

# POLARIS



## Newsletter of the London Centre, RASC

June 2019

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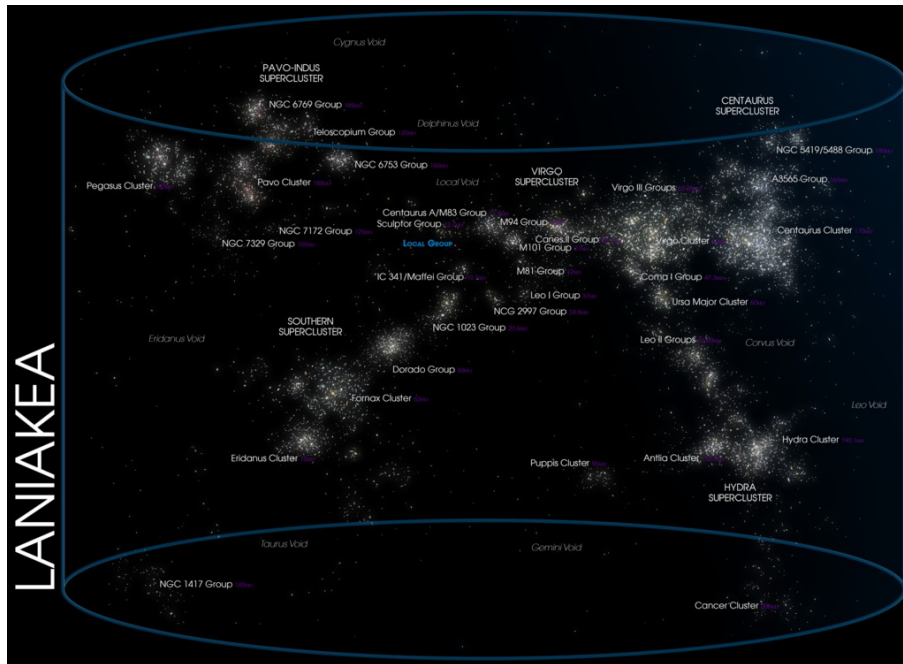
### All Things Great and Small Part 2

Last month, in the first half of this essay, I discussed the smallest things we know of, the particles that make up the Standard Model. This month I'm moving to the other end of the spectrum and discussing the largest things that we've discovered.

Before the 'Great Debate' of the 1920s, the universe was thought to be comprised of our galaxy which included all of the stars we could see plus a number of 'spiral nebulae' which were thought to be within the Milky Way. After the debate Heber Curtis' argument that the Andromeda Nebula had to be external to the Milky Way due to the number of novae showing up in it. That there would be more of these in a small patch of the Milky Way vs the rest of the galaxy pointed in this direction.

In 1924 Edwin Hubble, using the 100" Hooker telescope found cepheid variables in both the Andromeda and Triangulum nebulae which showed definitively that the spiral nebulae were outside the boundary of the Milky Way.

Eventually it was found that groups of galaxies (such as our Local Group) are bound gravitationally and that these clusters form superclusters and even larger structures. Following is a map of OUR supercluster, the Laniakea Supercluster.



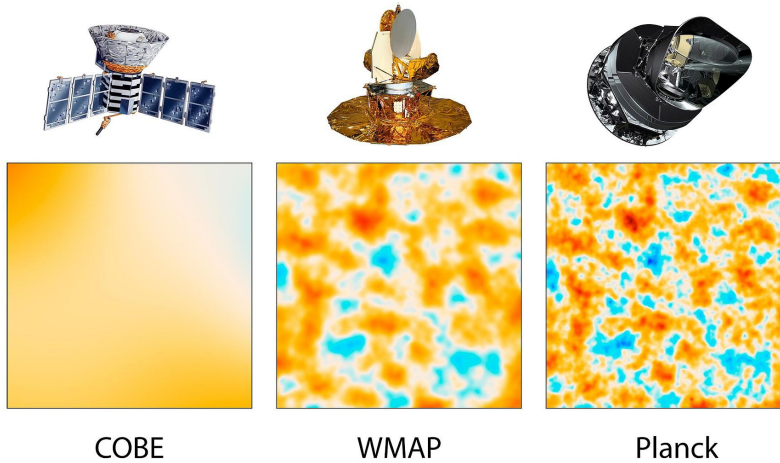
Here is the list of 'big things' from smallest to largest:

- **Galaxies**
  - Groups of gas, stars and dust containing millions to trillions of solar masses
- **Clusters of Galaxies**
  - Gravitationally bound groups of galaxies
- **Superclusters**
  - Gravitationally bound groups of clusters of galaxies
- **Sheets and voids**
  - Areas of the cosmos where there are more evident superclusters, or, a lack of superclusters
- **Large Quasar Groups**
  - A collection of quasars that might be the largest structures in the known universe. Thought to be precursors of walls, sheets and voids.
- **Walls**
  - Discovered through various sky surveys such as the Sloan Digital Sky Survey and Gamma Ray Burst mapping.

The last three of these are tentative as they may extend farther than we can see AND can extend into the Avoidance Zone in the Milky Way, an area that we just can't see through..

### Formation of large structure.

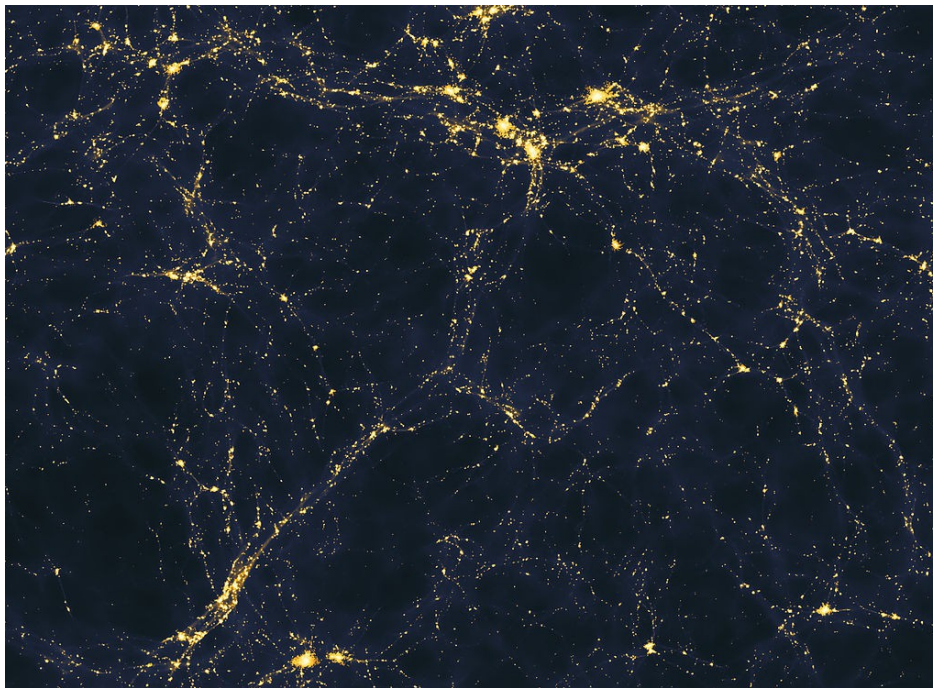
The furthest back we can 'see' in the universe is the Cosmic Microwave Background. This is the temperature (2.7K) of the universe that we see after roughly 13.7 billion years of cooling and expanding. It is the temperature that existed ~380,000 years after the Big Bang when the universe became cool enough for electrons, protons and neutrons to combine into atoms. Prior to this the universe was opaque.



Comparison of resolution between COBE, WMAP and Planck

Once the CMB was discovered several satellites were launched to map it as accurately as possible. The first was the Cosmic Background Explorer (COBE), launched in 1989, which showed that there were fluctuations in the CMB. These fluctuations in temperature equate to density fluctuations in the universe.

The second satellite was the Wilkinson Microwave Anisotropy Probe which was launched in 2001 and had a higher resolution than COBE both thermally and angularly. WMAP data was crucial in confirming the cosmological model we believe today which includes baryonic matter, dark matter and dark energy.



Filaments, sheets and voids

The last of the satellites I'll briefly touch on is the Planck satellite which went into operation in 2009 and mapped anisotropies in the CMB with very high accuracy and resolution.

So why is the CMB so important? As I mentioned earlier the differences in temperature of the CMB equate to density changes. Density differences mean areas of more or less gravity. These density changes close to the time of the Big Bang give us our initial conditions in which to start building simulations of what the universe should look like today.

Specifically, the CMB 'maps' the early distribution of dark matter and we've since found that galaxies fall along a 'web' of dark matter that permeates the universe. These then draw together into clusters, superclusters etc.,

## **The three largest things we've postulated.**

### **Huge Large Quasar Group**

This is a possible structure of 73 quasars. When discovered it was identified as the largest and most massive thing in the observable universe. It is approximately 4 billion light years in extent.

### **Giant GRB Ring**

A ring of 9 (Gamma-ray bursts GRBs) that may be associated with one of the largest known cosmic structures. It was discovered July 2015 by a team of Hungarian and American astronomers led by L.G. Balazs while analyzing data from different gamma-ray and X-ray telescopes, in particular the Swift Spacecraft. Extends about 5.6 billion light years.

### **Hercules-Corona Borealis Great Wall**

a massive galactic superstructure in a region of the sky seen in the data set mapping of gamma-ray bursts (GRBs) that has been found to have an unusually higher concentration of similarly distanced GRBs than the expected average distribution. It was discovered in early November 2013 by a team of American and Hungarian astronomers led by István Horváth, Jon Hakkila and Zsolt Bagoly while analyzing data from the Swift Gamma-Ray Burst Mission, together with other data from ground-based telescopes. It is the largest known formation in the universe, exceeding the size of the prior Huge-LQG by about two times, or 10 billion light years.

As our ability to see into the distant past becomes better I'm sure that we'll find more large structure out there. We only need better tools.

***RASC London Centre Library***  
***Books of the Month***  
***June 2019***  
***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 June 2019 are as follows:

*The Planet Factory: Exoplanets and the Search for a Second Earth*, [by] Elizabeth Tasker. – London: Bloomsbury Sigma, 2019, c2017.

*A Portfolio of Lunar Drawings*, by Harold Hill. 1991. (Practical Astronomy Handbooks, 1)

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

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 anything you wish to borrow from the Library, please feel free to contact me by telephone at (519) 439-7504 or by e-mail at [rduff@sympatico.ca](mailto:rduff@sympatico.ca)

### **RASC London Centre Library New Acquisition:**

The following book was purchased from the author at the April 19<sup>th</sup>, meeting and received from RASC London Centre President Norm McCall at the May 17<sup>th</sup>, 2019, meeting held at Western University's Cronyn Observatory.

*The Planet Factory: Exoplanets and the Search for a Second Earth*, [by] Elizabeth Tasker. – London: Bloomsbury Sigma, 2019, c2017.

## **Cronyn Observatory Public Nights & Special Events, May 10<sup>th</sup>—June 8<sup>th</sup>, 2019**

*By Robert Duff*

### **Early Outreach Conference (REACH) Event at Cronyn Observatory, Friday, May 10th, 2019**

Cloudy skies greeted 286 visitors, including 225 youth (Grade 7 and 8 students) and 61 adults, from the Early Outreach Conference for a Special Event at Western University's Cronyn Observatory, Friday, May 10<sup>th</sup>, 2019, 10:00 a.m.—12:00 p.m. The Early Outreach Conference (REACH) is an annual initiative of the Western University Students' Council (USC) introducing low-income youth in London and Middlesex County to post-secondary education opportunities. Western University collaborates with the City of London, Middlesex County, Thames Valley District School Board, and London District Catholic School Board, as well as various non-profit community organizations in this initiative.

The students were divided into 6 groups and Professor Jan Cami made 6 presentations, one to each group, of his digital slide presentation, "*Astronomy and Space Research at Western*" and fielded questions. Each of the 6 groups were then split into 2 groups, with one going downstairs for the "*Spectroscopy Demonstration*" in the "*Black Room*," and the other going upstairs into the dome. There were in all 12 groups circulating between the downstairs "*Black Room*" and the upstairs dome.

RASC London Centre was represented by Henry Leparskas, Heather MacIsaac, Bob Duff and Peter

Jedicke. Since it was cloudy, Henry set up the observatory's Meade 8-inch (20.3cm) Schmidt-Cassegrain (12.5mm Ortho eyepiece, 160X) and Coronado 90mm H-Alpha Solar Telescope inside the dome for demonstration. Peter gave 12 telescope talks to each of the 12 groups of students as they arrived in the dome, explaining some of the history of the observatory and technical aspects of the big 25.4cm refractor, as well as the 20.3cm Schmidt-Cassegrain and Coronado 90mm H-Alpha Solar Telescope. Peter also talked about the Sun while Heather showed the "*Sunspots on the Move*" video from the PBS Learning Media Web site, followed by an image of sunspots from the NASA's Solar Dynamics Observatory (SDO) on the computer.

Downstairs in the "*Black Room*" Henry did 12 demonstrations of the "*Spectroscopy Demonstration*," one to each group, with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury.

Graduate student Hadi Papei arrived to assist in the dome around 11:30 a.m. The visitors were gone by 12:00 p.m. noon after an interesting morning learning about the Sun, some properties of light, spectroscopy, the observatory and telescopes.

## **Science Rendezvous at Western University, Saturday, May 11<sup>th</sup>, 2019**

Cloudy skies greeted visitors to Science Rendezvous held at Western University's TD Stadium on Saturday, May 11<sup>th</sup>, 2019, 2:00—9:00 p.m. This was the third time Western University participated in this nationwide event, bringing hands-on science, technology, engineering, art and math (STEAM) activities to children. Cronyn Observatory Director Professor Jan Cami was the main organizer of the event and chair of the Organizing Committee, with Postdoctoral Fellow Dilini Subasinghe (PhD, Meteor Physics) and Joyla Furlano (graduate student, Neuroscience) as co-chair.

Graduate students Viraja Khatu and Hadi Papei set up the Solar Observing booth in the morning with the help of RASC volunteers Everett Clark, Heather MacIsaac and Henry Leparskas, later joined by Bob Duff (1:40 p.m.) and Peter Jedicke (2:10 p.m.), Mohammed Mubeen (2:25 p.m.) and Norm McCall (3:20 p.m.). Lynn Jones visited briefly to give Bob her 2 hand tally counters, one to count all visitors and one for youth (high school or younger). RASC member Dale Armstrong did the group photo at the beginning of Science Rendezvous (1:30 p.m.) and accompanied Jan as VIP photographer for the afternoon. Henry Leparskas along with Building and Physics & Astronomy Stores Manager Phin Perquin were event photographers.

Telescopes set up outside the canopy at the Solar Observing booth included the Cronyn Observatory's Coronado 90mm H-Alpha Solar Telescope (CEMAX 25mm eyepiece, 32X), on the Sky-Watcher EQ5 mount, and the RASC London Centre's Coronado 60mm H-Alpha Solar Telescope, on a Manfrotto 055 camera tripod brought by Mohammed from Fanshawe College. Since the Sun was obscured by clouds, these H-alpha telescopes were used for display. However, visitors were able to look through other telescopes, including the Cronyn Observatory's Meade 8-inch (20.3cm) Schmidt-Cassegrain (26mm Plossl, eyepiece, 77X) and Heather's Celestron NexStar 90SLT 90mm Maksutov-Cassegrain. Heather used a 32mm Plossl (39X) and later a 17mm Plossl (73.5X) eyepiece in her 90mm Maksutov, while a

12.5mm Ortho eyepiece (160X) was swapped in for higher magnification in the 20.3cm Schmidt-Cassegrain. Norm McCall set up his Explore Scientific 152mm Maksutov-Newtonian Comet Hunter. All 3 telescopes were directed towards the large bird's nest (thought to be an osprey, a type of hawk) on top of one of the floodlight towers overlooking the TD Stadium.

Tents and booths began to be dismantled in TD Stadium at 6:00 p.m., although the event did not end until after the fireworks, scheduled for 9:00 p.m., which began at 9:06 p.m. and ended at 9:19 p.m. Volunteers worked tirelessly to make this third annual Science Rendezvous a success. A special thanks goes to Physics & Astronomy Stores Manager Phin Perquin for his exceptional work in the days before, during and after the event as well as his photography in TD Stadium.

RASC London member Bob Duff counted an estimated 476 visitors, including 266 youth (children, high school or younger), who viewed through telescopes at the Solar Observing booth. This included 446 visitors (including 249 youth) counted by Bob using the 2 hand tally counters, provided by RASC London member Lynn Jones, plus an estimated 30 visitors (including 17 youth) who show up prior to the use of the hand tally counters.

Professor Jan Cami reported over 1,600 visitors counted by 6:00 p.m., entering the gate to TD Stadium, with an estimated 200 people attending the evening program (fireworks). If we include about 300 volunteers and external people who participated, an estimated 2,000 people participated in Science Rendezvous 2019, at Western University's TD Stadium.

## **Science Rendezvous Cronyn Observatory Public Night, Saturday, May 11<sup>th</sup>, 2019**

Cloudy skies greeted 65 visitors (including 35 youth) to Western University's Cronyn Observatory Summer Public Night, Saturday, May 11<sup>th</sup>, 2019, 8:30—11:00 p.m. This was after Science Rendezvous 2019 held in Western University's TD Stadium, 2:00—9:00 p.m. Professor Pauline Barmby made 2 presentations of her digital slide presentation "*A long time ago in a galaxy very, very nearby*" and fielded questions. This was done on the large TV screen newly installed in the lecture room. Graduate student James Xu was "crowd manager," greeting and directing visitors. RASC member Bob Duff gave James 2 hand tally counters provided by fellow RASC member Lynn Jones. James counted the visitors with the 2 hand tally counters, one to count all visitors and one for youth (children, high school or younger).

Professor Jan Cami brought Communications Coordinator for the Natural Sciences and Engineering Research Council of Canada and Executive Director of Science Rendezvous Kathleen Miller and her family for a quick tour of the Cronyn Observatory and she was very impressed by what was offered at the observatory! She was also impressed by her afternoon tour of Science Rendezvous in TD Stadium and the quality of the program offered, commenting that we had top-notch quality science communicators and ambassadors here at Western.

Graduate student Ameek Sidhu was telescope operator for the big 25.4cm refractor in the dome, which

remained closed due to the cloudy skies. RASC London Centre was represented by Dave Clark, Bob Duff, Peter Jedicke, Everett Clark, Heather MacIsaac, Mark Tovey and Edith Tovey. They were later joined by Dale Armstrong, who remained behind until 9:30 p.m. in TD Stadium to photograph the fireworks. Henry Leparskas was at the Cronyn Observatory for 30 minutes doing photography after spending 12 hours at TD Stadium.

Since it was cloudy, Heather set up her Celestron NexStar 90SLT 90mm Maksutov-Cassegrain (32mm Plossl eyepiece, 39X) inside the dome so as to view out the door towards the lights on the communications tower in south London. Peter gave a telescope talk explaining some of the history of the observatory and technical aspects of the big 25.4cm refractor.

Science Rendezvous ended with fireworks in TD Stadium. The fireworks, scheduled for 9:00 p.m., actually began around 9:06 p.m. and continued until 9:19 p.m. Some *diffraction grating* glasses, used in the "*Spectroscopy Demonstration*," were brought upstairs and shared with visitors on the observatory's observation deck, so that they could see the fireworks in spectra. People took pictures of the fireworks with their smartphones and tried imaging the spectra through the *diffraction grating* glasses.

Downstairs in the "*Black Room*" graduate student Klay Kulik did the the "*Transit Demonstration*," with the "*Transit Demo*" model, showing how the transit detection method worked for finding extra-solar planets, and the "*Spectroscopy Demonstration*," with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury. Mark Tovey showed visitors the "*1940s Period Room*," a recreation of Dr. H. R. Kingston's 1940 office, with his brass refractor and the *Sotellunium*—a mechanical eclipse demonstration model built by W. G. Colgrove—on display. Mark also showed them the "*1967 Period Room*," recreating the early control room of the Elginfield Observatory to celebrate the 150<sup>th</sup> anniversary of Confederation—Canada 150. Edith Tovey was also there and talked to visitors. The "*W. G. Colgrove Workshop Period Room*" was closed for renovations. The 3 "*Period Rooms*" were designed by RASC London Centre member Mark Tovey.

The visitors were gone by around 11:00 p.m. after an interesting and enjoyable evening with the slide presentation on galaxies, demonstrations of the transit detection method for finding extrasolar planets, the spectroscopy demonstration, tours of the history rooms and the dome. The fireworks in TD Stadium, viewed from the observatory's observation deck marked a fitting end to Science Rendezvous 2019.

## **Cronyn Observatory Public Night, Saturday, May 18<sup>th</sup>, 2019**

Clear skies greeted 55 visitors (including 13 youth) to Western University's Cronyn Observatory Summer Public Night, Saturday, May 18<sup>th</sup>, 2019, 8:30 p.m. Graduate student Shannon Hicks made 2 presentations of her digital slide presentation "*How Did Venus Get So Hot?*" and fielded questions. This was done on the large TV screen newly installed in the lecture room. RASC member Bob Duff



greeted and counted visitors using 2 hand tally counters—provided by fellow RASC member Lynn Jones—one to count all visitors and one for youth (children, high school or younger). There were 22 visitors (including 7 youth) in the lecture room for Shannon’s first presentation at 8:30 p.m. and 12 people (including 4 youth) for her second presentation at 9:30 p.m. Some visitors went directly upstairs into the dome or downstairs for demonstrations and history room tours without attending the slide presentation.

Professor Peter Brown was telescope operator in the dome and Professor Margaret Campbell-Brown did the “*Transit Demonstration*” and the “*Spectroscopy Demonstration*” downstairs in the “*Black Room*.” RASC London Centre was represented by Bob Duff, Steve Imrie, Fraser McCrossan, Henry Leparskas, Heather MacIsaac, Everett Clark, Peter Jedicke and Mark Tovey. Bob helped make ready the big 25.4cm refractor in the dome, selecting the Meade 28mm Super Wide Angle eyepiece (157X) to observe the one-day-past-full Moon. Professor Peter Brown directed the 25.4cm refractor towards the Moon, rising in the east and spent the evening talking to visitors as they viewed through the big telescope. Some people delighted in taking smartphone pictures of the Moon through the telescope.

Fraser set up his Williams Optics 80mm apochromatic refractor on a Celestron NexStar SE mount and Heather, her Celestron NexStar 90SLT 90mm Maksutov-Cassegrain, on the observation deck. Steve and Bob set up the RASC London Centre’s 25.4cm Dobsonian. Fraser showed visitors the Moon, the double star Algieba and the star Arcturus (briefly) through his 80mm refractor, using 10mm (48X) and 7.5mm (64X) Speers-WALER eyepieces. Several people tried taking pictures of the Moon through Fraser’s telescope with their smartphones. Heather showed the Moon through her 90mm Maksutov (32mm Plossl eyepiece, 39X). Steve showed people the Moon and Arcturus (briefly) through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X).

Visitors had the opportunity to view the International Space Station (ISS) pass predicted for 9:27—9:33 p.m. (21:27:39—21:33:09), travelling southwest to east, reaching a maximum altitude of 24 degrees above the southeastern horizon at 9:30 p.m. (21:30:23) before disappearing into the Earth’s shadow 10 degrees above the eastern horizon at 9:33 p.m. (See: “*ISS – Visible Passes*” for London, Ontario, on Web site “*Heavens Above*”: <http://www.heavens-above.com/>)

Downstairs in the “*Black Room*” Professor Margaret Campbell-Brown did the the “*Transit Demonstration*,” with the “*Transit Demo*” model, showing how the transit detection method worked for finding extra-solar planets, and the “*Spectroscopy Demonstration*,” with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury. Mark Tovey showed visitors the “*1940s Period Room*,” a recreation of Dr. H. R. Kingston’s 1940 office, with his brass refractor and the *Sotellunium*—a mechanical eclipse demonstration model built by W. G. Colgrove—on display. Mark also showed them the “*1967 Period Room*,” recreating the early control room of the Elginfield Observatory to celebrate the 150<sup>th</sup> anniversary of Confederation—Canada 150. The “*W. G. Colgrove Workshop Period Room*” was closed for renovations. The 3 “*Period Rooms*” were designed by RASC London Centre member Mark Tovey.

Peter Jedicke listened to the first slide presentation and later went downstairs to join Mark Tovey.

Henry Leparskas talked to people in the dome and left around 9:40 p.m. Since there were relatively few visitors, Peter Brown, Everett and Heather closed down the dome early and everybody was gone by around 10:30 p.m.

## **Cronyn Observatory Public Night, Saturday, May 25<sup>th</sup>, 2019**

Partly cloudy, later clearing skies greeted 60 visitors (including 19 youth) to Western University's Cronyn Observatory Summer Public Night, Saturday, May 25<sup>th</sup>, 2019, 8:30 p.m. Professor Stan Metchev made 2 presentations of his digital slide presentation "*The child and the dog in the Moon: a trip through Inuit astrolore*" and fielded questions. This was done on the large TV screen newly installed in the lecture room. Undergraduate student Meet Panchal was "crowd manager," greeting and directing visitors. RASC member Bob Duff gave Meet 2 hand tally counters provided by fellow RASC member Lynn Jones. Meet counted the visitors with the 2 hand tally counters, one to count all visitors and one for youth (children, high school or younger). There were 23 visitors (including 9 youth) in the lecture room for the first presentation. RASC member Peter Jedicke listened to the first slide presentation before going downstairs to give tours of the "*Period Rooms*."

RASC London Centre was represented by Henry Leparskas, Bob Duff, Steve Imrie, Everett Clark and Peter Jedicke, with Heather MacIsaac arriving at the end of the evening to help put equipment away. Graduate student Hadi Papei was telescope operator in the dome and early in the evening directed the big 25.4cm refractor (Meade 28mm Super Wide Angle eyepiece, 157X) towards the flashing white lights on the communications tower in south London. As the sky darkened Everett assisted Hadi with the 25.4cm refractor as they showed visitors the double star Mizar and Alcor in the handle of the Big Dipper and Jupiter as it rose above the eastern horizon after 10:00 p.m. Steve and Bob set up the RASC London Centre's 25.4cm Dobsonian and Everett and Henry set up the observatory's Meade 8-inch (20.3cm) Schmidt-Cassegrain on the observation deck.

Bob showed visitors the lights on the communications tower through the 20.3cm Schmidt-Cassegrain (26mm Plossl eyepiece, 77X). As the sky darkened Bob showed visitors Arcturus through the 20.3cm Schmidt-Cassegrain (77X), later swapping in the 12.5mm Ortho eyepiece (160X) to show them the double star Algieba in the constellation Leo. Steve directed the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) towards the wind turbine on the Engineering building and as the sky darkened showed visitors Arcturus, Mizar and Alcor, and the Ring Nebula (M57) in the constellation Lyra. Henry and Steve later brought out the RASC London Centre's home-built 30.5cm Dobsonian, installing the 17mm Nagler eyepiece (88X) to show visitors globular cluster M13 in the constellation Hercules.

Henry invited people to view the International Space Station (ISS) pass from the front lawn of the observatory, although it was also seen from the observation deck over the dome. The ISS pass was predicted for 10:01—10:06 p.m. (22:01:57—22:06:56), beginning 10 degrees above the northwest horizon and reaching 19 degrees above the northern horizon at 10:04 p.m. (22:04:26) before disappearing into the Earth's shadow 10 degrees above the northeastern horizon at 10:06 p.m. (22:06:56). (See: "*ISS – Visible Passes*" for London, Ontario, on Web site "*Heavens Above*": <http://www.heavens-above.com/>)

Downstairs in the “*Black Room*” graduate student Ameet Sidhu did the the “*Transit Demonstration*,” with the “*Transit Demo*” model, showing how the transit detection method worked for finding extrasolar planets, and the “*Spectroscopy Demonstration*,” with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury. Peter Jedicke showed visitors the “*1940s Period Room*,” a recreation of Dr. H. R. Kingston’s 1940 office, with his brass refractor and the *Sotellunium*—a mechanical eclipse demonstration model built by W. G. Colgrove—on display. Peter also showed them the “*1967 Period Room*,” recreating the early control room of the Elginfield Observatory to celebrate the 150<sup>th</sup> anniversary of Confederation—Canada 150. The “*W. G. Colgrove Workshop Period Room*” was closed for renovations. The 3 “*Period Rooms*” were designed by RASC London Centre member Mark Tovey.

Heather MacIsaac arrived around 11:00 p.m. and helped everybody put away equipment and close down the dome. The observatory was closed down shortly after 11:00 p.m. after a very enjoyable evening learning about Inuit astrolore, demonstrations of the transit method for detecting extrasolar planets and spectroscopy, tours of the historic “*Period Rooms*” and viewing through telescopes.

## **Cronyn Observatory Public Night, Saturday, June 1<sup>st</sup>, 2019**

Cloudy skies and rain showers greeted 16 visitors (including 9 youth) to Western University’s Cronyn Observatory Summer Public Night, Saturday, June 1<sup>st</sup>, 2019, 8:30 p.m. RASC London member Peter Jedicke gave his digital slide presentation “*Asteroids: Friend or Foe?*” and fielded questions. This was done on the large TV screen newly installed in the lecture room. Undergraduate student Meet Panchal was “crowd manager,” greeting and directing visitors. RASC London member Bob Duff gave Meet 2 hand tally counters provided by fellow RASC member Lynn Jones. Meet counted the visitors with the 2 hand tally counters, one to count all visitors and one for children and youth (under 21 years of age). There were 13 visitors (including 5 children) for the presentation.

RASC London Centre was represented by Henry Leparskas, Bob Duff, Peter Jedicke, Mike Hanes, Heather MacIsaac, Mark Tovey and Everett Clark. Lynn Jones visited the dome briefly and then listened to Peter’s slide presentation along with Mike Hanes, later joined by Bob Duff and Mark Tovey.

Graduate student Ameet Sidhu was telescope operator for the big 25.4cm refractor in the dome, which remained closed due to rain showers. Bob selected the Meade 28mm Super Wide Angle eyepiece (157X) for demonstration with the 25.4cm refractor and helped Henry set up the observatory’s 8-inch (20.3cm) Schmidt-Cassegrain (26mm Plossl eyepiece, 77X) on the dome floor so as to view out the door to the observation deck. Bob aligned the finderscope and directed the 20.3cm Schmidt-Cassegrain towards the TV screen in the Western Student Recreation Centre windows. Heather MacIsaac gave informal tours of the dome to several visitors, explaining the big 25.4cm refractor and the 20.3cm Schmidt-Cassegrain—with some visitors viewing the TV screen in the Western Student Recreation Centre windows through the Schmidt-Cassegrain. Heather showed them the RASC London Centre’s home-built 30.5cm Dobsonian in the storage room and invited one little girl to rotate the dome, opening it briefly for demonstration, with the girl’s brother moving it back towards its normal position facing west.

Downstairs in the “*Black Room*” Henry Leparskas did the the “*Transit Demonstration*,” with the “*Transit Demo*” model, showing how the transit detection method worked for finding extrasolar planets. Mark Tovey showed visitors the “*1940s Period Room*,” a recreation of Dr. H. R. Kingston’s 1940 office, with his brass refractor and the *Sotellunium*—a mechanical eclipse demonstration model built by W. G. Colgrove—on display. Mark also showed them the “*1967 Period Room*,” recreating the early control room of the Elginfield Observatory to celebrate the 150<sup>th</sup> anniversary of Confederation—Canada 150. The “*W. G. Colgrove Workshop Period Room*” was closed for renovations. The 3 “*Period Rooms*” were designed by Mark Tovey.

Ameek began closing down the dome around 10:10 p.m. since there were no more visitors. Everybody helped put everything away. The observatory was closed by 10:45 p.m. shortly after the last visitors left the historic “*Period Rooms*.”

## **Cronyn Observatory Public Night, Saturday, June 8<sup>th</sup>, 2019**

Partly cloudy skies with hazy clouds greeted 55 visitors (including 14 youth) to Western University’s Cronyn Observatory Summer Public Night, Saturday, June 8<sup>th</sup>, 2019, 8:30 p.m. The speaker was Dr. Sarah Gallagher, Associate Professor at Western University and Science Advisor to the President of the Canadian Space Agency. Sarah gave her digital slide presentation “*Canada in Space!*” on the large TV screen newly installed in the lecture room and fielded questions. There were 41 people in the audience. Undergraduate student Meet Panchal was “crowd manager” and he counted 55 visitors, including 14 youth (under 21 years of age).

Graduate student Collin Knight was telescope operator for the big 25.4cm refractor in the dome and showed visitors the 5-day-past-new Moon, using the Meade 28mm Super Wide Angle (157X) and 18mm Radian (244X) eyepieces; and later Jupiter, using the Meade 28mm SWA eyepiece (157X). RASC London Centre was represented by Heather MacIsaac, Peter Jedicke, Everett Clark, Steve Imrie, Henry Leparskas and Mark Tovey. Steve showed people the Moon and Jupiter through the RASC London Centre’s home-built 30.5cm Dobsonian, using the 17mm Nagler eyepiece (88X). Heather showed visitors the Moon and Jupiter through her Celestron NexStar 90SLT 90mm Maksutov-Cassegrain, using a 32mm Plossl eyepiece (39X).

Downstairs in the “*Black Room*” Henry Leparskas did the the “*Transit Demonstration*,” with the “*Transit Demo*” model, showing how the transit detection method worked for finding extrasolar planets, and the “*Spectroscopy Demonstration*,” with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury. Mark Tovey gave tours the “*1940s Period Room*,” a recreation of Dr. H. R. Kingston’s 1940 office, with his brass refractor and the *Sotellunium*—a mechanical eclipse demonstration model built by W. G. Colgrove—on display. Mark also showed visitors the “*1967 Period Room*,” recreating the early control room of the Elginfield Observatory to celebrate the 150<sup>th</sup> anniversary of Confederation—Canada 150. The “*W. G. Colgrove Workshop Period Room*” was closed for renovations. The 3 “*Period Rooms*” were designed by Mark Tovey. When Mark took a break, Henry gave one tour of the the “*1940s Period Room*.” Henry also had the opportunity to tutor Meet Panchal on the demonstrations in the “*Black Room*.”

The observatory was closed down at 10:50 p.m. after an enjoyable evening for the visitors, beginning with a slide presentation about Canada's space program, demonstration of spectroscopy and the transit method for detecting extrasolar planets, tours of the historic "*Period Rooms*" and observing the Moon and Jupiter through telescopes.