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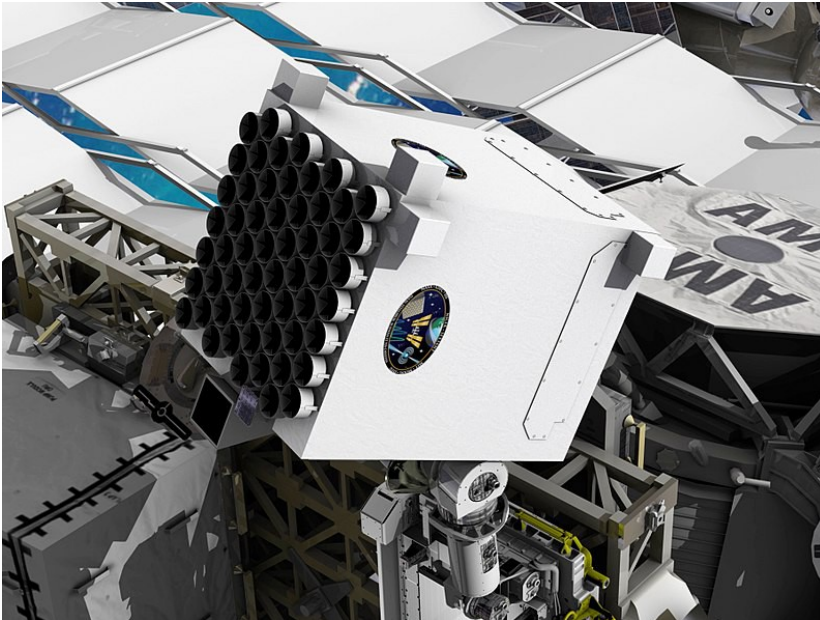


Newsletter of the London Centre, RASC

March 2020

Some telescopes are NICER

On June 3, 2017 an ISS resupply ship took a scientific payload called NICER up to the International Space Station. NICER, the Neutron Star Interior Composition Explorer, is an X-ray Timing Instrument. It is comprised of a rectangular array of 56 pairs of X-ray Concentrator optics and a silicon drift detector. Each of these pairs form an x-ray telescope with a field of 30arcmin that operate in the soft x-ray band of .2 to 12keV and the ability to detect single photons. This band is perfectly matched to the spectra of neutron star.



NICER allows astronomers to take rotation-resolved spectroscopy of neutron stars, using simultaneous fast timing and spectroscopy. This will allow investigators to determine to a high degree of accuracy the size of a neutron star. Also, it will provide guest observers post-Rossi X-ray Timing Explorer data. Outside of the science goals NICER will also demonstrate pulsar-based spacecraft navigation.

Using NICER has allowed astronomers to make the first ever surface map of a pulsar. J0030+0451

is about 1100ly from earth in Pisces. While measuring the size of the pulsar NICER found some hot spots of a million degrees. These hot spot rotated past NICER's view several hundreds of times per second. J0030 turns out to be about 1.3 solar masses and about 25km across. The surface map generated by the data is shown to the right.

NICER also looked at a neutron star that was accreting material from a brown dwarf, SAX J1808.4-3658 produced the brightest x-ray burst that NICER had observed back in Aug 2019. The data recovered from the observations showed that J1808 had pulled enough hydrogen from the surface of the brown dwarf until it 'ignited' to make helium, then more mass was dragged across until the surface of the neutron star exploded throwing two layers, one of hydrogen and one of helium from the surface of the star.



NICER saw both layers moving off of the surface by the x-rays that they emitted then saw the helium then falling back through the hydrogen. The several interacting layers each gave its own x-ray signature that NICER measured.

RASC London Centre Library

Books of the Month

March 2020

By Robert Duff

Normally, I bring 3 “Books of the Month” to the RASC London Centre monthly meetings, to be available for loan to members and returned the following month. Since the March meeting is cancelled there are no “Books of the Month” for March 2020.

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

Cronyn Observatory Exploring the Stars Events & Public Night, February 24th— March 12th, 2020

By Robert Duff

Exploring the Stars, 110th London Brownies, Guides, Pathfinders & Rangers, February 24th, 2020

Cloudy skies greeted 26 visitors from the 110th London Brownies, Guides, Pathfinders and Rangers, including 19 children and 7 adult leaders, for Exploring the Stars at Western University's Cronyn Observatory, Monday, February 24th, 2020, 6:30—8:00 p.m. Graduate student Kaylie Green gave the digital slide presentation "*The Scout / Guide Astronomy Badge*," with the title slide "*The Basics*," and fielded questions. This was presented on the large TV screen newly installed in the lecture room. She then did the "*Kitchen Comet*" activity on a table set up at the front of the lecture room, making a comet with dry ice and other materials.

RASC London member Bob Duff arrived around 6:53 p.m. and, after counting the visitors in the lecture room, set up the observatory's Meade 8-inch (20.3cm) Schmidt-Cassegrain (26mm Plossl eyepiece, 77X) inside the dome so as to view 2 flashing white lights on the communications tower in south London, visible through the doorway to the observation deck. As the visitors were arriving in the dome, Bob also set up RASC London Centre's home-built 30.5cm Dobsonian, installing the 17mm Nagler eyepiece (88X) for demonstration. Kaylie gave a talk about the technical aspects of the big 25.4cm refractor in the dome and called their attention to the Schmidt camera piggybacked on the main telescope. She also rotated (but did not open) the dome for demonstration. She then introduced Bob and invited him to talk about the amateur telescopes. Bob showed them the 30.5cm Dobsonian and explained the difference between a reflector and refractor telescope. He showed them the 17mm Nagler eyepiece, explaining magnification and how it gave 88X with the 30.5cm Dobsonian. Bob showed them the big lens on the 25.4 cm refractor and used the 32mm Erfle eyepiece (137X) to explain how it worked. He also showed them the 2 finderscopes and further explained the Schmidt camera and Cassegrain reflector piggy-backed on the 25.4cm refractor. He opened and closed the shutter on the Schmidt camera to demonstrate how it worked. Bob showed them the 20.3cm Schmidt-Cassegrain and how it was similar to the Cassegrain reflector mounted on the main telescope, but with a corrector lens at the front, making for a very short compact telescope.

Bob also explained the 2 clocks mounted on the east wall of the dome and the difference between Standard and Sidereal Time. Kaylie invited the Brownies, Guides, Pathfinders and Rangers and their leaders to line up and view the flashing white lights on the communications tower through the 20.3cm Schmidt-Cassegrain (26mm Plossl eyepiece, 77X) telescope.

Kaylie then took everybody back downstairs into the "*Black Room*," where she did 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.

The visitors were gone by around 8:00 p.m., after an enjoyable evening with the slide presentation on astronomy, making a comet with dry ice and other materials, a tour of the big 25.4cm refractor and other telescopes in the dome, a demonstration of the transit method for detecting extra-solar planets and a demonstration of spectroscopy.

Exploring the Stars, St. Anthony French Immersion Catholic School, Thursday, February 27th, 2020

Cloudy skies with some light snow flurries greeted 29 visitors from St. Anthony French Immersion Catholic School, Grade 6, including 27 children and 2 adults (one teacher and one parent) for a daytime Exploring the Stars event at Western University's Cronyn Observatory, Thursday, February 27th, 2020, 11:00 a.m.—1:00 p.m. They were greeted by graduate students Viraja Khatu and Hadi Papei. Viraja gave the digital slide presentation "*The Scout / Guide Astronomy Badge*," with the title slide "*The Basics*," and fielded questions. This was presented on the large TV screen newly installed in the lecture room. There was one additional visitor who arrived during the slide presentation, a little before noon, and was a Grade 11 student from another school working with Professor Jan Cami, Dr. Parshati Patel and Viraja Khatu.

After Viraja had finished the slide presentation Hadi gave a brief presentation on meteors, beginning with the slide "*Asteroids & Meteors*," before introducing the "*Crater Experiment*" activity, which involved dropping various size objects into a pan placed on the floor and filled with flour and topped with chocolate powder. Viraja and Hadi then divided the Grade 6 students into 2 groups, with one group going upstairs into the dome and the other downstairs for demonstrations in the "*Black Room*."

RASC London member Bob Duff arrived before 11:00 a.m. Since cloudy skies and snow flurries ruled out opening the dome, Bob set up the RASC London Centre's home-built 30.5cm Dobsonian (17mm Nagler eyepiece, 88X) inside the dome for demonstration and the observatory's Meade 8-inch (20.3cm) Schmidt-Cassegrain (26mm Plossl eyepiece, 77X) so as to view some tree branches visible through the door to the observation deck. He also set up the observatory's Coronado 90mm H-Alpha Solar Telescope (CEMAX 25mm eyepiece, 32X) on the Sky-Watcher EQ5 mount for demonstration. Hadi located a Web site on the computer which displayed an image of the Sun in H-Alpha light.

Bob gave 2 dome tours, one to each group of students, explaining some of the technical aspects of the big 25.4cm refractor and history of the observatory. He showed them the lens on the 25.4cm refractor and used the 32mm Erfle eyepiece (137X) to demonstrate how it worked. He explained the 2 finderscopes and the Schmidt camera and Cassegrain reflector piggy-backed on the 25.4cm refractor, opening and closing the shutter on the Schmidt camera to demonstrate how it worked. He showed them the 30.5cm Dobsonian, explaining the difference between a reflector and refractor telescope; and the 20.3cm Schmidt-Cassegrain, explaining how it was similar to the Cassegrain reflector mounted on the main telescope, but with a corrector lens at the front, making for a very short compact telescope. Bob rotated (but did not open) the dome to demonstrate how it worked and explained the 2 clocks mounted on the east wall of the dome and the difference between Standard and Sidereal Time.

Downstairs in the “*Black Room*” Hadi gave 2 demonstrations of the “*Spectroscopy Demonstration*,” one to each group of students, with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury.

When everybody was back together again in the lecture room, Bob gave a brief talk on the Moon and Mars meteorite samples, showing the students how visitors were sometimes invited to “walk on the Moon and Mars” by stepping on the observatory’s 2 round wood and clear plastic display cases containing tiny “*Moon Rock*” and “*Mars Rock*” meteorite samples. The visitors were gone by 1:00 p.m., after an enjoyable visit to the observatory and learning about astronomy.

Cronyn Observatory Public Night, Saturday, February 29th, 2020

Clear skies greeted an estimated 100 visitors (including 31 children) to Western University’s Cronyn Observatory Public Night, Saturday, February 29th, 2020, 7:00—9:00 p.m. Graduate student Kaylie Green presented her digital slide presentation “*The Life of a Star*” on the large TV screen newly installed in the lecture room and fielded questions. RASC London member Bob Duff arrived at 7:00 p.m. and counted 57 visitors (including 31 children) in the lecture room around 7:05 p.m. More visitors arrived and, after the slide presentation, there was a lineup of people all the way up the stairs into the dome, for an estimated 100 visitors for the evening.

Graduate student Hadi Papei was telescope operator and showed visitors the planet Venus in the western sky through the big 25.4cm refractor (32mm Erfle eyepiece, 137X) in the dome. Hadi later showed them the 6-day-past-new crescent Moon and the Orion Nebula (M42) through the big 25.4cm refractor (137X). Bob gave a brief talk to some visitors in the dome early in the evening on the history of the observatory and technical aspects of the 25.4cm refractor. Bob then hauled out the RASC London Centre 25.4cm Dobsonian, installed the 17mm Nagler eyepiece (66X), and showed people the Moon, Venus, the Orion Nebula (M42) and the stars Betelgeuse and Sirius. The visitors asked some good questions.

After the slide presentation, Kaylie went downstairs into the “*Black Room*,” where she did the “*Transit Demonstration*,” with the “*Transit Demo*” model, showing visitors 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. The visitors were gone by around 9:00 p.m. and the observatory was closed down after an enjoyable evening of astronomy.

Exploring the Stars, ARK Youth, First Baptist Church, Thursday, March 5th, 2020

Hazy, cloudy skies greeted 7 visitors, including one adult and 6 youth, from ARK Youth, First Baptist Church, for Exploring the Stars at Western University's Cronyn Observatory, Thursday, March 5th, 2020, 7:00—9:00 p.m. Graduate student Viraja Khatu gave the digital slide presentation "*Our Solar System*" and fielded questions. This was presented on the large TV screen newly installed in the lecture room. She then presented the "*Galaxy Sorting*" activity distributing laminated sheets with photographs of galaxies and showing several slides of Edwin Hubble's galaxy classification scheme to help the visitors identify different types of galaxies.

RASC London member Bob Duff arrived around 7:10 p.m. and directed the big 25.4cm refractor (Meade 28mm Super Wide Angle eyepiece (157X) in the dome towards the planet Venus in the western sky. Venus appeared to be at about half-phase. Bob also set up the RASC London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) on the observation deck and directed it towards the 3-day-past-first quarter gibbous Moon. Venus was clouded out by the time the group arrived upstairs in the dome, and Bob and Viraja redirected the big 25.4cm refractor towards the Moon. Viraja swapped in the 32mm Erfle eyepiece (137X) to show the visitors a better view of the Moon through the 25.4cm refractor. Bob showed them the Moon through the 25.4cm Dobsonian.

The visitors asked many good questions and Bob took a couple of group pictures of them with the adult leader's Smartphone, with everybody sitting on the observing ladder beside the 25.4cm refractor. The visitors were gone by around 9:00 p.m., after expressing their appreciation for an interesting and enjoyable evening of astronomy.

Exploring the Stars, Lakeview and Shiloh Christian Schools, Thursday, March 12th, 2020

Cloudy skies greeted 37 visitors from the Lakeview and Shiloh Christian Schools, including 25 youth from Grades 5—10 and 12 adults, for Exploring the Stars at Western University's Cronyn Observatory, Thursday, March 12th, 2020, 7:00—9:00 p.m. Graduate student Kaylie Green presented the digital slide presentation "*Our Solar System*" on the large TV screen newly installed in the lecture room. She followed this with the "*Telescope Kits*" activity, with the students assembling and testing telescopes from small reusable kits.

RASC London member Bob Duff arrived at 7:05 p.m. and, after counting the visitors in the lecture room, went upstairs where he opened the dome and directed the big 25.4cm refractor (32mm Erfle eyepiece, 137X) towards the flashing white lights on the communications tower in south London. He also set up the observatory's Meade 8-inch (20.3cm) Schmidt-Cassegrain (20mm Plossl eyepiece, 100X) inside the dome, directing it towards 2 flashing white lights on the communications tower, visible through the door to the observation deck. He brought out the RASC London Centre's 25.4cm Dobsonian, installing the 17mm Nagler eyepiece (66X) for demonstration.

When everybody arrived upstairs in the dome, Kaylie introduced Bob who gave a talk on the history of the observatory and the technical aspects of the big 25.4cm refractor and the amateur telescopes set up inside the dome. Bob showed them the big refractor's 25.4cm lens and the 32mm Erfle eyepiece to

explain how it worked. He called their attention to the 2 finderscopes, the Schmidt camera and the Cassegrain reflector telescope piggy-backed on the main telescope, opening and closing the shutter on the Schmidt camera to demonstrate how it worked. He showed them the 25.4cm Dobsonian, explaining the difference between a reflector and refractor telescope; and the 20.3cm Schmidt-Cassegrain, explaining how it was similar to the Cassegrain reflector mounted on the main telescope, but with a corrector lens at the front, making for a very short compact telescope. Bob explained the 2 clocks mounted on the east wall of the dome and the difference between Standard and Sidereal Time.

Kaylie supervised as the students climbed the observing ladder to view the flashing white lights on the communications tower through the 25.4cm refractor (32mm Erfle eyepiece, 137X) and Bob supervised as they viewed the flashing white lights on the tower through the 20.3cm Schmidt-Cassegrain (20mm Plossl eyepiece, 100X). Kaylie later took most of the students downstairs into the "*Black Room*" to show them the "*Spectroscope Demonstration*" with the visitors putting on *diffraction grating* glasses to view the spectra of 4 gas discharge lamps, including hydrogen, helium, neon and mercury.

Bob talked to the remaining visitors in the dome about the 25.4cm Dobsonian and the 20.3cm Schmidt-Cassegrain. In reply to a question from one visitor, Bob explained that the 25.4cm Dobsonian was not home-made and then hauled out the RASC London Centre's home-built 30.5cm Dobsonian. He explained how amateur astronomers could build their own Dobsonian telescopes. He also showed a few interested visitors the observatory's Coronado 90mm H-Alpha Solar Telescope in its case in the storeroom. The visitors were gone by around 9:00 p.m. after an interesting and enjoyable evening learning about the solar system, spectroscopy and telescopes.