

# POLARIS



## Royal Astronomical Society of Canada London Centre Newsletter November 2017

### Unique Observing Phenomena Everyone Can Experience

*Compiled By: Norman McCall*

So, you are interested in astronomy and observing phenomena related to our solar system and cosmos. No doubt there are more than enough items to observe to fill a lifetime or two. Ok, we only have one to live, but we could still fill another one observing the beauty of this universe if we had the means, time and money!

Here is a compilation of a few unique events we can pursue in our spare time to expand our life experience.

#### Iridium Flare



As the satellites of the Iridium cellular communication network orbits the Earth, their antennas sometimes catch the sunlight and reflect it down to the ground. If it's dark where you are and you happen to see this glint it can be

quite spectacular, especially if you aren't expecting it.

They last between 5 and 20 seconds so it is recommended to know their position in azimuth and elevation and the time of the flu-over. Check with Heavens Above (<http://www.heavens-above.com>) for more information.

#### Bright Pass of the ISS

Urban dwellers typically resign themselves to spotting the Moon, conspicuous planets and the brightest stars with the



unaided eye on a clear night, but did you know the brightest (and largest) artificial light in the night's sky is the 400-tonne International Space Station (ISS), a structure so large — 73 × 109 × 20

metres — that it can be seen the most light-polluted town or city.

If you have never yet seen an ISS flyover it is something that should be high on your list.

#### Earthshine

When you look at a crescent moon shortly after sunset or before sunrise, you can sometimes see not only the bright crescent of the moon, but also the rest of the moon as a dark disk. That pale glow on the unlit part of a crescent moon is light reflected from Earth's oceans and cloud tops. It's called earthshine. This one is easy to observe in the evening or early morning sky.

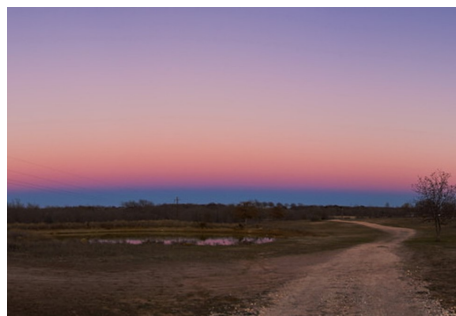


#### Earth's Shadow

Ok, so you have heard about earthshine but what about earth's shadow. I'm not talking about an eclipse. No, Earth's shadow as it is cast onto the atmosphere.

This phenomenon can be observed during the twilight hours, assuming the sky is clear and the horizon is relatively unobstructed. For example, at sunset the Earth's shadow is visible opposite the sunset in the eastern sky, just above the horizon. The shadow shows as a dark blue band that stretches over 180° of the horizon. It is most noticeable at the anti-solar point, exactly opposite the sunset.

At sunrise, the Earth's shadow is also seen in a similar way, but in the western sky. The Earth's shadow is best observed when there is a low horizon (such as over the sea),



and when the sky conditions are very clear. In addition, the higher up an observer is standing to view the horizon, the sharper the shadow appears.

At sunrise, the Earth's shadow can be seen to set as the sun itself rises, and at sunset, the Earth's shadow rises as the sun sets

*(Continued on page 2)*

## The Belt of Venus

In the right viewing conditions, a pink (or orange or purple) band is visible in the twilight sky just above the dark blue band of the Earth's shadow. (See previous picture.) This pink band is called the "anti-twilight arch" or "Belt of Venus". The Belt of Venus is part of Earth's upper atmosphere which is illuminated by the setting or rising sun on a clear night. It is visible either after the sun ceases to be visible (at sunset) or before the sun becomes visible (at sunrise).

The name of the phenomenon alludes to the cestus, a girdle or breast-band, of the Ancient Greek goddess of love, beauty pleasure and procreation - Aphrodite, customarily equated with the Roman goddess Venus. Maybe this is one solar event your partner will appreciate!

## Circumzenithal Arc

Lastly, there is the **circumzenithal arc**—although this could be classed as a “weather” event, it is still caused by the sun!

This colourful atmospheric phenomenon is only visible during the



daytime, high up overhead. These inverted rainbow-coloured arcs are located at the zenith and caused not by water droplets but by ice crystals in the upper atmosphere retracting sunlight. The most ideal time to

see a circumzenithal arc is when the sun is at a height of 22 degrees in the sky.

## A Sundog

A **sundog** or mock sun, is an atmospheric optical phenomenon that consists of a bright spot to the left and/or right of the Sun.



Two sun dogs often flank the Sun within a 22° halo and at the same altitude above the horizon as the Sun. It is an atmospheric phenomenon caused by the refraction of sunlight by ice

crystals in the atmosphere.

## Conclusion

So how many of these phenomena have you observed? Most likely there will be one or more missing from your list. As you only have one life to live, try to experience them all before your time runs out. Possibly make it an objective to get a photograph of each to have a record of the experience. Get started today by creating a list on your phone or computer today!

## R.A.S.C. London Centre Library — Books of the Month, October 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 November 2017 are as follows:

- *The Science of Shakespeare: A New Look at the Playwright's Universe*, by Dan Falk. C2014
- *In Search of Time: Journeys Along a Curious Dimension*, by Dan Falk. c2008.
- *Universe on a T-shirt: the Quest for the Theory of Everything*, by Dan Falk. c2002.

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://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](mailto:rduff@sympatico.ca)

## Fingal OBS2 News

The Celestron C14 telescope odyssey is finally over! The project was begun in mid July when a decision was reached to remove the C14 scope in Observatory 2 at Fingal to have haze cleaned from the inside corrector by returning the unit to Celestron in California. Due to a variety of issues with US customs the scope took a circuitous trip through various FedEx depots and finally arrived in CA on October 13<sup>th</sup> – one month after leaving London.

Celestron technicians were quite efficient in cleaning the haze (a known factory defect) and in fixing the damage caused when the scope was accidentally dropped by two adventurous club member (DUH). The unit was shipped back to us and arrived in London on November 3<sup>rd</sup>.

Upon inspection, Dale and Pete noted that Celestron had fully cleaned the optics and the scope looks like new. They also replaced the end ring at the front of the telescope, where the dovetail screws in. The dovetail now holds securely.

Celestron should be complemented on their service as they did not charge us for anything, even paying for the UPS shipping and the brokerage fees to get it back into Canada.

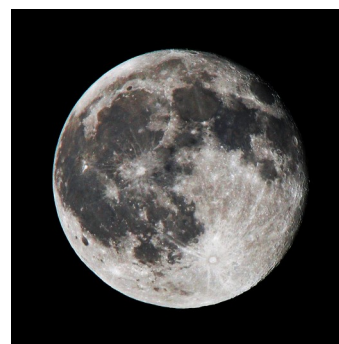
Pete and Dale installed it in the OBS 2 on the afternoon of Sunday November 12<sup>th</sup> and returned on November 14<sup>th</sup>, to clean the observatory caused by a variety of invasive wildlife. It was quite a filthy mess taking an hour to vacuum everything up, with Pete on the vacuum and Dale holding the flashlights.

The goal of this visit was to view a star and verify the optical performance. The unit now works well and focuses properly. The mirror-shift isn't any better than it was, and while this was mentioned to Celestron, it seems that this “feature” is considered normal. As the trip back from CA had affected its collimation another visit to Fingal is required to fine tune it.

The Executive are there pleased to announce OBS 2 and the C14 is now open for business! Thanks Pete and Dale for undertaking this task, their patience in dealing with UPS customs and their dedication to the club. We appreciate their commitment to resolving this issue.

## Sky Events for Late October and early November

Nov. 18 New Moon  
 Nov. 20 Mercury 7° S of Moon  
 Nov. 21 Saturn 3° S of Moon  
 Nov. 24 Mercury greatest elongation E (22°)  
 Nov. 26 Moon first quarter  
 Nov. 27 Neptune 1.2° N of Moon, occultation  
 Nov. 28 Mercury 3° S of Saturn  
 Dec. 3 Aldebaran 0.8° S of Moon, occultation . Full Moon  
 Dec. 8 Regulus 0.7° S of Moon, occultation  
 Dec. 10 Last Quarter  
 Dec. 14 Geminid meteors peak



### Planets

Mercury: Visible in the evening sky very early in December  
 Venus: Briefly visible in bright morning twilight early in the month .  
 Mars: Continues its ascension into the morning sky  
 Jupiter: Becomes more prominent in morning twilight throughout the month  
 Saturn: Too close to the Sun to be seen  
 Uranus: Well placed in evening sky in Pieces, setting after midnight  
 Neptune: In the western evening sky in Aquarius, setting in late evening

### Byron Northview Public School Star Night, Wednesday, October 18th, 2017

*By: Robert Duff*

Clear skies greeted some 60 enthusiastic children and parents for the Star Night at Byron Northview Public School, Wednesday, October 18<sup>th</sup>, 2017, 7:00 p.m. The Star Night involved some 40 children and 20 adults and was hosted by the grade-5 teacher.

RASC London Centre was represented by Peter Jedicke, Everett Clark and Bob Duff—who arrived later around 7:30 p.m. Everett helped Peter set up his home-built 40.6cm (16-inch) Truss-Tube Dobsonian in the school yard on the north edge of the playing field. The grade-5 teacher set up his 20.3cm Antares Dobsonian. Telescopes brought by families, included a Celestron 130mm Newtonian reflector and what appeared to be a 15cm alt-azimuth reflector on a pier mount. There was also a 60mm refractor.

Peter gave an outdoor digital slide presentation with the title “*Today’s Solar System.*” This was followed by observing as the sky darkened. Bob helped direct the 15cm alt-azimuth reflector towards Jupiter and then took charge of the teacher’s 20.3cm Antares Dobsonian for the rest of the evening. Bob showed people Saturn through the 20.3cm Antares Dobsonian, using the installed 20mm eyepiece (60X), and then swapped in his own 7mm Nagler (171.4X) for greater magnification. Bob also showed people the yellow and blue double star Albireo, the “Double-Double” star system Epsilon Lyrae and the Ring Nebula (M57) through the 20.3cm Antares Dobsonian (171.4X).

Peter showed people the Saturn, the Andromeda Galaxy (M31) and globular cluster M13 through his 40.6cm (16-inch) Truss-Tube Dobsonian, using a 35mm Panoptic eyepiece (52X), then swapping in a 15mm eyepiece (122X) for a better view of M13 at the end of the evening. The Star Night was over around 9:00 p.m. after a very enjoyable evening under clear skies.

### Cronyn Observatory Public Nights, Exploring the Stars & Special Events, October—November 2017

*By Robert Duff*

#### Cronyn Observatory Public Night, Monday, October 16<sup>th</sup>, 2017

A clear sky with cold weather greeted some 17 visitors to Western University’s Cronyn Observatory Public Night, Monday, October 16<sup>th</sup>, 2017, 7:00 p.m. Since it was a week-day public night, there was no slide presentation and visitors simply went upstairs into the dome, where they were greeted by graduate student Viraja Khatu and RASC London Centre members Everett Clark, Peter Jedicke and Bob Duff.

Viraja directed the big 25.4cm refractor (Meade 28mm Super Wide Angle eyepiece, 157X) towards Saturn, low in the western sky, early in the evening. She then directed the 25.4cm refractor to show visitors the yellow and blue double star Albireo and the “Double-Double” star system Epsilon Lyrae, with some assistance from Bob Duff. Seeing conditions were not very good despite the clear sky and Bob swapped in the 32mm Erfle eyepiece (137X) to try and get a sharper view of Epsilon Lyrae but the components of the 2 binary stars could not be resolved. Viraja then directed the 25.4cm refractor, with the help of Everett and Bob, towards globular cluster M13, which made a reasonably impressive view though the Erfle eyepiece (137X).

Peter called everybody’s attention to an International Space Station (ISS) pass (7:19—7:25 p.m.), reaching a maximum altitude of 35 degrees (7:22 p.m.) above the southwestern horizon, and an Iridium flare (7:44 p.m.), 48 degrees above the north-northeast horizon. (See: “*ISS – Visible Passes*” and “*Iridium Flares*” for London, Ontario, on *Heavens Above*: <http://www.heavens-above.com/>)

The visitors were impressed by the views through the big 25.4cm refractor despite the less than ideal seeing conditions. The observatory was closed down around 9:00 p.m. after the visitors had left.



### **International Observe the Moon Night, Cronyn Observatory, Saturday, October 28<sup>th</sup>, 2017**

Partly cloudy, clearing skies, greeted visitors to the Cronyn Observatory for the 8<sup>th</sup> Annual International Observe the Moon Night (InOMN), Saturday, October 28<sup>th</sup>, 2017, 5:00—9:00 p.m. This event was hosted by Western University's Centre for Planetary Science and Exploration (CPSX), in partnership with the Department of Physics and Astronomy, Western Engineering's Rocketry, the Canadian Lunar Research Network, the Planetary Society—London Chapter, and the London Centre of the Royal Astronomical Society of Canada (RASC London Centre).

The event organizer was Outreach Program Coordinator for Western University's Centre for Planetary Science and Exploration (CPSX) and Western University PhD graduate in astronomy, Parshati Patel. Graduate student Viraja Khatu helped plan the event, although she was not present. Cronyn Observatory Director Professor Jan Cami was there. Graduate student Amanda DeSouza gave out tickets for the Raffle Draw and counted visitors. The Planetary Society—London Chapter, Outreach Coordinator Kayle Hansen was at the welcome table.

The evening program included (1) Public Talks by Moon Experts, (2) Take a Trip to the Moon, (3) Edible Rock Analysis, (4) Lunar Puzzles, (5) Model Rockets, (6) Raffle Draw, and (7) Observing the Moon through Various Telescopes. There were an estimated 200 visitors (children and adults), including 140 people arriving, 5:00—7:00 p.m., based on the Raffle Draw ticket count by Amanda; and 50 more visitors counted at the door between 7:00—9:00 p.m.; plus a few more late arrivals for an estimated total of 200 visitors for the evening.

There were 3 digital slide presentations in the lecture room, 6:00—7:00 p.m., including (1) "*CSI – Moon*," by Dr. Phil Stooke, (2) "*How to Make a Moon: the Origin of Our Moon and Its Unique Formation*," by graduate student Patrick Hill, and (3) "*Mapping the Lunar Surface*," by graduate student Zachary Morse.

Activities downstairs in the "*Black Room*" included the (1) "Edible Rock Analysis"; and the (2) Rocket Design / Launch Activity (run by Western University Engineering, Rocketry). Graduate student Elise Harrington demonstrated the "*Sotellunium*"—a mechanical eclipse demonstration model—as visitors explored the historic "*1940s Period Room*," a recreation of Dr. H. R. Kingston's 1940 office designed by RASC London Centre member Mark Tovey.

Graduate student Jeff Vankerkhove was telescope operator in the dome and began by directing the big 25.4cm refractor (Meade 28mm Super Wide Angle eyepiece, 157X) to show visitors the communications tower in south London, and later the one-day-past-first-quarter Moon. RASC London Centre was represented by Peter Jedicke, Everett Clark, Steve Imrie, Norm McCall, Bob Duff (who arrived 6:45 p.m.) and youth member Jacob Renders, with his father. Steve showed visitors the Moon through the London Centre's home-built 30.5 Dobsonian (18mm Radian eyepiece, 83X). Peter, Everett and Jacob took turns operating the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), showing visitors the Moon. The observatory was closed down by around 9:00 p.m. after a very enjoyable evening for the visitors, observing through telescopes and learning about the Moon.

### **Exploring the Stars, Matthews Hall STEM Club, November 2<sup>nd</sup>, 2017**

Cloudy skies with some light rain greeted 48 visitors (23 children and 25 adults) from the Matthews Hall School STEM Club, for Exploring the Stars at Western University's Cronyn

Observatory, Thursday, November 2<sup>nd</sup>, 2017, 6:30 p.m. They were welcomed by graduate students Viraja Khatu and Amanda DeSouza. Viraja presented the digital slide presentation "*The Stuff of Stars*" and fielded questions. This was followed with the "*Constellations Activity*" with Viraja and Amanda distributing some 24 "*Star Finder*" planispheres to the children and the teacher, and then helping them put together the planispheres with adhesive tape. Viraja then demonstrated to the visitors how to use the planispheres.

The visitors were then divided into 2 groups, with one group going upstairs for a tour of the dome with RASC London Centre members Everett Clark and Bob Duff, and the other downstairs into the "*Black Room*" for demonstrations of the "*Transit Demo*" and "*Spectroscopy Demo*." The 2 groups then traded places between the dome and the downstairs "*Black Room*."

Downstairs in the "*Black Room*" Viraja did the "*Transit Demonstration*" activity, showing them the "*Transit Demo*" model—demonstrating the transit detection method for finding extra-solar planets. Amanda did the "*Spectroscopy Demo*," with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps set out on the table, including: hydrogen, helium, neon and mercury. Viraja and Amanda gave 2 demonstrations of the "*Transit Demo*" and "*Spectroscopy Demo*," one to each group.

Since cloudy damp weather ruled out opening the dome, Everett set up the observatory's 8-inch (20.3cm) Meade Schmidt-Cassegrain (20mm Plossl eyepiece, 100X) inside the dome so as to view the TV screen in the Western Sports & Recreation Center windows, through the door to the observation deck. Bob gave 2 talks, one to each group as they arrived upstairs, on the history of the Cronyn Observatory and technical aspects of the 25.4cm refractor, including the Cassegrain Reflector telescope and Schmidt Camera piggy-backed on the main telescope. Bob also explained the 2 clocks on the observatory's east wall and the difference between Standard and Sidereal Time.

The children and adults lined up to view through the 20.3cm Schmidt-Cassegrain and asked many questions of Everett and Bob. The visitors were gone by around 8:30 p.m. after an enjoyable evening learning about astronomy and telescopes despite the cloudy, rainy weather.

### **Exploring the Stars, Knox Presbyterian Church Youth Group, November 3<sup>rd</sup>, 2017**

A mostly clear sky greeted 13 visitors (6 children and 7 adults) from the Knox Presbyterian Church Youth Group, for Exploring the Stars at Western University's Cronyn Observatory, Friday, November 3<sup>rd</sup>, 2017, 7:00 p.m. Graduate student Jeff Vankerkhove presented the digital slide presentation "*Constellations*" and fielded questions. This was followed with the "*Constellations Activity*," with Jeff distributing 13 "*Star Finder*" planispheres and helping the visitors put them together with adhesive tape. Jeff showed the slide "*Reading a Star Finder*" followed by 2 slides of constellations to help them learn how to use the planispheres.

RASC London Centre was represented by Everett Clark, Bob Duff and Dale Armstrong. Everett directed the big 25.4cm refractor (52mm Erfle eyepiece, 84X) in the dome to show visitors the nearly full Moon in the eastern sky. (Full Moon was on November 4<sup>th</sup>, 1:23 a.m.) Everett later swapped in the Meade 28mm Super Wide Angle eyepiece (157X) to show the visitors the Ring Nebula (M57) through the 25.4cm refractor.

Bob Duff set up the London Centre's 25.4cm Dobsonian on the observation deck outside the dome and showed the visitors the "Double-Double" star system Epsilon Lyrae (6mm Ortho eye-

piece, 186X). Bob also directed the 25.4cm Dobsonian towards Albireo (18mm Radian eyepiece, 62X). Dale Armstrong and Everett set up the observatory's 8-inch (20.3cm) Meade Schmidt-Cassegrain on the observation deck. Dale showed visitors Albireo and the globular cluster M15, through the 20.3cm Schmidt-Cassegrain (15mm Sky-Watcher Ultra-Wide eyepiece, 133X). The visitors were gone by around 8:50 p.m. after expressing their appreciation and thanks for a very enjoyable and informative evening of astronomy.

### **Exploring the Stars, Canadian Science and Technology Historical Association, November 3<sup>rd</sup>, 2017**

The skies were mostly clear for 3 visitors from the Canadian Science and Technology Historical Association for Exploring the Stars at Western University's Cronyn Observatory, Friday, November 3<sup>rd</sup>, 2017, 10:00 p.m. (This was following the earlier group from Knox Presbyterian Church Youth Group, scheduled, 7:00—9:00 p.m.)

The 3 visitors from the Canadian Science and Technology Historical Association were greeted by graduate student Viraja Khatu and RASC London Centre members Dale Armstrong, Everett Clark and Bob Duff. Viraja presented the digital slide presentation "*Telescopes*" and fielded questions. This was followed by a tour of the dome, with Dale giving a talk on the history of the Cronyn Observatory and the technical development of telescopes, as well as the Perkin-Elmer company that made the big 25.4cm refractor. Dale also explained the Cassegrain Reflector telescope and Schmidt Camera piggy-backed on the 25.4cm refractor and the Standard and Sidereal Time clocks on the east wall of the dome. Everett showed them the full Moon (Full Moon was on November 4th, 1:23 a.m.) through the 25.4cm refractor, using the Meade 28mm Super Wide Angle eyepiece (157X) and then the 52mm Erfle (84X) eyepiece.

The visitors were also given an informal tour of the historic "*1940s Period Room*" and "*1967 Period Room*," with Dale and the others answering questions. (Both "*Period Rooms*" were designed by RASC London Centre member Mark Tovey.) The group was gone by around 11:15 p.m. after expressing their appreciation for a historic tour of the Cronyn Observatory and the opportunity to view the Moon through the 25.4cm refractor in the dome.

### **Exploring the Stars, The London School, November 7<sup>th</sup>, 2017**

Partly cloudy skies greeted 12 visitors (10 students and 2 teachers) from The London School, Grades 8, 9 and 11, for Exploring the Stars at Western University's Cronyn Observatory, Tuesday, November 7<sup>th</sup>, 2017, 12:00 Noon—2:00 p.m. Graduate student Viraja Khatu presented the digital slide presentation "*Black Holes*" and fielded questions. Viraja followed this with the "*Crater Experiment*" activity, which involved dropping various size balls into a pan—placed on the floor—filled with chocolate powder to demonstrate impact cratering.

Viraja had set up the observatory's 90mm Coronado H-alpha solar telescope on the Sky-Watcher EQ5 equatorial mount on the observation deck outside the dome. RASC London Centre member Bob Duff centered the Sun in the field of view of the 90mm Coronado, using the CEMAX 25mm eyepiece (32X), and then swapped in the 18mm (44X) and 12mm (66.7X) CEMAX eyepieces for a better view of prominences and filaments on the Sun. However, clouds periodically obscured the Sun, which was eventually completely clouded out by the time the visitors arrived in the dome.

Bob gave a talk on the history of the Cronyn Observatory and the technical aspects of the big 25.4cm refractor in the dome as well how the London Centre's 25.4cm Dobsonian reflector telescope and the 90mm Coronado H-alpha solar telescope worked. Since the cloudy sky ruled out observing the Sun through the 90 mm Coronado, Viraja and Bob directed the 25.4cm refractor (32mm Erfle eyepiece, 137X) to show the visitors the communications tower in south London.

Viraja then brought the visitors downstairs into the "*Black Room*," where she showed them the "*Spectroscopy Demo*," inviting the visitors to put on *diffraction grating* glasses and view the spectra of 4 gas discharge lamps set up on the table, including: hydrogen, helium, neon and mercury. The visitors were gone by around 2:00 p.m. after an interesting afternoon black holes, impact craters, telescopes, solar observing and spectroscopy, despite the cloudy sky.