio outside the dome.

Robin showed visitors the Orion Nebula (M42) through the 25.4cm Dobsonian, with the observatory's 2-inch Orion UltraBlock Narrowband Filter installed on the 17mm Nagler eyepiece (66X). Paul showed visitors M42, Betelgeuse and the Pleiades (M45), and Kendra showed them the Owl Cluster (NGC457) through the 25.4cm Dobsonian (17mm Nagler eyepiece (66X).

Robin also operated the 30.5cm Dobsonian (20mm Plossl eyepiece, 75X), showing visitors Mars, M42, and the Pleiades (M45). Bob installed the observatory's 12.5mm Ortho together with the Meade 2X Barlow lens so that visitors could view Mars at 240X through the 30.5cm Dobsonian. Mars was to the upper left of Venus in the western sky and showed only a tiny disk in the telescopes, being very far away. Robin and Kendra took turns operating the 30.5cm Dobsonian. Bob later showed visitors the double-star Castor in Gemini through the 30.5cm Dobsonian (12.5mm Ortho eyepiece, 120X).

Everett called people's attention to an ISS pass travelling from west to west-southwest, 8:06—8:08 p.m., reaching and altitude of 23 degrees before disappearing into the Earth's shadow. Paul showed the visitors his chondrite (stony) and iron meteorites as well as his Moon and Mars meteorite samples in small plastic display cases. Paul had placed his lunar meteorite sample display case in a wooden block with a transparent *Lexan* polycarbonate sheet cover and invited 2 children to *"walk on the Moon."* There were 2 *"Star Finder"* planispheres distributed to visitors. The visitors were gone by

around 9:00 p.m. after a very enjoyable evening of astronomy under clear skies.

Exploring the Stars, 1st Ilderton Beavers, February 16th, 2017

Clear skies greeted 33 visitors (18 children and 15 adults / leaders) from the 1st Ilderton Beavers for Exploring the Stars at Western University's Cronyn Observatory, Thursday, February 16th, 2017, 6:30 p.m. Graduate student Viraja Khatu presented the digital slide presentation *"Constellations"* and fielded questions. Viraja followed this with the activity *"Make Your Own Constellation / Constellation Detective"* which involved the children drawing and naming their own constellations by connecting patterns of black dots representing stars on 2 white laminated sheets, using magic markers.

RASC London Centre was represented by Paul Kerans and Bob Duff. When everybody arrived upstairs in the dome, Bob gave a brief talk on the history of the Cronyn Observatory and some of the technical aspects of the big 25.4cm refractor. At Bob's suggestion, the visitors divided into 2 groups with one group lining up to view through the big 25.4cm refractor in the dome and the other joining Paul on the roof patio to view through the London Centre's home-built 30.5cm Dobsonian. The 2 groups later traded places so that everybody had the opportunity to view through both telescopes.

Bob supervised in the dome as the Beavers and adults viewed the planet Venus, which appeared as a nice crescent, through the 25.4cm refractor (28mm Meade Super Wide Angle eyepiece, 157X). Paul showed them the Orion Nebula (M42) through the home-built 30.5cm Dobsonian (17mm Nagler eyepiece, 88X). The visitors were gone by around 7:40 p.m. after a very enjoyable evening of astronomy under clear skies.

Cronyn Observatory Public Night, Saturday, February 25th, 2017

Cloudy skies with some light snow greeted 42 visitors to Western University's Cronyn Observatory Public Night, Saturday, February 25th, 2017, 7:00 p.m. Graduate student Viraja Khatu presented her digital slide presentation *"Our Home Galaxy: The Milky Way"* before an audience of 35 visitors (including some 12 children) and fielded questions. There were 2 other visitors who went directly upstairs into the dome. Graduate student Kendra Kellogg directed 5 more visitors, who arrived after the slide lecture, directly upstairs into the dome which remained closed due to weather conditions. This brought the total to 42 visitors for the evening.

RASC London Centre was represented by Everett Clark, Heather MacIsaac, Mark Pickett, Bob Duff, Dale Armstrong and Patrick Whelan. Everett Clark set up the observatory's 2 Meade 8-inch (20.3cm) Schmidt-Cassegrain telescopes inside the dome. He set up one 8-inch (20.3cm) Schmidt-Cassegrain (26mm Plossl eyepiece, 77X) to view out the door towards the red lights on the communications tower in south London. The other 8-inch (20.3cm) Schmidt-Cassegrain (20mm Plossl eyepiece, 100X) he set up without its tripod on the table near the window to show visitors the red light above the north campus buildings. Mark Pickett set up his Antares 90mm (f/11) refractor (8mm—24mm zoom eyepiece) on his Vixen alt-azimuth mount on the roof patio outside the dome and directed so that visitors could view the red light on the construction crane behind the Engineering building.

When everybody arrived upstairs in the dome, Bob Duff gave a brief talk about the history of the observatory and some of the technical aspects of the big 25.4cm refractor in the dome, as well as the Cassegrain reflector telescope and Schmidt camera piggy-backed on the 25.4cm refractor. He also called their attention to the 2 clocks on the east wall and explained the difference between Standard and Sidereal Time. London Centre members talked to the visitors and answered questions as they looked though the telescopes. Heather MacIsaac and Everett Clark distributed 10 *"Star Finder"* planispheres to interested visitors.

Patrick Whelan arrived around 8:00—8:15 p.m. and in an informal ceremony in the dome presented Heather MacIsaac with a 10-inch (25.4cm, f/4.8) mirror, mirror cell, and accompanying 2.1-inch secondary mirror and spider, all donated to the London Centre by Matt Neima. Patrick also brought a 48-inch long section of 12-inch diameter Sonotube and mentioned a Dobsonian mount left at home.

With the visitors gone Dale Armstrong set up his camera and tripod to take some wide-angle pictures in the darkened dome with an off-camera flash, including several with the London Centre members and Kendra in front of the big 25.4cm refractor. The observatory was closed down a little after 9:05 p.m. after an enjoyable evening for the visitors, learning about astronomy and telescopes.

Exploring the Stars, 120th, London Brownies, February 28th, 2017

Cloudy skies greeted 22 visitors (15 children and 7 adults / leaders) from the 120th London Brownies for Exploring the Stars at Western University's Cronyn Observatory, Tuesday, February 28th, 2017, 6:00 p.m. Graduate student Kendra Kellogg presented the digital slide presentation *"Life in the Universe"* and fielded questions. Kendra followed this with the activity *"Telescope Kits"* with the Brownies assembling and testing simple telescopes from small reusable kits.

RASC London Centre was represented by Paul Kerans and Bob Duff. Cloudy damp weather ruled out opening the dome. Kendra gave them a brief tour of the big 25.4 cm refractor in the dome, using the 32mm Erfle eyepiece (137X) for demonstration. Kendra also explained the difference between a refractor and a reflector telescope. Paul had set up the London Centre's home-built 30.5cm Dobsonian (26mm Tele Vue Plossl eyepiece, 58X) reflector telescope on the roof patio outside the dome and Bob supervised as the Brownies viewed a red light on the construction crane behind the Engineering building.

Paul showed the visitors his chondrite (stony) and iron meteorites as well as his Moon and Mars meteorite samples in small plastic display cases. Paul had placed his lunar meteorite sample display case in a wooden block with a transparent *Lexan* polycarbonate sheet cover and all the children were invited to *"walk on the Moon."* Paul also distributed 17 *"Star Finder"* planispheres to the Brownies and their leaders. The visitors were gone by around 7:45 p.m. after an enjoyable evening learning about astronomy and telescopes.

Western University's Department of Visual Arts, Cronyn Observatory Tours, March 2nd, 2017

The Apollo 11 landing on the Moon in 1969 and subsequent Apollo missions left various artifacts—ranging from flags and equipment to footprints by astronauts—on the lunar surface. NASA and some historical preservationists have called for declaring the Moon a World Heritage Site. Western University's Department of Visual Arts explored this question with its exhibition *"Protectorate 1: A Darker Side of the Moon"* March 2nd—16th, 2017, held in the Artlab Gallery, John Labatt Visual Arts Centre, with the opening reception, Thursday, March 2nd, 2017, 5:00—7:00 p.m. The opening reception included tours of Western University's Cronyn Observatory, 6:15—8:00 p.m.

Clear skies greeted 21 visitors for this Special Event at the Cronyn Observatory, including 19 people from the ArtLab Gallery exhibition in 2 groups of 12 and 7 people respectively. There were 2 additional guests, not associated with the ArtLab, who were also welcomed to the observatory. The Cronyn Observatory dome as well as the downstairs *"Black Room"* (with the *"Transit Demo"* model) and historic *"Period Room"* were open to the visitors. Graduate students Kendra Kellogg and Robin Arnason welcomed the visitors and Professor Robert Cockcroft showed 5 people from the second group around the *"Period Room"* but did not demonstrate the *"Transit Demo"* in the *"Black Room."*

RASC London Centre was represented by Everett Clark, Paul Kerans and Bob Duff. Robin Arnason showed visitors the 4-day-past-new crescent Moon and the planet Venus through the big 25.4cm refractor (28mm Meade Super Wide Angle eyepiece, 157X) in the dome. On the roof patio outside the dome Paul showed the visitors Venus—which appeared as a nice crescent—and the Orion Nebula (M42) and Everett showed them the Moon through the London Centre's home-built 30.5cm Dobsonian (17mm Nagler eyepiece, 88X). Everett also showed and explained to visitors the observatory's 8-inch (20.3cm) Meade Schmidt-Cassegrain set up without its tripod on the table inside the dome near the window on the north side.

Paul showed the visitors his chondrite (stony) and iron meteorites as well as his Moon and Mars meteorite samples in small plastic display cases. Paul had placed his lunar meteorite sample display case in a wooden block with a transparent *Lexan* polycarbonate sheet cover so that visitors could *"walk on the Moon."* The visitors were gone by 8:00 p.m. after an enjoyable evening of astronomy under clear skies.

For more information on Western University's Department of Visual Arts exhibition see the Department's News & Events Web page: Protectorate 1: A Darker Side of the Moon / Artlab:
https://www.uwo.ca/visarts/news/2017/01_03-ALProtectorate.html

Exploring the Stars, Thamesford 4-H Club, March 7th, 2017

Partly cloudy, later cloudy skies greeted 22 visitors (15 children and 7 adults / leaders) from the Thamesford 4-H Club, for Exploring the Stars at Western University's Cronyn Observatory, Tuesday, March 7th, 2017, 6:30 p.m. Graduate student Jeff Vankerkhove presented the digital slide presentation *"Our Solar System"* and fielded questions. Jeff followed this with the activity *"Kitchen Comet,"* making a comet from dry ice and other materials.

RASC London Centre member Bob Duff made ready the big 25.4cm refractor in the dome and, together with Jeff, set up the London Centre's home-built 30.5cm Dobsonian on the roof patio outside the dome. Jeff operated the 25.4cm refractor (28mm Meade Super Wide Angle eyepiece, 157X) showing the visitors the 2-day-past-first quarter gibbous Moon through hazy clouds and, later, the red lights on the communications tower in south London after the sky completely clouded out. Bob operated the 30.5cm Dobsonian (26mm Tele Vue Plossl eyepiece, 58X) and showed them the Moon and, later, a red light on the construction crane behind the Engineering building. Bob also gave a talk about the Cronyn Observatory and the 25.4cm refractor in the dome. The visitors were gone by around 8:15 p.m. after an enjoyable evening learning about astronomy and telescopes.

Exploring the Stars, Ilderton Girl Guides and Pathfinders, March 9th, 2017

Partly cloudy skies and cold weather greeted 26 visitors (18 children and 8 adults / leaders) from the Ilderton Girl Guides and Pathfinders, Thursday, March 9th, 2017, 6:30 p.m. They were welcomed by graduate students Kendra Kellogg and Viraja Khatu. Kendra presented the digital slide presentation *"The Scout / Guide Astronomy Badge"* and fielded questions. Kendra followed this with the activity *"Kitchen Comet,"* making a comet from dry ice and other materials.

RASC London Centre was represented by Paul Kerans and Bob Duff. When everybody arrived upstairs in the dome Kendra showed the visitors the 4-day-past-first quarter gibbous Moon through the big 25.4cm refractor (32mm Erfle eyepiece, 137X). Paul set up the London Centre's home-built 30.5cm Dobsonian on the roof patio outside the dome. Bob supervised as the visitors viewed the Moon through the 30.5cm Dobsonian (17mm Nagler eyepiece, 88X) and Paul later showed them the red giant star Betelgeuse.

Paul showed the visitors his chondrite (stony) and iron meteorites as well as his Moon and Mars meteorite samples in small plastic display cases. Paul invited the Guides and Pathfinders to *"walk on Mars"* and then *"walk on the Moon"* by placing on the floor of the observatory his Mars meteorite sample in a wooden block with a transparent *Lexan* polycarbonate sheet cover and then swapping in the lunar meteorite sample. The visitors were gone by 8:30 p.m. after an enjoyable evening of astronomy, despite the partly cloudy skies and cold weather.

NOTE:
Please see the on-line edition of the Polaris newsletter for any additional star night reports not included in this printed edition at:
http://www.rasclondon.ca/polaris-newsletter