POLARIS

Royal Astronomical Society of Canada
London Centre Newsletter
May 2015

The Fermi Paradox and Tardigrades
By Patrick Whelan

I am sure everyone reading this article has looked up at the night sky and marveled at the thousands of stars they could see. The darker the night, the more stars that are visible. And when you look at the Milky Way the stars are so numerous and dim that it really looks like milk spread across the sky. When under dark skies for the first time I have heard people lament that there is a cloud overhead. I then tell them they are looking at the Milky Way. It is awe inspiring.

The other thing you may wonder is: with all the billions and billions of stars out there, surely there must be life. If there is life, why haven't we detected it yet? SETI hasn't detected any. And other than crack-pots we have not seen any aliens on Earth. This is the Fermi Paradox.

Our Sun is relatively young with billions of stars (200-400 billion) in our galaxy that are billions of years older. There is a fairly high probability some of these stars will have Earth like planets. If Earth is typical (is it?) some of these planets should have intelligent life.

At the slow pace of how we could conduct interstellar travel, it would only take tens of millions of years to colonize the galaxy. Even if interstellar was not attempted, we should still be able to detect more advanced civilizations around other stars.

In 1964 the Russian astronomer Nikolai Kardashev came up with this scale of civilizations.
Type I civilizations can harness the entire resources of their planet and explore their entire solar system.
Type II civilizations can harness the power of their Sun.
Type III civilizations can harness the power of their galaxy.
We certainly aren't even a Type I civilization yet, and the higher categories are hard to imagine!

So why don't we see any life? There are so many possibilities I can only put down a few.

1. **There is no other life in existence**. Just because we have life on Earth it could be that the possibility of life developing in a galaxy is actually less than 1. Just because it occurred here, doesn't mean that it is probable. Or it could be that there is a wall civilizations hit: they destroy themselves or it is improbable that technology can advance so far as to be detectable by others. We could also be the first, and there are no others yet.
2. **There is alien life but we aren't seeing them**. Perhaps they came to our planet a long time ago, and they have not come back. Perhaps as civilizations advance, they realize colonization of the galaxy is a 'redneck' idea and have abandoned it. Or advanced civilizations are like us, predatory, and destroy every civilization they find. (they haven't found us yet) Planets are naturally destroyed (earthquakes, meteorites, Solar disturbances) so life can't advance that far. We have only been looking for a short time, and we need to keep looking. Or perhaps, just perhaps, we are not advanced enough to 'see' the evidence of alien life or colonization. (any sufficiently advanced technology is indistinguishable from magic/nature?) Think of it like this: What if comparing us to an advanced civilization is like comparing a crow to us? So we are the crow and the advanced civilization are the humans. So there is a flock of crows in a field and there is a computing centre been constructed right next to them. Do you think the crows know what it is? Not a chance, they have no clue what it is. Perhaps the advanced civilization has been able to (sci-fi stuff here) create a quantum polarization in a certain type of particle emanating from their Sun and we have no way to either detect it or understand that it is not natural.

Or maybe tardigrades are it?

Have you heard of tardigrades? They are fascinating creatures that were discovered back in the 1700's. They can survive the cold of just a few degrees above absolute zero or the heat above 100C. They can withstand 6 times the pressure of our deepest ocean trenches. They can withstand 10 times the radiation that would be fatal for humans and they can exist in the vacuum in outer space! They can survive over 10 years with no food or water, drying out and then rehydrating on contact with water. They have been found in fossils over 530 million years old. They survived all 5 mass extinctions. Perhaps tardigrades are the evidence we don't see. Perhaps tardigrades were used millions of years ago to colonize planets. They would seed a habitable planet with their DNA. Could aliens send out a species to hopefully start life on planets? It seems tardigrades can survive in outer space and perhaps entry through an atmosphere. They could be inside a meteorite. They would land on Earth and at first just eat each other for food. Instead of RNA or DNA spontaneously being formed by heat vents in the ocean or in ponds, the RNA and DNA of tardigrades would be there to mutate. Tardigrades could be the seeds of DNA for all life on the planet.

Certainly my idea is far fetched. But could it have happened?

Moon Phases

May 4 2015

May 11 2015

May 18 2015

May 25 2015

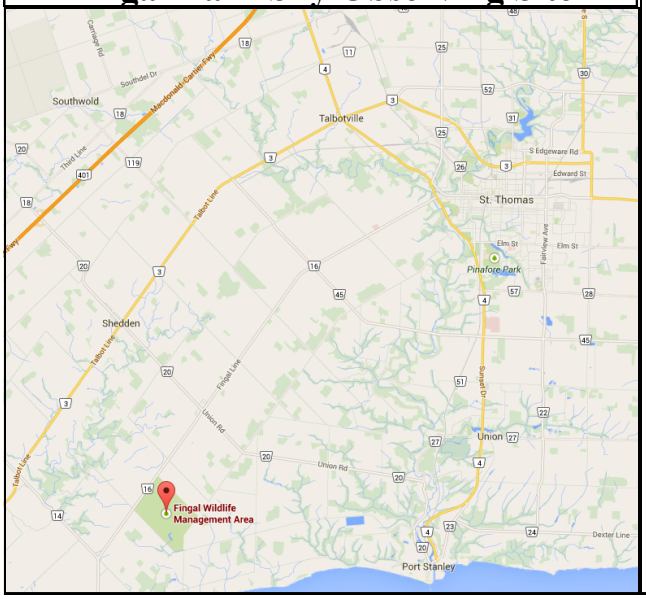
May

This months speaker will be Eduardo Martin-Martinez. Research Assistant Professor, Institute for Quantum Computing, University of Waterloo, Perimeter Institute for Theoretical Physics

His topic will be ""Echoes of light from the early Universe"

In recent work, we have proven that events that generate electromagnetic radiation leave an echo in the quantum vacuum that remains long after the light that reaches us passed by.

Fingal Dark Sky Observing Site



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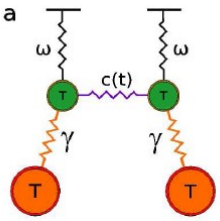
The ESA sent tardigrades into space in a mission they called Tardigrades in Space. For 12 days in September 2007, some 3000 water bears hitched a ride into space on ESA's orbital Foton-M3 mission. They shortened the mission name to **TARDIS**! Any Dr. Who fans present?

Sky Events for Late May and Early June

May 21 Double shadow transit on Jupiter
May 21 Another Double shadow transit on Jupiter
May 23 Saturn at opposition
May 28 Double shadow transit on Jupiter
June 4 Double shadow transit on Jupiter
June 6 Venus at greatest elongation E
June 11 Uranus 0.5° N of Moon
June 12 Pallas at opposition
June 15 Mercury .004° N of Moon
June 15 Aldebaran 1.0° S of Moon, occultation?

Mercury well placed in the evening sky from 1st to 21st
Venus in the evening sky
Mars not visible
Jupiter in the western evening sky. Sets after midnight
Saturn visible most of the night
Uranus low in the eastern dawn sky in Pisces
Neptune in the eastern morning sky in Aquarius



R.A.S.C. London Centre Library
Books of the Month May 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 May 2015 are as follows:

Foundations of Astronomy, by Michael A. Seeds. – 7th Edition, c2003.

Looking Up: a History of the Royal Astronomical Society of Canada, by R. Peter Broughton. c1994.

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

Exploring the Stars & Cronyn Observatory Public Nights, April 11th—May 2nd, 2015

By Robert Duff

Cronyn Observatory Public Night, Saturday, April 11th, 2015

Mostly clear skies greeted some 70 visitors to Western University's Cronyn Observatory Public Night, Saturday, April 11th, 2015, 7:00 p.m. Graduate student Dilini Subasinghe made the digital slide presentation "Mars" and fielded questions. Graduate students Tony Martinez and Emily McCullough worked in the dome. Western's Physics and Astronomy Department computer resources person Henry Leparskas was also there.

RASC London Centre was represented by Tricia Colvin, Mark Tovey and Bob Duff, later joined by Peter Jedicke. London Centre member Richard Gibbens was also there and listened to the slide lecture. Bob counted 40 people in the slide lecture around 7:08 p.m. and Peter later counted 55 in the lecture room and dome. The total for the evening is estimated to be around 70 visitors.

Tony, Peter and Bob showed visitors Venus and Jupiter through the big 25.4cm refractor in the dome (32mm Erfle eyepiece, 137X). Tricia operated the London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) and showed visitors Jupiter. (Earlier in the evening Emily had tried to display an image on a laptop computer from the Observatory's Celestron NexImage 5 Solar System Imager, installed on the London Centre's 25.4cm Dobsonian.) Mark and Tricia set up Mark's 8-inch (20.3cm) Celestron CPC 800 GPS Schmidt-Cassegrain and Emily showed people Venus through this telescope. People observed an Iridium flare just after 9:00 p.m. The Observatory was being closed down by around 9:30 p.m. after a very interesting and enjoyable evening of astronomy.

Exploring the Stars, 1st Ailsa Craig Guides, Pathfinders & Scouts, April 15th, 2015

Generally clear skies with a few clouds greeted 31 visitors (19 children and 12 adults) from the 1st Ailsa Craig Guides, Pathfinders & Scouts for Exploring the Stars at Western University's Cronyn Observatory, Wednesday, April 15th, 2015, 7:00 p.m. Graduate student Tony Martinez made the digital slide presentation "The Scout / Guide Astronomy Badge" and fielded questions. Tony followed this with the activity "Kitchen Comet," making a comet from dry ice and other materials on a table set up at the front of the lecture room.

RASC London Centre was represented by Tricia Colvin, later joined by Bob Duff. Tricia arrived early, setting up the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) on the roof patio outside the dome and finding Jupiter in the still bright daylight sky. She also opened the dome and made ready the big 25.4cm refractor. 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. Bob then directed the big 25.4cm refractor and showed them Venus (32mm Erfle eyepiece, 137X) and Jupiter (28mm Meade Super Wide Angle eyepiece (157X).

Tricia showed the visitors Jupiter, the stars Betelgeuse and Sirius, the Orion Nebula (M42) and the stars Mizar and Alcor through the 25.4cm Dobsonian (17mm Nagler eyepiece, 66X). The visitors were gone by around 9:45 p.m. after a very interesting and enjoyable evening of astronomy.

Exploring the Stars, St. Kateri Catholic School, April 22nd, 2015

Cloudy skies with wet snow flurries greeted 50 visitors (26 children and 24 adults) from St. Kateri Catholic School (Grades 4/5/6) for Exploring the Stars at Western University's Cronyn Observatory, Wednesday, April 22nd, 2015, 7:00 p.m. Graduate student Parshati Patel made the digital slide presentation "Our Solar System" and fielded questions. Parshati followed this with the activity "Telescope Kits," with the children assembling 18 small telescopes from reusable kits.

RASC London Centre was represented by Tricia Colvin and Bob Duff, later joined by Mark Tovey. 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 telescope and explained the Standard and Sidereal Time clocks on the east wall. Parshati opened and then closed the dome for demonstration but use of the big 25.4cm refractor was ruled out because of possible snow flurries.

Mark supervised as the children and adults lined up to view the wind turbine on the engineering building through the RASC London Centre's 25.4cm Dobsonian telescope (17mm Nagler eyepiece, 66X), which Tricia had set up inside the dome and facing out the roof patio door, earlier in the evening. The children took the small telescopes they had assembled in the activity "Telescope Kits" out on the roof patio outside the dome and Parshati supervised as they focused them on the Engineering building. Tricia and Bob talked to some of the visitors in the dome. Most all the visitors were gone by around 9:15 p.m. after a very enjoyable evening learning about astronomy and telescopes, despite the cloudy, snowy weather.

Cronyn Observatory Summer Public Night, Saturday, May 2nd, 2015

Some hazy clouds, later clearing sky greeted some 60 visitors to Western University's Cronyn Observatory Summer Public Night, Saturday, May 2nd, 2015, 8:30 p.m. Graduate student Parshati Patel made 2 presentations of her digital slide presentation "The Eta Aquarids: Shooting Stars from Halley's Comet" before an audience of perhaps 50 people for the first presentation and 10 people for the second presentation for an estimated total of 60 visitors.

Professor Aaron Sigut was telescope operator in the dome and directed the big 25.4cm refractor (52mm Erfle eyepiece, 84X) towards the 1-day-prior-to full Moon rising through hazy clouds in the eastern sky. Visitors were impressed by the bright, heavily cratered view of the Moon. Aaron later redirected the big 25.4cm refractor, with the help of RASC London Centre member Dale Armstrong, towards Saturn, which was rising in the eastern sky. Dale recommended swapping in the 32mm Erfle eyepiece (137X) in place of the 52mm Erfle (84X) for a more impressive sight of Saturn in the big 25.4cm refractor for a few remaining visitors at the end of the evening.

RASC London Centre was represented by 8 members, including Bob Duff, Steve Imrie, Dale Armstrong, Mark Tovey, Steve Gauthier, Peter Jedicke, Roman Dubinski and graduate student and RASC London Centre member Emily McCullough. London Centre member Richard Gibbens was also there and listened to the slide lecture.

Steve Imrie set up the RASC London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) and Dale, Mark, Bob and Emily set up the Observatory's 2 Meade Schmidt-Cassegrain telescopes on the roof patio outside the dome. People viewed the Moon, Venus and Jupiter through these telescopes. In addition, Dale showed them the double-star Izar and Saturn in the 8-inch (20.3cm) Meade 2080/LX3 Schmidt-Cassegrain. Mark, Bob and Emily operated the second 8-inch (20.3cm) Meade Schmidt-Cassegrain, which had no power supply and had to be moved manually. They showed people the Moon, Venus and Jupiter in this unpowered Schmidt-Cassegrain.

Steve Gauthier set up his 10 X 70mm Fujinon binoculars on a camera tripod and showed people the Moon, Venus, Jupiter and Saturn. Bob gave one lady a "Moon Gazers' Guide" card and a "Star Finder" planisphere, which he assembled with tape and showed her how to use out on the roof patio. The visitors were mostly gone with the Observatory being closed down by around 11:20 p.m. after a very interesting and enjoyable evening of astronomy under clearing skies.

Cronyn Observatory Summer Public Night, Saturday, May 9th, 2015

Partly cloudy skies with dark clouds and rain showers moving in from the southwest greeted 14 visitors to Western University's Cronyn Observatory Summer Public Night, Saturday, May 9th, 2015, 8:30 p.m. Professor Martin Houde made his digital slide presentation "Submillimetre Astronomy" before an audience of 11 people (8 adults and 3 children). There were 3 people counted in the dome bringing the evenings total to 14 visitors (10 adults and 4 children).

RASC London Centre was represented by Dale Armstrong, Everett Clark, Mark Tovey, Bob Duff, Tricia Colvin, Steve Gauthier and Peter Jedicke. London Centre member and astronomy graduate student Emily McCullough was telescope operator for the big 25.4cm refractor in the dome. London Centre member Richard Gibbens was also there and listened to the slide lecture.

Emily and Bob supervised as a man took pictures of a young boy sitting on the observing ladder and viewing through the 32mm Erfle eyepiece (137X) in the big 25.4cm refractor, although nothing was visible in the bright southwestern sky.

Tricia set up the RASC London Centre's 25.4cm Dobsonian (17mm Nagler eyepiece, 66X) and others pitched in to set up the Observatory's 2

Meade 8-inch (20.3cm) Schmidt-Cassegrain telescopes on the roof patio only to hastily bring them back inside the dome as dark clouds and rain moved in from the southwest. Dale directed the recently donated 8-inch (20.3cm) Meade Schmidt-Cassegrain (Tele Vue 26mm Plossl eyepiece, 77X) which had no power supply, just inside the dome door so as to view the lights on the communications tower in south London. Mark had brought a MotoMaster Nautilus Battery Pack to power this Schmidt-Cassegrain but it was not needed on this cloudy evening.

The other 20.3cm Schmidt-Cassegrain and the 25.4cm Dobsonian were set up inside the dome for display. The evening was spent in conversation with visitors. Dale set up his tripod and camera with a wide field lens and took pictures inside the dome. Bob and Everett spoke with one girl, later joined by her father, who had brought her Celestron 90mm Maksutov telescope. Dale took a group picture with his tripod and camera at the end of the evening and the Observatory was closed down around 10:35 p.m.

RASC London Centre Star Nights & Public Outreach, April —May

By Robert Duff

Star Night, Sparks @Camp Orenda, Saturday, April 25th, 2015

Partly cloudy skies with some hazy clouds greeted 5 RASC London Centre members for the Sparks Star Night at Camp Orenda, Saturday, April 25th, 2015, 8:00 p.m. They were greeted by 12 Sparks (ages 5-6) and their parents (12 adults) of Sparks Unit 119, who were in the Chapandale Building, and 5 Rangers for a total of 29 people. Camp Orenda is on Truman Line Road, east off Highbury Avenue south of London towards St. Thomas. Bob Duff set up his Meade Starfinder 8 (203mm) Newtonian on its Dobsonian mount; Steve Imrie, his Orion SkyQuest 8-inch (203mm) Dobsonian; Rick Saunders, his 80mm Stellarvue Night Hawk refractor on a Sky-Watcher HEQ-5 equatorial mount; and Norman McCall, with his Explore Scientific 152mm Maksutov-Newtonian Comet Hunter.

While other RASC London Centre members were setting up their telescopes outside, London Centre member and Western University Astronomy graduate student Emily McCullough greeted the Sparks in the Chapandale Building. Emily did some activities to help five and six year olds understand the astronomical objects they would later view through telescopes. They examined posters of the Sun and planets and their moons, with special attention to Jupiter and Venus. They acted out the solar system showing where the planets were in relation to each other and the stars. After seeing Jupiter and its Galilean moons through the telescopes, the girls were interested in again looking at the NASA images of these moons and comparing them with the Earth and our Moon.

Bob began by showing them the first quarter Moon in his 203mm Dobsonian telescope, with a Meade MA25mm eyepiece (49X) and soon swapped in his 7mm Nagler eyepiece (174.3X) for a better view. Everybody was impressed by the craters and remarkable detail visible on the Moon's surface. Bob then showed them Venus and Jupiter, which were impressive in his telescope, using the 7mm Nagler eyepiece (174.3X). The double stars Castor (in the constellation Gemini) and Algieba (in Leo) were later nicely split in Bob's 203mm Dobsonian telescope.

Steve Imrie showed everybody the Moon, Venus and Jupiter in his Orion SkyQuest 8-inch (203mm) Dobsonian, using a 25mm eyepiece (48X) and doubling the magnification with a 2X Barlow lens (96X). Rick Saunders showed them Jupiter, Venus and the Moon in his 80mm Stellarvue Night Hawk refractor. Norman McCall also showed them the Moon, Venus and Jupiter in his Explore Scientific 152mm Maksutov-Newtonian Comet Hunter.

Rick observed the Iridium flare around 9:46 p.m. but this was not seen by either Steve or Bob. The Sparks were gone by around 9:30 p.m. with RASC London Centre members packing and leaving around 10:00 p.m. after an enjoyable evening of astronomy for everybody.

Star Night @Matthews Hall School, April 28th, 2015

Mostly clear skies greeted 6 RASC London Centre members with 5 telescopes for the Star Night at Matthews Hall School in London, Tuesday, April 28th, 2015, 8:00 p.m. Norman McCall set up his Explore Scientific 152mm Maksutov-Newtonian Comet Hunter and was soon joined by Bob Duff with his Meade Starfinder 8 (203mm) Newtonian on its Dobsonian mount; and Dale Armstrong, with his 25.4cm Newtonian reflector on its alt-azimuth mount. Peter Jedicke arrived bringing Mark Tovey, with his 20.3cm Celestron CPC 800 GPS Schmidt-Cassegrain, and Ryan Fraser brought his 20.3cm Sky-Watcher Dobsonian.

The Star Night involved the whole school from JK to Grade-8 and outdoor lighting was turned off for better viewing through telescopes. There were an estimated 100 enthusiastic children and parents lining up to view through the telescopes asking many informed and thoughtful questions. Bob began by showing a few people the 3-day-past-first-quarter gibbous Moon in his 203mm Dobsonian telescope, with a Meade MA25mm eyepiece (49X) and soon swapped in his 7mm Nagler eyepiece (174.3X) for a better view. The children and adults were impressed by the craters and other remarkable detail visible on the Moon's surface. Bob then showed them Venus and Jupiter, which were an excellent view in his telescope, using the 7mm Nagler eyepiece (174.3X). Venus appeared brilliant white at half phase and Jupiter was impressive with the cloud belts visible on its surface and the 4 Galilean moons arrayed to the east of the planet. Bob directed his telescope towards the Moon again near the end of the evening, which made an excellent view in the 7mm Nagler eyepiece (174.3X).

Norman McCall showed them the Moon and Jupiter as well as the Beehive star cluster (M44) in his Explore Scientific 152mm Maksutov-Newtonian Comet Hunter telescope. Dale Armstrong showed them the Moon, Jupiter and Venus in his 25.4cm Newtonian reflector (with the aid of a step ladder provided by the school). Mark showed them Jupiter in his 20.3cm Celestron CPC 800 GPS Schmidt-Cassegrain and viewed the Moon himself. Ryan Fraser showed them Venus and Jupiter in his 20.3cm Sky-Watcher Dobsonian.

Everybody was gone by around 10:20 p.m. and the RASC London Centre members packed up their telescopes to leave after a very successful and very much appreciated school star night.

Slide Presentation & Star Night, St. Thomas Field Naturalist Club, May 1st, 2015

RASC London Centre member Peter Jedicke made his digital slide presentation "Our Wonderful Heavens" before some 55 members of the St. Thomas Field Naturalist Club in the basement room of Knox Presbyterian Church in St. Thomas, Friday, May 1st, 2015, 19:30h. He was joined by fellow London Centre members Steve Imrie and Dennis Giasson.

Steve hosted a short observing session in the church parking lot after Peter's slide talk, and was joined by Dennis. Setting up his Orion SkyQuest 8-inch (203mm) Dobsonian, Steve showed people the 2-day-prior-to full gibbous Moon, using his 25mm eyepiece (48X) and then doubling the magnification with his 2X Barlow lens (96X) as well as Venus and Jupiter (96X).