

# POLARIS



## Royal Astronomical Society of Canada London Centre Newsletter February 2015

### Astronomy Math

Patrick Whelan

Whether you know it or use it, our hobby has lots of math.

When we talk about telescopes, we usually use mirror or lens size, focal length and f ratio.

The f ratio is:  $f = (\text{focal length}) / (\text{mirror diameter})$

Or rearranged:  $\text{focal length} = (f \text{ ratio}) * (\text{mirror diameter})$ .

If someone says they have a 200mm f4 telescope, you know the focal length is 800mm. (Let's abbreviate focal length to fl for now)

Quite often people want to know what the magnification is when looking through the telescope. Easy!

$\text{Magnification} = (\text{fl telescope}) / (\text{fl eyepiece})$

If your telescope has an fl of 800mm and your eyepiece is 20mm, the magnification is  $800/20=40x$  (40x means 40 times magnification)

There are many types of eyepieces. They have different 'apparent fields of view'. (afov) What does this mean? When you look through an eyepiece, the circle you see inside has a certain size to it. Here are some common afov's:

Orthoscopic: 40-45 degrees

Plossl: 50 degrees

Super Plossl: 60 degrees

Super Wide: 68 degrees

Ultra Wide: 80 degrees

Super Ultra Wide: 100 degrees

You can see that looking into a orthoscopic would be akin to looking into a big straw, while looking into a super ultra wide you might not be able to see the entire view without moving your eye around!

When you look through the eyepiece, how big a piece of sky are you actually seeing? That is the true field of view. You calculate it like this:  $\text{fov} = (\text{afov}) / (\text{magnification})$

In the example above, we calculated the magnification for the 20mm eyepiece to be 40x. If that eyepiece had an afov of 60 degrees, the true field of view would be  $60/40$  or 1.5 degrees of sky.

Yet another property of using a telescope with an eyepiece is the 'exit pupil'. This is the minimum size of the light cone that emerges from the eyepiece. If the exit pupil is bigger than your actual pupil, this means that all the light cannot enter your eye. For this reason an exit pupil of over 7mm is

usually considered bad or wasteful. Of course as you get older your pupil won't expand 7mm any more, it is smaller. So perhaps over 6mm would be wasteful.

You can calculate the exit pupil two different ways:

$\text{Exit pupil} = (\text{diameter of mirror}) / (\text{magnification})$

Or  $\text{exit pupil} = (\text{fl of eyepiece}) / (f \text{ ratio of telescope})$

In our example it would be:

$200\text{mm}/40x=5\text{mm}$  exit pupil

$20\text{mm}/f4=5\text{mm}$  exit pupil

The first calculation is best for binoculars since you probably won't know the eyepiece focal length or f ratio for the binoculars.

Now you have all the tools you need to analyze your telescope/eyepiece collection. Why not create a spreadsheet and calculate the magnifications and apparent field of views and exit pupils for all of them? (I know I have.)

We usually think of distances in terms of kilometers. In astronomy we use different units. For example our Earth is 149,597,871 kilometers from the Sun. (on average) This is also called 1 AU. (astronomical unit) We then measure the distance of other planets from the Sun in terms of AU:

Mercury: 0.39 AU

Venus: 0.72 AU

Mars: 1.52 AU

Jupiter: 5.20 AU

1 Light Hour: 7.2 AU

Saturn: 9.58 AU

Uranus: 19.23 AU

Kuiper Belt: 30 AU to 52 AU

Neptune: 30.10 AU

Pluto: 39.3 AU

Voyager 1: 125 AU (as of August 2013)

Oort Cloud: 2,000 to 75,000 AU

Proxima Centauri: 230,000 AU (nearest star)

Another way to talk of distance is how far light travels in a given time. One light hour is 7.2 AU and one light year is 63,241 AU! (or 9,460,730,472,580 km) When you read astronomy articles about the galaxy or the universe they will usually talk about distances in light years.

## Moon Phases



February 3 2015



February 12 2015



February 18 2015



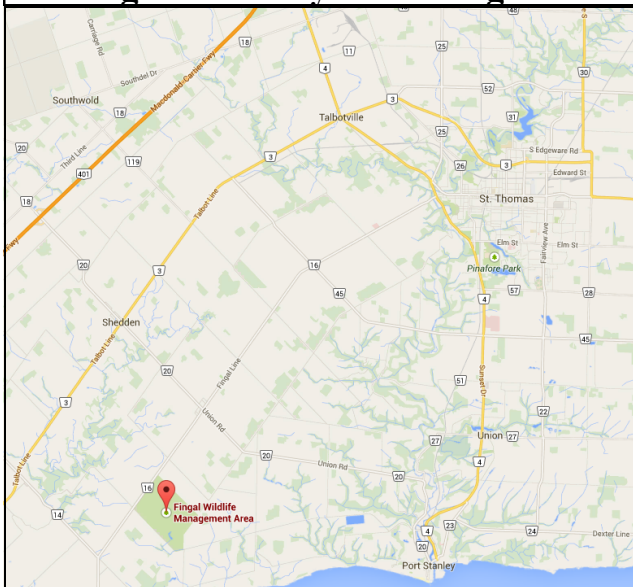
February 25 2015

### February

Our guest speaker for February will be Dr. Tina Pollman from SNOLAB+ in Sudbury. Her talk is titled "Dark Matter detection with DEAP-3600"

Just about everything in the universe, from stars to galaxy clusters, moves faster and is more structured than the amount of visible matter allows for. We believe that these structures were pulled together and are now maintained by the gravitational pull of vast amounts of Dark Matter, a new form of matter never yet observed in the laboratory.

## Fingal Dark Sky Observing Site



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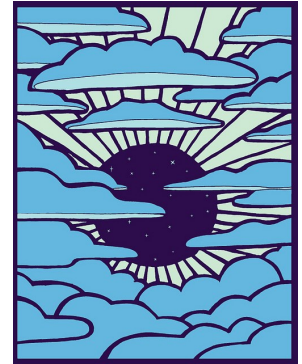
### Youth Programs

London RASC Website: <http://www.rasclondon.ca/>

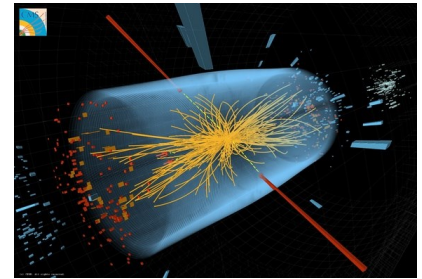
London RASC Forums: <http://forums.rasclondon.ca/>

## Sky Events for Late February and Early March

February 21 Mars 1.5° S of Moon  
 February 21 Venus 0.5° S of Moon  
 February 21 Uranus 0.3° S of Moon  
 February 24 Mercury greatest elongation W  
 February 25 Aldeberan 1.0° S of Moon  
 February 26 Double shadow transit on Jupiter  
 March 8 Daylight saving time begins  
 March 8 Zodiacal light visible in Northern latitudes in the W after evening twilight for next 2 weeks  
 March 9 Juno stationary  
 March 11 Mars 0.3° N of Uranus  
 March 17 Mercury 1.6° S of Neptune  
 March 19 Large tides  
 March 20 Total solar eclipse (not visible in Canada, well a bit in Nunavut)



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 February 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 February 2015 are as follows:

In Search of Time: Journeys Along a Curious Dimension, by Dan Falk. c2008.

The Infinite Journey: Eyewitness Accounts of NASA and the Age of Space, written by William E. Burrows.  
New York: Discovery Books, c2000. – (Discovery Books)

Uncovering the Secrets of the Red Planet: Mars, by Paul Raeburn. Foreword and Commentary by Matt Golombek. –  
Washington, D.C.: National Geographic Society, c1998.  
+ 2 pairs 3-D glasses enclosed in back cover.

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](mailto:rduff@sympatico.ca)

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## **Exploring the Stars & Cronyn Observatory Public Night, January 13th—February 10th, 2015**

**By Robert Duff**

### **Exploring the Stars, Monseigneur-Bruyere School, January 13th, 2015**

Clear skies and cold weather greeted 10 visitors from the French language Monseigneur-Bruyere Catholic Secondary School (for Grades 7-12), including 7 students and 3 adults for Exploring the Stars at the Cronyn Observatory, Tuesday, January 13th, 2015, 6:30 p.m. Graduate student Shannon Hicks made the digital slide presentation “Extra Solar Planets” and fielded questions. Shannon followed this with the activity “Kitchen Comet,” inviting everybody to the table set up at the front of the lecture room where she created a comet from dry ice and other ingredients.

RASC London Centre was represented by Everett Clark, Tricia Colvin, Bob Duff and Dave McCarter. Dave brought the London Centre’s 25.4cm Dobsonian with a newly installed 2-inch focuser, replacing the old worn and damaged one. Before he left Dave located Comet Lovejoy with the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), which was west of Aldebaran and south of the Pleiades. Everett shovelled enough snow from the roof patio to set up the Observatory’s 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain on the west side beside the London Centre’s 25.4cm Dobsonian.

When everybody arrived upstairs in the dome, Bob gave a talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor. He also explained the 2 clocks on the east wall of the dome and the difference between Standard and Sidereal Time. Ice and snow prevented the dome from being opened and Tricia supervised as visitors viewed Comet Lovejoy through the London Centre’s 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). Clouds of steam from Western University’s heating plant towards the east interfered with observing Comet Lovejoy and at one point Tricia lost Comet Lovejoy and then recovered it again. Since it was impossible to view the Orion Nebula (M42) because of the clouds of steam from the heating plant, Bob showed visitors the star Sirius—twinkling brightly, low in the southeast—through the 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain (26mm Plossl eyepiece, 77X). The visitors were gone by around 8:30 p.m. after a very enjoyable evening learning about astronomy and observing through telescopes.

### **Exploring the Stars, 2nd St. Thomas Brownies, January 14th, 2015**

Mostly clear, slightly hazy skies with a few clouds, greeted 49 visitors, including 28 children and 21 adults (not counting one infant) from the St. Thomas Brownies for Exploring the Stars at the Cronyn Observatory, Wednesday, January 14th, 2015, 6:30 p.m. Graduate student Tony Martinez made the digital slide presentation “The History of Space Exploration” and included a short video about the Rosetta mission by ESA. Tony fielded many questions from the audience. After everybody had gone

upstairs into the dome, Tony gave 20 “Star Finder” planispheres to some of the leaders and showed them how to assemble and use them.

RASC London Centre was represented by Bob Duff, later joined by Tricia Colvin. Bob set up the London Centre’s 25.4cm Dobsonian on the roof patio outside the dome and located Comet Lovejoy, which made a splendid view in the 17mm Nagler eyepiece (66X). Comet Lovejoy was west of Aldebaran and south of the Pleiades. Bob also directed the big 25.4cm refractor in the dome towards the Orion Nebula (M42), installing the 32mm Erfle eyepiece (137X) with the 2-inch Orion UltraBlock Narrowband Light Pollution filter to improve contrast. When everybody arrived upstairs in the dome, Bob gave a talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor.

Bob then invited everybody to form 2 groups with one going out on the roof patio where Tricia supervised as they viewed Comet Lovejoy through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). The other group viewed the Orion Nebula (M42) through the big 25.4cm refractor (32mm Erfle eyepiece, 137X) supervised by Bob sitting at the top of the observing ladder. The Orion Nebula made a fine sight through the Orion UltraBlock Narrowband Light Pollution filter. People were able to view the Comet and the Orion Nebula as they went inside and outside the dome to view through both telescopes. The visitors were gone by around 8:20 p.m. after a very enjoyable evening of astronomy.

### **Exploring the Stars, 36th London Sparks, January 15th, 2015**

Cloudy skies greeted 30 visitors, including 16 children and 14 adults, from the 36th London Sparks for Exploring the Stars at the Cronyn Observatory, Thursday, January 15th, 2015, 6:00 p.m. Graduate student Parshati Patel made the digital slide presentation “Constellations” and fielded questions. She followed this with the activity “Constellations,” distributing 14 “Star Finder” planispheres and showing the slide “Reading a Star Finder.” Parshati also demonstrated the sky charting software “Stellarium” and explained how it could be downloaded for free to an iPad or cell phone.

RASC London Centre was represented by Everett Clark, Tricia Colvin and Bob Duff. Bob gave a talk about the history and technical aspects of the big 25.4cm refractor, using the 32mm Erfle eyepiece (137X) to help demonstrate, and also explained the Standard and Sidereal Time clocks on the east wall. Everett had set up the London Centre’s 25.4cm Dobsonian telescope (17mm Nagler eyepiece, 66X) inside the dome so as to view out the door and Bob directed it so as to view a compressed gas canister with gauges visible in the window of the nearby Engineering building to the south. Parshati supervised as the children viewed through the 25.4cm Dobsonian. Everybody was gone by around 7:30 p.m. after a very enjoyable evening of astronomy, despite the cloudy weather.

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### **Exploring the Stars, Northdale Central Public School, January 20th, 2015**

Clear skies and cold weather greeted 38 visitors (24 children and 14 adults) from the Northdale Central Public School (Dorchester) Grade-6 class for Exploring the Stars at the Cronyn Observatory, Tuesday, January 20th, 2015, 7:00 p.m. Graduate student Tony Martinez made the digital slide presentation “Our Solar System.” Tony followed this with the activity “Kitchen Comet,” creating a comet from dry ice and other ingredients.

Visiting Astronomy 2021 student Mike Labiak was interested in volunteering and assisted Tony by bringing more water to get the dry ice and other comet ingredients to stick together. The comet billowed clouds of water vapour, condensed from the extremely cold carbon dioxide gas evaporating from the dry ice—much to the delight of the visitors!

RASC London Centre was represented by Everett Clark, Tricia Colvin and Bob Duff.

Everett made ready the big 25.4cm refractor in the dome (32mm Erfle eyepiece, 137X), directing it towards the Pleiades (M45) star cluster. Everett also set up the London Centre’s 25.4cm Dobsonian (17mm Nagler eyepiece (66X). Tricia located Comet Lovejoy with the 25.4cm Dobsonian, which made a fine sight in the 17mm Nagler eyepiece (66X) field of view. Bob redirected the 25.4cm refractor towards the Orion Nebula (M42) and installed the 2-inch Orion UltraBlock Narrowband Light Pollution filter in the 32mm Erfle eyepiece (137X) to improve contrast.

When the visitors arrived upstairs in the dome, Bob gave a talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor. He also explained the Standard and Sidereal Time clocks on the east wall. Bob then invited everybody to form 2 groups with one going out on the roof patio where Tricia supervised as they viewed Comet Lovejoy through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). The other group viewed the Orion Nebula (M42) through the big 25.4cm refractor (32mm Erfle eyepiece, 137X) supervised by Everett. The visitors were able to view the Orion Nebula and Comet Lovejoy as they went inside and outside the dome to view through both telescopes. The visitors were gone by around 8:30 p.m. after a very enjoyable evening of astronomy.

### **Exploring the Stars, 85th London Pathfinders, January 21st, 2015**

Cloudy skies with snow flurries greeted 19 visitors from the 85th London Pathfinders (Girl Guides), including 17 children and 2 adult for Exploring the Stars at the Cronyn Observatory, Wednesday, January 21st, 2015, 6:30 p.m. Graduate student Shannon Hicks made the digital slide presentation “Constellations” and fielded questions.

RASC London Centre was represented by Everett Clark, Tricia Colvin and Bob Duff. Since snow flurries ruled out opening the dome, Everett set up the London Centre’s 25.4cm Dobsonian telescope (17mm Nagler eyepiece, 66X) near the door to the roof patio. When the visitors

arrived upstairs in the dome, Bob gave a talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor, using the 32mm Erfle eyepiece (137X) for demonstration. He also explained the Standard and Sidereal Time clocks on the east wall. Bob called everybody’s attention to the London Centre’s 25.4cm Dobsonian and explained the difference between a reflector and refractor telescope. He then invited everybody to view the wind turbine on the nearby Engineering building to the south through the 25.4cm Dobsonian. Tricia supervised as the visitors lined up to view the wind turbine through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), which was set up just inside the dome door.

After everybody had returned downstairs to the lecture room, Shannon presented the activity “Constellations,” distributing 17 “Star Finder” planspheres. Shannon helped them assemble the planspheres and showed the slide “Reading a Star Finder” and several slides of constellations to help them learn how to use them. The visitors were gone by around 8:30 p.m. after a very enjoyable evening of astronomy despite the cloudy sky and snow flurries.

### **Exploring the Stars, 1st Ilderton Sparks, January 22nd, 2015**

Clear skies, later clouding over, greeted 25 visitors from the 1st Ilderton Sparks, including 13 children and 12 adults, for Exploring the Stars at the Cronyn Observatory, Thursday, January 22nd, 2015, 6:00 p.m. Graduate student Parshati Patel made the digital slide presentation “The Guide Astronomy Badge” and followed this with the activity “Constellations” distributing 14 “Star Finder” planspheres.

RASC London Centre was represented by Everett Clark, Tricia Colvin and Bob Duff.

Astronomy 2021 student Mike Labiak was also there as a volunteer. Everett made ready the big 25.4cm refractor in the dome (18mm Radian eyepiece, 244X) and directed it towards the 2-day-old crescent Moon in the southwest, but it was soon obscured by clouds. Bob set up the London Centre’s 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) on the roof patio outside the dome and directed it towards the wind turbine on the nearby Engineering building to the south.

When everybody arrived upstairs in the dome, Bob gave a talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor. He also explained the Standard and Sidereal Time clocks on the east wall. Since the sky was clouded out, Bob supervised as children and adults viewed the wind turbine on the nearby Engineering building through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) set up on the roof patio outside the dome.

After everybody had returned downstairs to the lecture room, Parshati spent some time answering questions. The visitors were gone by around 7:30 p.m. after a very enjoyable evening of astronomy despite the sky clouding over.

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### **Cronyn Observatory Public Night, Monday, January 26th, 2015**

Hazy, cloudy skies, later cloudy, and cold temperature greeted 39 visitors to the Western University's Cronyn Observatory Public Night, Monday, January 26th, 7:00 p.m. The event was especially intended for students on campus, with observing only and no slide presentation.

Graduate student Parshati Patel, Shannon Hicks and Emily McCullough operated the big 25.4cm refractor in the dome. They directed the big 25.4cm refractor (52mm Erfle eyepiece, 84X) towards the First Quarter Moon, visible through thin clouds and occasionally obscured completely. Emily later swapped in the 32mm Erfle eyepiece (137X) for a better view of the Moon through the 25.4cm refractor.

RASC London Centre was represented by Tricia Colvin, Mark Tovey, Bob Duff and Peter Jedicke. Tricia set up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) and Mark and Tricia supervised as visitors viewed the Moon through the thin and occasionally obscuring clouds. Emily hauled out the framed composite photographic portrait of the Moon from the storage room and leaned against the wall and Emily and Bob explained craters and other lunar features to several of the visitors. Most everybody was gone by around 8:45 p.m. except for 2 student visitors who arrived before 9:00 p.m. Parshati and Shannon took them upstairs for a tour of the dome. Tricia, Mark, Peter, Bob and Emily departed for home with Emily bringing the A-frame Cronyn sign indoors. It was an enjoyable and informative evening of astronomy for the visitors, despite the hazy clouds and cold weather.

### **Exploring the Stars, Northdale Central Public School, January 27th, 2015**

Clear skies and cold weather greeted 42 visitors (22 children and 20 adults) from the Northdale Central Public School (Dorchester) Grade 5-6 class for Exploring the Stars at the Cronyn Observatory, Tuesday, January 27th, 2015, 7:00 p.m. Graduate student Tony Martinez made the digital slide presentation "The Solar System Including Small Bodies" and fielded questions.

RASC London Centre was represented by Everett Clark, Tricia Colvin, Mark Tovey and Bob Duff. Everett made ready the big 25.4cm refractor in the dome (32mm Erfle eyepiece, 137X), directing it towards the one-day-past-first-quarter Moon. Tricia and Mark set up the London Centre's 25.4cm Dobsonian on the roof patio outside the dome and Tricia located Comet Lovejoy, which made a fine sight in the 17mm Nagler eyepiece (66X). Tricia, Mark and Everett also set up the Observatory's 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain (20mm Plossl eyepiece, 100X) on the roof patio and Everett directed it towards Jupiter in the eastern sky. Jupiter made a fine site in the 20.3cm Schmidt-Cassegrain as it gradually rose above the billows of steam from the heating plant. The cloud belts on Jupiter's surface were clearly visible along with the 4 Galilean moons—Io, Europa, Ganymede and Callisto—to the left (west) and from nearest to furthest

from the planet.

When everybody arrived upstairs in the dome, Bob gave a talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor. He also explained the Standard and Sidereal Time clocks on the east wall. Bob then invited everybody to form 2 groups with one group going out on the roof patio to view Comet Lovejoy through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), supervised by Tricia, and Jupiter through the 20.3cm Schmidt-Cassegrain (20mm Plossl eyepiece, 100X), supervised by Mark. The other group viewed the Moon through the big 25.4cm refractor (32mm Erfle eyepiece, 137X) in the dome, supervised by Everett. Everett soon swapped in the 52mm Erfle eyepiece, 84X) for a better view of the Moon. Towards the end of the evening Everett redirected the big 25.4cm refractor towards Jupiter and again swapped in the 32mm Erfle eyepiece (137X) for a better view. The visitors thanked everybody before leaving around 9:00 p.m. after a very enjoyable evening of astronomy.

### **Exploring the Stars, Kids Learning Connections, January 28th, 2015**

Hazy skies greeted 18 visitors, including 10 children (ages 6-14) and 8 adults, from the homeschoolers group Kids Learning Connections to the Cronyn Observatory for Exploring the Stars, Wednesday, January 28th, 6:30 p.m. Graduate student Dilini Subasinghe made the digital slide presentation "The Small Bodies in Our Solar System" and followed this with the activity "Kitchen Comet," making a comet from dry ice and other materials.

Bringing everybody upstairs into the dome, Dilini gave a brief talk on the history of the Cronyn Observatory. She then showed them the 2-day-past-first quarter gibbous Moon through the big 25.4cm refractor (32mm Erfle eyepiece, 137X). However, Jupiter was too low in the eastern sky to observe at the time for the big 25.4cm refractor. The children were also interested in the sky charting software "Starry Night Pro" which Dilini had opened on the computer and they played with it while waiting to view through the telescope. The group was interested in seeing Comet Lovejoy but the sky became quite hazy while they were observing the Moon and the comet was not seen.

RASC London Centre member Tricia Colvin arrived around 7:40 p.m., although by this time half the visitors were gone and Dilini was in the process of closing down the telescope. Tricia stayed until everybody had left, talking with some of the visitors and showing them (not with a telescope, but pointing out) where Jupiter was in the sky. All the visitors were gone by 8:00 p.m. after an interesting evening of astronomy.

### **Exploring the Stars, Northdale Central Public School, January 29th, 2015**

#### **Report by Mark Tovey, Edited by Robert Duff**

Cloudy skies greeted 23 visitors (13 children and 10 adults) from the Northdale Central Public School (Dorchester) Grade 6 class for Exploring the Stars at the Cronyn Observatory, Thursday,

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January 29th, 2015, 7:00 p.m. Graduate student Parshati Patel made the digital slide presentation "Our Solar System," which included small bodies, and fielded questions. Parshati followed this by the activity "Kitchen Comet."

RASC London Centre was represented by Everett Clark, Tricia Colvin, and Mark Tovey. Everett set up the London Centre's 25.4cm Dobsonian on the roof patio outside the dome. When everybody arrived upstairs in the dome, Mark talked about the history of the Cronyn Observatory and Parshati discussed some technical aspects of the big 25.4cm refractor.

Due to the cloudy weather conditions, visitors were invited to view the wind turbine on the nearby Engineering building to the south. This was done through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), supervised by Tricia, and assisted by Mark. Everett, Tricia, and Mark put away the Dobsonian once visitors finished observing, around 8:45 p.m., after an enjoyable evening of astronomy.

#### **Exploring the Stars, 81st and 98th London Girl Guides, February 3rd, 2015**

Cloudy skies with occasional snow flurries greeted 22 visitors (14 children and 8 adults) from the 81st and 98th London Girl Guides for Exploring the Stars at the Cronyn Observatory, Tuesday, February 3rd, 2015, 6:30 p.m. Graduate student Tony Martinez made the digital slide presentation "The Scout / Guide Astronomy Badge." Tony followed this with the activity "Telescope Kits," with the children assembling small telescopes from reusable kits.

RASC London Centre was represented by Mark Tovey and Tricia Colvin, with Bob Duff arriving later around 8:13 p.m. When everybody arrived upstairs in the dome, Mark gave a talk about the big 25.4cm refractor in the dome and also about the London Centre's 25.4cm Dobsonian, set up just inside the door to the roof patio. Due to the cloudy weather and snow flurries the Guides were invited to view the wind turbine on the nearby Engineering building to the south. Tricia supervised as the visitors lined up to view the wind turbine through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), which was set up just inside the dome door. Tricia and Mark put away the 25.4cm Dobsonian after everybody had viewed through it and the visitors were gone by around 8:30 p.m. after an enjoyable evening learning about astronomy.

#### **Exploring the Stars, Northdale Central Public School, February 4th, 2015**

Cloudy skies greeted 21 visitors (13 children and 8 adults) from the Northdale Central Public School (Dorchester) Grade-6 class for Exploring the Stars at the Cronyn Observatory, Wednesday, February 4th, 2015, 7:00 p.m. Graduate student Dilini Subasinghe made the digital slide presentation "Our Solar System" and fielded questions. Dilini 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 Mark Tovey, Tricia Colvin and Bob Duff. Mark set up the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) inside the door leading to the roof patio outside the dome. 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 and explained the Standard and Sidereal Time clocks on the east wall. He also demonstrated the 25.4cm Dobsonian and explained the difference between a reflector and refractor telescope. Since cloudy skies and snow on the roof ruled out opening the dome, Mark supervised as the visitors viewed the wind turbine on the Engineering building through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X), set up just inside the door leading to the roof patio outside the dome. The visitors were gone by 8:30 p.m. after an interesting and enjoyable evening learning about astronomy, despite the cloudy skies.

#### **Exploring the Stars, Masonville Cub Scouts, February 5th, 2015**

Clear skies and cold weather greeted 26 visitors from the 77th Masonville Cub Scouts for Exploring the Stars at the Cronyn Observatory, Thursday, February 5th, 2015, 7:00 p.m. There were 20 children—including 19 Cubs—and 6 adults for a total of 26 visitors. Graduate student Parshati Patel made the digital slide presentation "The History of Space Exploration" and fielded questions. Parshati followed this with the activity "Telescope Kits," with the 19 Cubs assembling 16 small telescopes from reusable kits.

RASC London Centre was represented by Tricia Colvin, Mark Tovey, and Bob Duff. Astronomy 2021 student Mike Labiak was also there as a volunteer. Tricia acquired Comet C/2014 Q2 Lovejoy with the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) set up on the roof patio outside the dome. 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, using the 32mm Erfle eyepiece for demonstration. Bob also explained the Standard and Sidereal Time clocks on the east wall. Snow and possibly ice prevented opening the dome and the Cubs lined up to view Comet Lovejoy through the 25.4cm Dobsonian, supervised by Tricia, assisted by Mark. After everybody had viewed Comet Lovejoy, the 25.4cm Dobsonian was redirected and Mark showed them Jupiter high in the eastern sky. Jupiter—with its Galilean moons and colourful cloud belts—made a fine sight in the 25.4cm Dobsonian, through the 17mm Nagler eyepiece (66X). The visitors were gone by 9:00 p.m. after a very enjoyable and informative evening learning about astronomy, space exploration and telescopes.

#### **Exploring the Stars, St. George's Public School, February 10th, 2015**

Hazy cloudy skies greeted 25 visitors (16 children and 9 adults) from St. George's Public School Grade-6 class for Exploring the Stars at the Cronyn Observatory, Tuesday, February 10th, 2015, 6:30 p.m. Graduate student Shannon Hicks made the digital slide

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presentation “Smaller Bits of Our Solar System” and fielded questions. Shannon 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, Bob Duff and Mark Tovey.

Everett made ready the big 25.4cm refractor in the dome, installing the 32mm Erfle eyepiece (137X), and Bob set up the London Centre’s 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) on the roof patio outside the dome. When everybody arrived upstairs in the dome Bob gave a brief talk on the history of the Cronyn Observatory and technical aspects of the big 25.4cm refractor. Bob also explained the Standard and Sidereal Time clocks on the east wall. Everett, and later Shannon, supervised as everybody lined up to view Jupiter through the big 25.4 cm refractor (32mm Erfle eyepiece, 137X). Mark also showed them Jupiter in the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X).

Jupiter made a fine sight in both telescopes as it rose in the eastern sky above the billows of steam from the heating plant. The sky gradually cleared from extremely hazy to just a thin haze, revealing the cloud belts on Jupiter’s surface and 3 of the Galilean moons. Everett opened the sky charting software “Starry Night Pro” on the computer, showing Jupiter and 3 Galilean moons—Io, Callisto and Ganymede—to the west (left in the eyepiece) and from nearest to furthest from the planet. The Galilean moon Europa was shown just inside Jupiter’s edge on the east side (right in the telescope) and beginning to transit the planet. Europa would have been visible just inside the right edge of Jupiter’s disk in the telescopes but hazy skies made it impossible to see. Everybody was gone from the dome by 8:25 p.m. with enthusiastic appreciation expressed for a truly enjoyable and informative evening of astronomy.