Peterborough Astronomical Association

The Reflector

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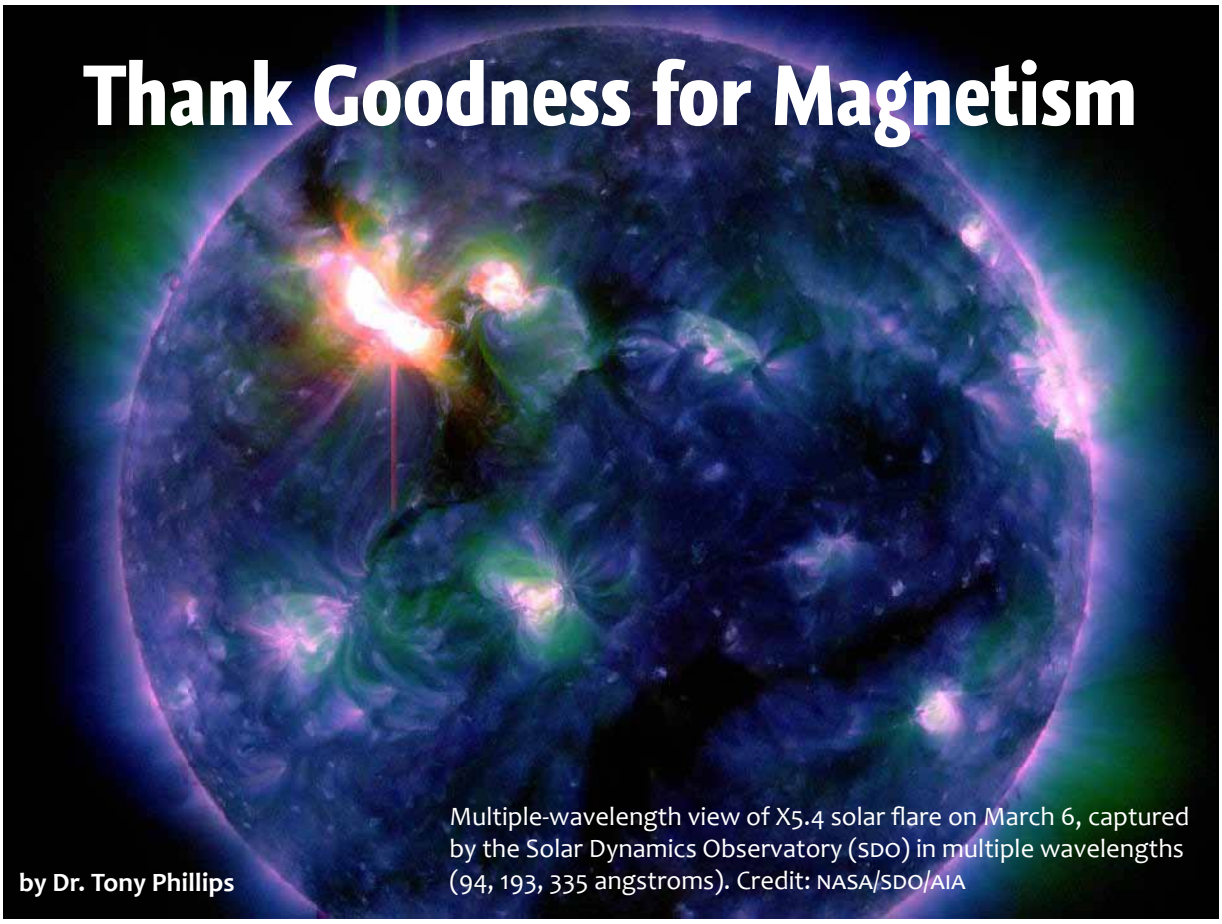
Thank Goodness for Magnetism



Multiple-wavelength view of X5.4 solar flare on March 6, captured by the Solar Dynamics Observatory (SDO) in multiple wavelengths (94, 193, 335 angstroms). Credit: NASA/SDO/AIA

by Dr. Tony Phillips

Only 93 million miles from Earth, a certain G-type star is beginning to act up.

Every 11 years or so, the solar cycle brings a period of high solar activity. Giant islands of magnetism — "sunspots" — break through the stellar surface in increasing numbers. Sometimes they erupt like a billion atomic bombs going off at once, producing intense flares of X-rays and UV radiation, and hurling massive clouds of plasma toward Earth.

This is happening right now. Only a few years ago the Sun was in a state of deep quiet, but as 2012 unfolds, the pendulum is swinging. Strong flares are becoming commonplace as sunspots once again pepper the solar disk. Fortunately, Earth is defended from solar storms by a strong, global magnetic field.

In March 2012, those defenses were tested.

At the very beginning of the month, a remarkable sunspot appeared on the Sun's eastern limb. AR1429, as experts called it, was an angry-looking region almost as wide as the planet Jupiter. Almost as soon as it appeared, it began to erupt. During the period March 2nd to 15th, it rotated across the solar disk and fired off more than 50 flares. Three of those eruptions were X-class flares, the most powerful kind.

As the eruptions continued almost non-stop, Earth's magnetic field was buffeted by coronal mass ejections or "CMEs." One of those clouds hit Earth's magnetosphere so hard, our planet's magnetic field was sharply compressed, leaving geosynchronous satellites on the outside looking in. For a while, the spacecraft were directly exposed to solar wind plasma.

Charged particles propelled by the blasts swirled around Earth, producing the strongest radiation storm in almost 10 years. When those particles rained down on the upper

see "Solar Flare" on page 16

President's Message

Hello Summer, Goodbye Meetings

The 7th annual "Astronomy on the Hill" is now behind us. Although the weather could have been better we had a successful event. Thank you to all the members that participated. An article on the event appears in this issue complete with some photos. Be sure to check the website for a list of the attendance draw winners and more photos.

June marks our last meeting before our summer break. Meetings are discontinued until September but this does not mean the end of activities for the PAA. Our next publicized event will be the "Transit of Venus" on June the 5th. We will set up on Armour Hill at 5:00 p.m. to be ready for the start of the transit at 6:00 p.m. then stick around until midnight to give the public more opportunity to scan the wonders of our night sky. The news release for this event is included in this issue of *The Reflector*. Then in August we will be back "on the hill" for the Perseids meteor shower. Keep checking the website, e-mail reminders will be sent out as well.

I wish everyone a safe and fun filled summer with lots of clear skies. Keep observing and we'll see you in September if not before.

Rodger Forsyth
PAA President

Letter from the Editor

Summer Salute

The summer hiatus is almost here: one more club meeting and this is the last newsletter for the next two months. But don't be a stranger. Come on out to Armour Hill on June 5 for the transit of Venus across the Sun. Hope for clear skies that day.

Then on August 12th come back to Armour Hill for the Perseid meteor shower. Again, wish for clear skies.

In this issue we have a report from May's Astronomy on the Hill event by Rodger Forsyth. A last minute submission also allows Rodger to report on Girl Guides camping weekend at Emily Provincial Park on May 26th.

John Crossen sets us up nicely for the Venus transit on June 5th and also provides us with his usual erudite updates of the astronomical world.

Rick Stankiewicz rants about the Super Moon, makes the most of the annular solar eclipse on May 20th, and reviews Dava Sobel's new book on Copernicus. If you have never read a Dava Sobel book then this is your chance to get acquainted with her writing. I guarantee you will not be disappointed.

Until September, having a celestial summer.

Phillip Chee
Editor, The Reflector

Peterborough Astronomical Association

The Reflector is a publication of the Peterborough Astronomical Association (P.A.A.) Founded in 1970, the P.A.A. is your local group for astronomy in Peterborough and the Kawarthas.
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Venus Glides Across the Face of the Sun on June 5

John Crossen

Imagine having a ring-side seat to witness the planets in motion. Using a proper solar filter you can observe Venus as the planet passes in front of the Sun. Silhouetted against the giant fireball of the Sun, tiny Venus will slowly pass from one side of our celestial furnace to the other. It's the last time it will happen this century, so amateur and professional astronomers across Canada are hoping for clear skies.

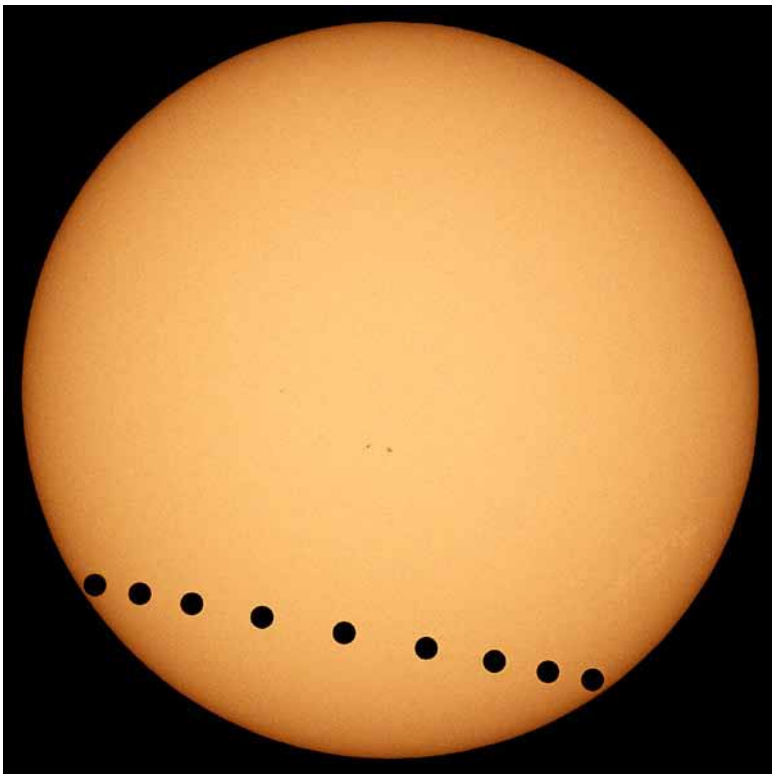
Called a transit, the event occurs to both of the planets that are inside Earth's orbit — Mercury and Venus. What makes these transits so rare is the fact that the orbital planes of the planets aren't quite on the level. Instead they vary by a few degrees and only line up occasionally. When that happens we can look straight across from Earth's orbit and see either Mercury or Venus pass across the Sun's face. The last Venus transit was in 2004. The next one is on June 5, 2012. After that you'll have to wait until 2117 for Venus to make a repeat performance.

To best observe the transit you'll need a proper glass or Mylar solar filter and a small telescope. But the transit can be observed with out telescopic aid. To do so a #14 welder's mask is sufficient. Venus's disc will just be visible, so the telescope option is preferable.

For those of us in the Kawarthas the transit begins at 6:05 p.m. So the Sun will still be well up in the sky. Sunset on June 5 will be at 8:55 p.m. thus giving you almost 3 hours to enjoy the sight — provided you have an open view to the west.

The rest of June pales by comparison to the Venus transit. But change is rising on the eastern horizon. The familiar spring constellations will be slowly drifting to the west while the summer constellations will be rising in the east. Mars will still be in the constellation Leo, but the big cat will be dipping below the sunset horizon for a catnap until next spring. So look east for what's new.

Summer brings with it the Summer Triangle, an asterism consisting of the brightest stars in the constellations Lyra, Cygnus and Aquila. The summer Milky Way will be stretching from the southern to the northern horizons. Along the way it will pass directly through the Summer Triangle. Only 25% of the world's population have seen the Milky Way due to the enormous light pollution in urban areas.



Transit of Venus 2004. The last transit of Venus was in 2004 — shown here in progressive images. After the June 5, 2012 transit you'll have to wait until 2117 for an encore.

Our old friend Saturn will still be Virgo's travel companion and will be visible all summer long. In early June Saturn's rings will be tilted by 12.6 degrees, so those with even small telescope should be able to see the gap between the planet and its rings. Larger instruments — 6- to 8-inches will show the gaps between the rings as well as the planet's shadow against the rings.

The Sun Rules June

Partial Eclipse of the Sun. If you're in western Canada on June 4 you'll have the opportunity to witness a partial eclipse of the Sun.

John Crossen

I'm not just talking about those lazy hazy days of summer, welcome though they may be. Instead there's the transit of Venus across the face of the Sun near 6:05 on the evening on June 5. Plus one day prior to that Canada's west coast, most of the U.S. west along with Australia and Asia will be treated to a partial eclipse of the Sun. So a lot of people will be having fun with the Sun as well as fun in the Sun.

Unfortunately those of us in the Kawarthas will be left out of the eclipse's path, so we'll just have to settle for the Venus transit. And that's not bad because there won't be another on for over a century.

The transit of Venus has a lot in common with one of the techniques for discovering exoplanets — those planets orbiting distant stars. The technique measures incredibly small dips in the star's brightness. Those dips in the star's light indicate that there is a planet orbiting its home star — just like Venus does as it crosses the face of our Sun.

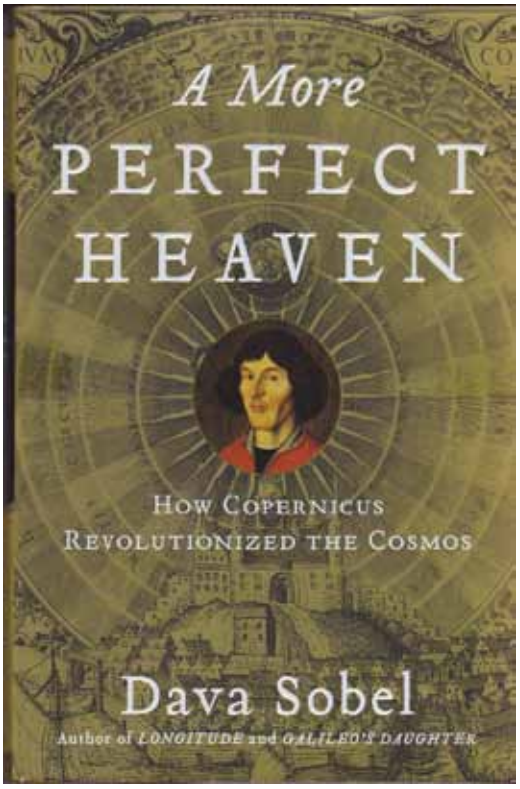
Speaking of exoplanets, the current confirmed count has topped 700 and is growing daily. Unfortunately we won't be visiting them soon. They're hundreds to thousands of light-years away. With our current rocketry those distances will take generations of human lifetimes to travel.

See "June Happenings" on page 14

BOOK REVIEW

A More Perfect Heaven
How Copernicus Revolutionized The Cosmos

Rick Stankiewicz



Dava Sobel
ISBN-10: 0802717934
ISBN-13: 978-0802717931
Penguin, 2011

For anyone who has read other books by Dava Sobel like, *Longitude*, *Galileo's Daughter* or *The Planets*, you will not be disappointed with this book. It is an easy read of only 238 pages, plus some nicely researched Copernican Chronology and Quotational Notes are an added bonus.

After just having read Owen Gingerich's book about Copernicus I could hardly wait to see what Sobel had to say and how she would frame it. It was a perfect follow-up to Gingerich' s work. However, just when you think that you know what to expect she throws a curve ball. In the middle of the book is "a play", that you can follow like you are a character in. You can pick whichever character you like because the whole play is laid out for you. It was a delightful interlude and fit nicely with the overall flow of the book.

I guess it does not hurt that I like all things Copernican and this somewhat biographical treatment of Copernicus's life is about as well researched and portrayed in simple terms as you could hope for. I found that many questions were answered about Copernicus and the author does not stop at his death, but instead illustrates the impact his work had in the centuries that followed and included the mystery around his burial, so this treatment of Copernicus is brought right into the 21st Century. I highly recommend this book for anyone who likes scientific history.

In communications with Sobel, I learned that there are plans to make a few amendments to this book in time for the release of the paperback version later this year. This will not only make it cheaper, but even better researched piece of work for those that can wait.

She is also working on research for possibly her next book and it will likely be about the women, called "Pickering's Harem" (after observatory Director, Edward Pickering), who worked at the Harvard College Observatory in the late 1800s and how they contributed greatly to science. I can hardly wait.

To all things Copernican!

What's Up in Astronomy?

John Crossen

Astronomers are contantly making new discoveries, so here's a brief review of some recent newsy items. Let's start with the wild and wonderful world of exoplanets.

These planets orbit distant stars, some like our own Sun. Early on in the exoplanet search astronomers could only detect the largest planets. Called Super Jupiters, these giants were as much as ten times larger than our Jupiter. Technology has advanced since the first discoveries and the size of the detectable planets has shrunk down to the point that Earth-sized exoplanets can now be found. Astronomers recently topped that with the discovery of three exoplanets smaller than Earth. The trio is orbiting a red dwarf star named KOI-961. This find opens up a whole new universe of exoplanets orbiting very small stars.

Hot on the tail of that discovery is news of two exoplanets, each orbiting two suns. Once thought to be the realm of science fiction, the discovery is proof that the universe is stranger than we can imagine. These new additions come courtesy of the Kepler Exoplanet Mission. Both the exoplanets are in stable orbits around their binary stars. Named Kepler 34b and 35b, the planets are Jupiter sized. Combined with the previous discovery of Kepler 16b, this brings us up to three exoplanets orbiting two suns.

The Kepler Mission has delivered 1,200 exoplanet candidates for astronomers to analyse. The number of confirmed exoplanets has topped 500 and the current estimate for exoplanets in our Milky Way galaxy alone is 100 billion. So what's to be discovered next? How about rogue planets drifting through space with no sun-like star to orbit? Planets can be gravitationally flung out of their solar systems.

The Canada-France-Hawaii Telescope is being used to map the mysterious dark matter that makes up 90% of the universe. Dark matter can't be seen, hence it's name. But it does warp light and that is what astronomers are basing their research on. So far they have been able to map dark matter out to a distance of about 6 billion light-years.

Image of auroras on Uranus. The same phenomenon that gives us Northern and Southern Lights on Earth also cause aurora on distant planets like Uranus.

While on the subject of light it should be noted that light and radio waves travel at the same speed—roughly 300,000 kilometres per second. So since the first commercial radio broadcast

See "Auroras on Uranus" on page 15

Join the PAA on Armour Hill for the Transit of Venus

On June the 5th the planet Venus will cross the face of the Sun! This is called a "transit" and this won't happen again until the 22nd century. Be a part of history, as there have only been six of these transits of Venus ever observed in recorded history. You won't want to miss this one or you will have to wait 105 years for your next opportunity.

Come join the Peterborough Astronomical Association (PAA) to observe at this free public event at Ashburnham Memorial Park on Armour Hill. Please park in the parking lot of the Peterborough Museum and Archives and walk up the hill. WARNING! Never look at the Sun without proper eye protection! A number of safe solar-filtered telescopes will be set up and members of the PAA will be there to demonstrate and answer questions. Be early because the transit will commence at about 6:00 p.m. and will continue until sunset (9:00 p.m.). From our location, Venus will complete its journey after sunset and out of our view. This event is weather dependent.

After the transit, members of the PAA will remain on the hill until midnight with their telescopes set up to potentially view Mars, Saturn and many other wonders of our night sky. The Moon will make an appearance around 11:00 p.m.

PHOTO GALLERY

Astronomy on the Hill 2012

Another weekend on Armour Hill is behind us and at least the weather was better than last year. Not perfect, but better. Saturday night was for the most part cloudy but there were fleeting moments where the planets Venus, Mars and Saturn peeked through. Indeed the "holes" in the clouds seemed to favour these planets. Somebody up there liked us. We probably had upwards of 60 people attend on Saturday night.

Sunday afternoon was certainly better and there was some good solar viewing. Many people had never looked at the sun through a telescope and were at awe with the sunspots. Explaining that the largest sunspot was about 16 times the diameter of the Earth and the smallest about Earth's diameter simply "blew them away." Rick had about 30 people total spread out over 4 shows in the planetarium. Dean manned the information booth as usual and Trish was kept busy with the tattoos. Brett, Mark, Boyd, John Cameron and I manned the telescopes. John Crossen entertained a group in the portable with a slide show and answered many questions.

We handed out 13 attendance prizes which included passes to the B.H.O., a star finder, Moon Phase wheel, one family membership to the PAA and an autographed copy of *Night Watch* by Terence Dickinson. The list of winners is on the club's website.

Note: More photos of Sunday afternoon are available on the website.

Rodger Forsyth

Photos by Rodger Forsyth

What is a Super Moon?

Rick Stankiewicz

I would suggest that the Moon is always "super" to look at. It drives me crazy that the media have "created" a phenomenon. Maybe it is all a matter of perspective? I could buy into the original "Super Moon" concept back in March 2011 when the perigee Moon of the year was technically the closest that it had been to Earth in 18 years, but is every perigee moon now a "Super Moon"? Not to me. It seems more like crying wolf.

The attached are some images from Keene, of the Full Moon rising on May 5th

See "Super Moon" on page 15

May Moon and Other Thoughts

John Crossen

May 5 was a king-size occasion for Moonatics. That night saw the largest Full Moon for the year. In fact, you'll have to wait until to 2014 to see anything close to a repeat performance.

The last "Super Moon" was in 2011 and many people noted that it seemed unusually bright. I did a little photo check on the Full Moon's size over the course of a few months. Full Moons varied by about 10% in size, which was quite apparent in my photographs. The reason is that the Moon has an elliptical orbit around Earth. Sometimes it is closer to us than at others. As a result the Full Moon's size appears to change.

Moon with Airplane Silhouette. May's Full Moon is known as the Milk Moon. Why? Ask a cow.

The night sky is now home to the spring constellations. Leo is visible in the south as night falls. It is also where Mars lurks. Just look for the bright red "star" near Regulus, the lion's heart. That's the angry red planet.

Saturn is in the constellation Virgo as the next door neighbour to the star Spica. Earth is now in a favourable position so that the ringed planet will present its rings to us.

The full roster of spring constellations also includes Corvus the crow, Crater the goblet, Hydra the water snake, Libra the scales as well as Boötes, Hercules and Corona Borealis — the Northern Crown.

To explore them I recommend picking up a copy of Terry Dickinson's *NightWatch*. At $39.95 it's the only astronomy book most people will ever need. You'll find it at Chapters, Coles and any astronomy store.

Along with the merry month of May comes a not-so-merry event, the flight of the biting bugs. But there is a solution. It's called ThermaCell™ and it does something most of the others don't — it works!

I use it exclusively at the observatory, so I'm a convert. The system consists of a butane cartridge that heats a saturated pad which ultimately surrounds you with a 12-

see "Spring Thoughts" on pae 15

Girl Guides at Emily

Rodger Forsyth

On April 30, 2012 I received an e-mail from the co-chair of an annual Girl Guide camp at Emily Provincial Park. They were requesting that the Peterborough Astronomical Association (PAA) come out to the camp to set up telescopes, discuss astronomy, answer questions and generally enlighten the group.

Eight members of the PAA took on the challenge and on May 26th we arrived at the park. Just as we got set up we could hear singing, laughing and general chatter approaching the area where we were. Soon we were overwhelmed by the sheer numbers. A leader told me we had four hundred eager Sparks, Brownies, Guides, Pathfinders, Rangers and Leaders waiting to see the wonders of the night sky. The group ranged in age from five to eighteen and the leaders at eighteen plus. After the initial panic struck at having this many people and only five telescopes we got underway. It was about 7:00 p.m.

Photo by Rodger Forsyth.

Mother Nature was not kind at this point. The Moon teased us through a thin layer of clouds. Lines were forming at the telescopes and the clouds got thicker. Soon there was nothing to see. As the clouds increased we were informed that the entire group would be leaving us for "campfire." We assured them that if the skies cleared we would still be there after dark and there would be some fine viewing indeed.

Photo by Rodger Forsyth.

I think the first sensation at that point was how quiet it was. As the club members stood around and discussed a number of items the clouds for the most part disappeared. Soon we could hear people approaching the area and sure enough a number were back to "get a good look." We didn't disappoint. I can't estimate how many returned but one leader was bringing in five girls at a time, going back and returning with five more. I'm not sure how many trips she made.

The darkness gave us great views of a six day old Moon, Saturn and M13 to name a few. A couple of the girls mentioned that they could see Mizar and Alcor a challenge for any naked eye. I convinced myself that I could see them both as well. I really believe I did, a testament to the sky quality at that point. It was probably close to midnight when we wrapped up.

This turned out to be a very rewarding experience. I don't believe that members of the PAA have addressed a group this large, but I may be wrong.

I have already been informed that the PAA will in all likelihood be asked to return to the camp next year.

We will be there.

Something Is Better Than Nothing

Handheld Olympus — u5010; ISO 400; ¼ sec; f/6.5; exposure compensation –2.0. Phoro by Rick Stankiewicz.

The annular solar eclipse of May 20, 2012 was nothing to write home about, if you were in southern Ontario. At least the weather was clear and sunny for most of the day. If I had not had a convention booked in Toronto that I had to work at, I would have flown to the southwestern United States to see this unusual solar eclipse where the Moon is too small to totally cover the solar disk. Most of North America had to be satisfied with some form of a partial eclipse and such was my lot as I found myself in Toronto on the day of the eclipse. Sunset was scheduled for 8:40 p.m. EDT, so I left the meeting I was at about 8:24 p.m. to check out the bit that I could see with my "eclipse shades" and sure enough I could just start to see a sliver of the Moon entering the lower right corner of the solar disk. I used the eclipse shades to protect the little "point and shoot" Olympus camera I had and the attached (cropped) image was what I captured at that time. Within minutes, the Sun started to sink quickly into the cloudy haze of the western horizon in Toronto and I was not able to see any more of the eclipse than what I captured in those first few minutes. It was very disappointing because if I had been able to find a clear horizon I would have been able to see as much as 17% of the Sun covered by the Moon at sunset, but it was not to be. I had a bus of overseas tourists next to me as I watched the Sun slip into the haze and I passed my "shades" around for some to have a look, but all they could say is that they saw the Sun (which was cool for some of them), but no eclipse. At least I got to see and record something of the event, which once again shows that, something is better than nothing.

Rick Stankiewicz

continued from page 4

June Happenings

If you remember the TV show *Battlestar Galactica* you know the story.

A single light-year is 10 trillion kilometres. Speeding along at 300,000 kilometres per second (km/s) a beam of light can travel that distance in a year — hence the term light-year. With a current top rocket speed of 72,000 miles per hour we'll arrive a few thousand eons later.

Not that we're sitting still. Right now, as you read this, you are moving at 1,600 km/h. That's the speed Earth revolves at during its 24-hour cycle from dawn to dusk to night and back again. But that's just poking along compared to the 29.8 km/s at which we can be clocked orbiting the sun. Still have the need for speed?

Our galaxy — the Milky Way — also rotates. At present it takes 250 million years to make one complete revolution. That means that the human race has only existed for a degree or two of the galaxy's 360-degree rotation. Given that our galaxy is 120 light-years across, that translates into a rotational speed of about 600 km/s. Are we dizzy yet!

As June unwinds, we will see Mars appear to move closer to Saturn in the sky. Mars will now be in the southwest as the Sun sets. The two planets will still be separated by 24 degrees as June comes to an end and will appear to be about the same brightness.

Mars was at its best in March and has been steadily dwindling in size. At present the observatory's 16-inch scope is hard pressed to make out any detail on the little red pea. Saturn on the other hand is still in its glory. The rings are nicely tilted towards us. On a night of steady seeing you can easily make out the gaps in the rings as well as the planet's shadow against the rings. Yes, it looks just like in those coffee table picture books!

The Sky this Month

Mercury reappears in the north west twilight evening sky in the second half of June but becomes dimmer during the month. Passes below Castor and Pollux from June 18-21. The waxing crescent Moon lies south of it on the 21st. Reaches greatest elongation east (26°) by month's end.

Venus transits the Sun on the 5/6th. Reappears in east-north-east dawn twilight during last half of the month. Waning crescent Moon lies near it on the 17th and 18th.

Mars moving eastward (direct motion) in Leo and crosses into Virgo on June 20th. Dimming as it recedes from the Earth.

Jupiter reappears in the dawn twilight low in Taurus. On the 17th waning crescent Moon passes 1° N. Venus in the Hyades joins it late in the month.

Saturn visible in the late evening western sky. Retrograde motion ends on the 26th.

Partial Lunar Eclipse on the 4th but not visible in eastern North America.

Moon Phases

Full Moon	7:12 AM	June 4
Last Quarter	6:41 AM	June 11
New Moon	11:02 AM	June 19
First Quarter	11:30 PM	June 26

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Auroras on Uranus

took place in 1920 we've been announcing our existence to any aliens in our neighbourhood. That means a radio or TV broadcast from 2008 would just be reaching Proxima Centauri, the nearest star after our Sun. Any aliens passing near the star Altair would be picking up news and images from broadcasts made in the mid-1990s.

News of my high school graduation in 1962 would just be reaching an alien ship orbiting the star Castor in Gemini. And my 4th birthday would be taking place just as broadcasts of the end of WWII reached the star Aldebaran. My how time and radio waves fly!

We know that aurora occur on Earth as well as Jupiter and Saturn. We have the pictures to prove it. In 2011 NASA imaged aurora on Uranus taken from Earth. The photos have just been released. They are caused by charged particles from a solar mass ejection interacting with a planet's atmosphere. When these particles interact with Earth's atmosphere they put on a light show we call the Northern Lights.

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Super Moon

over Rice Lake. From my vantage point I waited and waited thinking my watch was wrong, as it was about 10 minutes past moonrise when I caught my first view of the Moon sliding up through a band of clouds at the horizon, that I did not even know were there, like a pen sticking out of a pocket. The colour of the lunar disk was not as impressive as I had hoped, but a nice peachy tinge was still nice. I would call it a "nice" Moon, not a "super" one. I guess we will wait until next year's Moon at perigee and then the hype will start all over? I suspect that it will, but if there is any positive aspect to this, it does heighten the public's awareness astronomically? Keep looking up!

Images taken with a tripod mounted Canon 400D and Sigma 70-300mm lens at 300mm; ISO 100; f/5.6; exp. 1/13th — 1/15th.

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Spring Thoughts

foot no-fly-zone for mosquitoes. I've used it for the last couple of years and it works better than any spray-on, rub-on, citronella candle or mosquito stick that I've ever tried.

For those not charmed by the thought of being the main course on Le Menu d' Mosquito, visit Canadian Tire and Home Hardware. But get there early. It goes faster than beer cans at a biker convention.

Now that cottage season is upon us, please help preserve the night sky in the Kawarthas. Don't leave bright spot lights on all night long. Make sure all your outside lights are shielded so that 100% of the light is directed down. If dock lights are necessary be sure that they are on motion sensors — ditto goes for cottage exterior lights. You'll save energy, money and our dark night sky.

For many cottagers light pollution is no different than the jackass down the lake who blasts his stereo into the wee hours of the night. If you want all the noise and glare of the city ... kindly stay there. This is where people come to escape from it.

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Solar Flare

atmosphere, they dumped enough energy in three days alone (March 7-10) to power every residence in New York City for two years. Bright auroras circled both poles, and Northern Lights spilled across the Canadian border into the lower 48 states. Luminous sheets of red and green were sighted as far south as Nebraska.

When all was said and done, the defenses held — no harm done.

This wasn't the strongest solar storm in recorded history — not by a long shot. That distinction goes to the Carrington Event of September 1859 when geomagnetic activity set telegraph offices on fire and sparked auroras over Mexico, Florida, and Tahiti. Even with that in mind, however, March 2012 was remarkable

It makes you wonder, what if? What if Earth didn't have a magnetic field to fend off CMEs and deflect the most energetic particles from the Sun.

The answer might lie on Mars. The red planet has no global magnetic field and as a result its atmosphere has been stripped away over time by CMEs and other gusts of solar wind. At least that's what many researchers believe. Today, Mars is a desiccated and apparently lifeless wasteland.

Only 93 million miles from Earth, a G-type star is acting up. Thank goodness for magnetism.

With your inner and outer children, read, watch, and listen in to "Super Star Meets the Plucky Planet," a rhyming and animated conversation between the Sun and Earth, at http://spaceplace.nasa.gov/story-superstar.

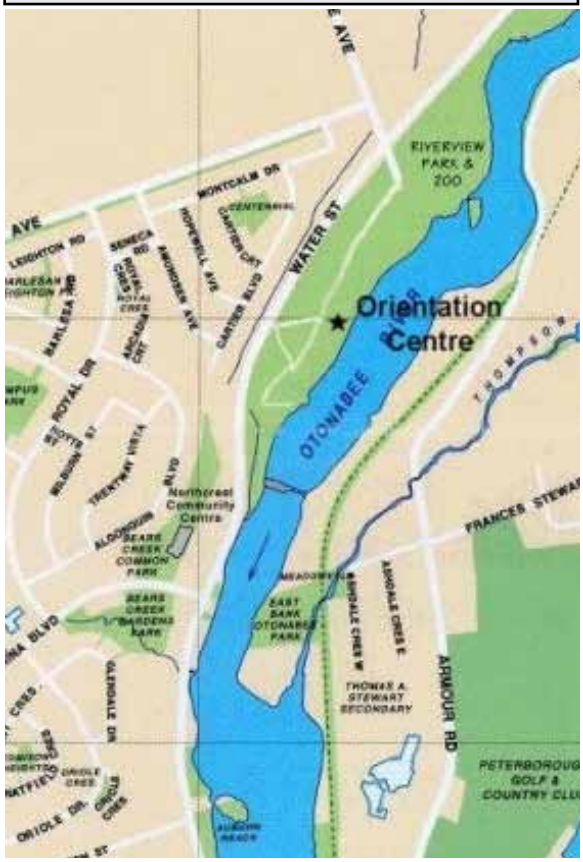
This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Articles

Submissions for *The Reflector* must be received by the date listed below. E-mail submissions are preferred (Microsoft Word, OpenDoc, ASCII and most common graphic formats are acceptable). If your article contains photso or graphics, please provide a separate file for each. Typed or hand-written submissions are acceptable provided they are legible (and not too long.) Copyrighted materials will not be published without written permission from the copyright holder. Submissions may be edited for grammar, brevity, or clarity. Submissions will be published at the editor's sole discretion. Depending on the volume of submissions, some articles may be published at a later date. Please submit any articles, thoughts, or ideas to:

phillip.chee@gmail.com

NEXT SUBMISSION DEADLINE:
AUGUST 24, 2012



Meetings

The Peterborough Astronomical Association meets every first Friday of most months at the **Peterborough Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at 8 p.m. P.A.A. executive business will be conducted starting at 7:30 P.M. Members and the public are welcome to attend the earlier time.