Event Horizon

Volume 22, Number 6
April 2015

From The Editor

This is a smaller E.H. this month, but it's still a goodie!

There's a bit of an aurora theme this time, courtesy of this month's Masthead Photo, Cartoon, and NASA Space Place column.

Enjoy!

Bob Christmas,
Editor

Chair's Report by Jim Wamsley

March has been another busy month for the H.A.A. Starting with the astronomy 101 group meeting on the 5th, again on the 19th. The last classroom meeting will be April 2, with an observing session to follow. The astro photo group met on March 7th. John Gauvreau delivered 4 talks at schools, and libraries, as well as 1100 students at the B.A.S.E.F activity day at Mohawk College. I would like to thank Don Pullen again, for stepping up and helping out with his talk at the March meeting on the 13th when John Gauvreau picked up a terrible cold at a school talk a few days before. Well done Don, an interesting talk. On the 26th, Matthew Mannering and I attended the B.A.S.E.F. to judge the projects for the H.A.A.'s special award (The James A. Winger award; see photo on Page 7). There were over 300 projects, with several qualifying for our award. The winner was very hard to choose, as the quality of the projects was fabulous. We finally determined that the project entitled "Optimizing a Hybrid Rocket Engine" by Matthew McGuire of Ancaster High School, was the best fit for the requirements of this award. The prize of $200.00 will be presented by me at the Awards Ceremony at *(Continued on page 2)*

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Chair's Report (continued)

Mohawk College on March 31st. The club held its first public observing night of the season on the 28th. We had a good showing from the membership, despite the cold and windy conditions. There were about 13 scopes set up for the people that stopped by, as they were traveling on the highway. There were many very interested folks asking questions, and taking in the views of the Moon, Jupiter, Mars, and many other sights. I'm sure everyone had a good time.

April will also be packed with things to do. As I mentioned, Astro 101's final classroom session will be on the 2nd with an observing night to be arranged. The cosmology group will meet on Sat. the 4th. Our monthly meeting takes place on the 10th with John Gauvreau delivering his previously scheduled talk. Our spring Scope Clinic is all set for Fri. the 17th. This event is always well received. Finally, Astronomy Day this year is on Sat. the 25th. We will have solar viewing from 1:00pm till 4:00pm, and the night session will begin at 7:30pm and run until 11:00, weather permitting of course.

Looking further forward, our speaker in May will be Astro Photographer Extraordinaire, Kerry-Ann Lecky Hepburn. In June, we will change it up a little. Instead of a single guest speaker, I have received a suggestion that we have a panel of our most experienced members, answer your questions on astronomy, cosmology, telescope equipment, etc. To do this, I would ask you to please send me an e-mail with questions you would like to ask, and we will have panel members put together short talks with your answers. I'm sure we can look after 4 or 5 of your most pressing questions. Send your questions or other ideas to me at "chair'at'amateurastronomy.org" as soon as you can, to give us time to prepare.

I hope to see you out there at a club event soon.

HAA Helps Hamilton

To support our community, we will be collecting non-perishable food items and cash for local food banks at our general meetings.

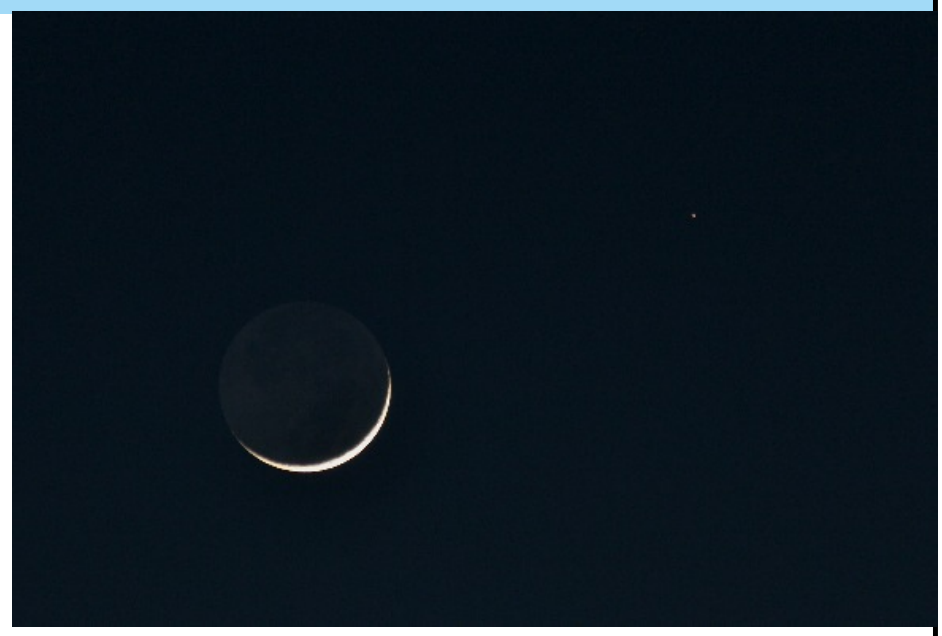
Please bring a non-perishable food item to the meeting or a donation of cash and help us help others.

If you would like to help or have any questions about this initiative, please contact Jim Wamsley at 905-627-4323.

Masthead Photo: *Aurora on St. Patrick's Day, by Ann Tekatch.*
Taken on March 17, 2015 near Westover ON, with a Canon 6D and Sigma 50mm f/2 lens.
ISO400, 15 seconds.

The Sky This Month for April 2015 by Matthew Mannering

Welcome to spring! The heat from the Sun is much more noticeable during the day but the temperatures at night are still in the -10 C range. I was outside on the 21st to see the nice Moon - Mars pairing at around 8:15pm. The moon was a sliver at just over a day old in its cycle. The temperature was still pretty brutal and I didn't stay out for too long. Venus was about 12 degrees overhead of the pair and added very nicely to the scene. In some ways it felt very similar to the Moon, Mars and Venus grouping from the same date in February although the Moon and Venus had swapped positions in the sky. Here's one of the pictures I took of the Moon and Mars.



March 21st – The Moon and Mars
Photo Credit: Matthew Mannering

Other than that, I did manage to get out a couple of times with the 12" Dob. I saw some very nice views of Jupiter including the great red spot. I also looked at some double stars, galaxies and globulars and of course the great nebula M42/M43 in Orion. One night the sky was so clear I could see a 3D-like effect to the cloud structure around the Trapezium. NGC1977 was very easy to spot on the other side of the great black rift that separates it from M43. Normally I would use a narrow band filter to see this much detail.

On Thursday the 26th Jim, John and I spent the day at Mohawk College. Jim and I were there to represent the HAA as special award judges at the BASEF competition. BASEF stands for the 'Bay Area Science and Engineering Fair'. This year we have become a bronze level sponsor of the event. Entries come from grades 7-12 representing many local schools. Every year the HAA awards $200 to the project we think best represents excellence in Astronomy and Physics. Of the 350 entries there were 9 possibilities. In the end, Matthew McGuire got our vote for his project "Optimizing a Hybrid Rocket Engine". Here's a picture of the sponsor board with our club Logo down near the bottom right of the poster.

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The Sky This Month (continued)

The annual Spring Scope Clinic is on April 17th. As always, club members will be there with their scopes set up on different mounts. All members and the public are encouraged to come out and see the equipment and ask the members any questions they may have. Find out what type of scope or binoculars may suit you, which books and software can help you to get started observing. You can even get help with your own scope. Bring it along and someone will assist you.

Now how about what's happening this month. Let's start with the partial Lunar eclipse on the morning of the 4th. The Moon will set just before 7:00am. At that time, the face of the Moon will be about half way into the Earth's shadow. You must find a clear view of the western horizon to catch the Moon just as it sets.

The next event happens on the morning of the 8th at 6:00am. At that time Saturn will be two degrees to the East of the Moon in the constellation Scorpius. Shortly after 6:00am the sky will start to lighten so that's about as late as you can wait to take your pictures. *(Continued on page 5)*

The Sky This Month (continued)

On the evenings of April 10-12 Venus is just 3 degrees from the Pleiades in the West. At 9:30pm of each evening, the grouping will be roughly 20 degrees above the horizon so you will have about 45 minutes to look at them.

Lastly on April 30th at 9:00 pm look for Mercury only 1.5 degrees from the Pleiades. You will have a very short window to observe them as they are just 10 degrees above the western horizon.

This year, Astronomy Day will be held on Saturday April 25th. On that day the club will be at Bayfront Park in Hamilton. There will be solar viewing from 1-4pm and nighttime observing from 8-11:00pm. The Moon will be at first quarter and Jupiter will be riding high in the sky so come on out for a look at the sky and a chat with some of our members.

The Moon:

Libration this month is as follows: The Northern limb will be most exposed on the 23rd and the Southern limb on the 11th. The Eastern limb will be most exposed on the 23rd and the Western limb on the 10th.

The Planets:

- ***Mercury*** begins its evening appearance around April 22. Look for it at 8:50pm 5 degrees above the western horizon. By the end of April it will appear 12 degrees above the horizon at the same time.
- ***Venus*** climbs higher into the Western evening sky all through the month. At magnitude -3.6 it outshines everything else in the night sky except for the Moon.
- ***Mars*** continues to get lower in the west this month. The best time to see it is about a half hour after sunset. By the end of the month it will be much harder to see as it disappears into the west.

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The Sky This Month (continued)

- ***Jupiter*** is still in its prime this month. Look between Leo and Cancer. At about 9:00pm it will be due South about 60 degrees above the horizon and won't set until well into the wee hours of the morning.
- ***Saturn*** rises at 12:30am on the 1st and at 10:30pm by months end. Wait for at least an hour after those times to start observing.
- ***Uranus*** and ***Neptune*** are both too close to the Sun to be viewed through the month.

Other Events:

-April 4th:	Partial Lunar eclipse. Moon set just before 7:00am.
	Full Moon.
-April 8th:	Saturn only 2 degrees from the Moon at 6:00am.
-April 10th -12th:	Venus passes the Pleiades.
-April 11th:	Last quarter Moon.
-April 17th:	Scope Clinic.
-April 18th:	New Moon.
-April 22nd:	Mars and Mercury only 1.3 degrees apart low in the west after sunset.
-April 25th:	First quarter Moon.
	Astronomy Day. Public viewing at Bayfront Park.
-April 30th:	Mercury passes the Pleiades.

Comet Lovejoy in Cassiopeia

Comet C/2014 Q2 (Lovejoy) in Cassiopeia, March 9, 2015, by **Bob Christmas**
ISO 1600, f/2.8, Canon 40D & Tamron 300mm lens, 33 x 1 min exposures, tracked on SP EQ mount.
Also appears in Sky & Telescope's Meteor, Comet & Asteroid gallery:
http://www.skyandtelescope.com/online-gallery/comet-lovejoy-c2014-q2-in-cassiopeia/

2015 H.A.A. James A. Winger Prize Presentation at B.A.S.E.F.

On March 31, 2015 at the B.A.S.E.F. Awards Ceremony, H.A.A. Chair Jim Wamsley proudly presented the H.A.A.'s James A. Winger prize to Matthew McGuire for his project "Optimizing a Hybrid Rocket Engine". *Photo Credit: Celia Wamsley*

Draw for a Beginner's Reflecting Telescope

The H.A.A. will raffle off a beginner's telescope at the April 10th General Meeting.

This is a Tasco 4" Newtonian reflector with .905" eyepiece and EQ mount.

This is a great telescope for a beginner just starting out in this wonderful, rewarding hobby of astronomy.

Video Game Review — Kerbal Space Program by David Tym

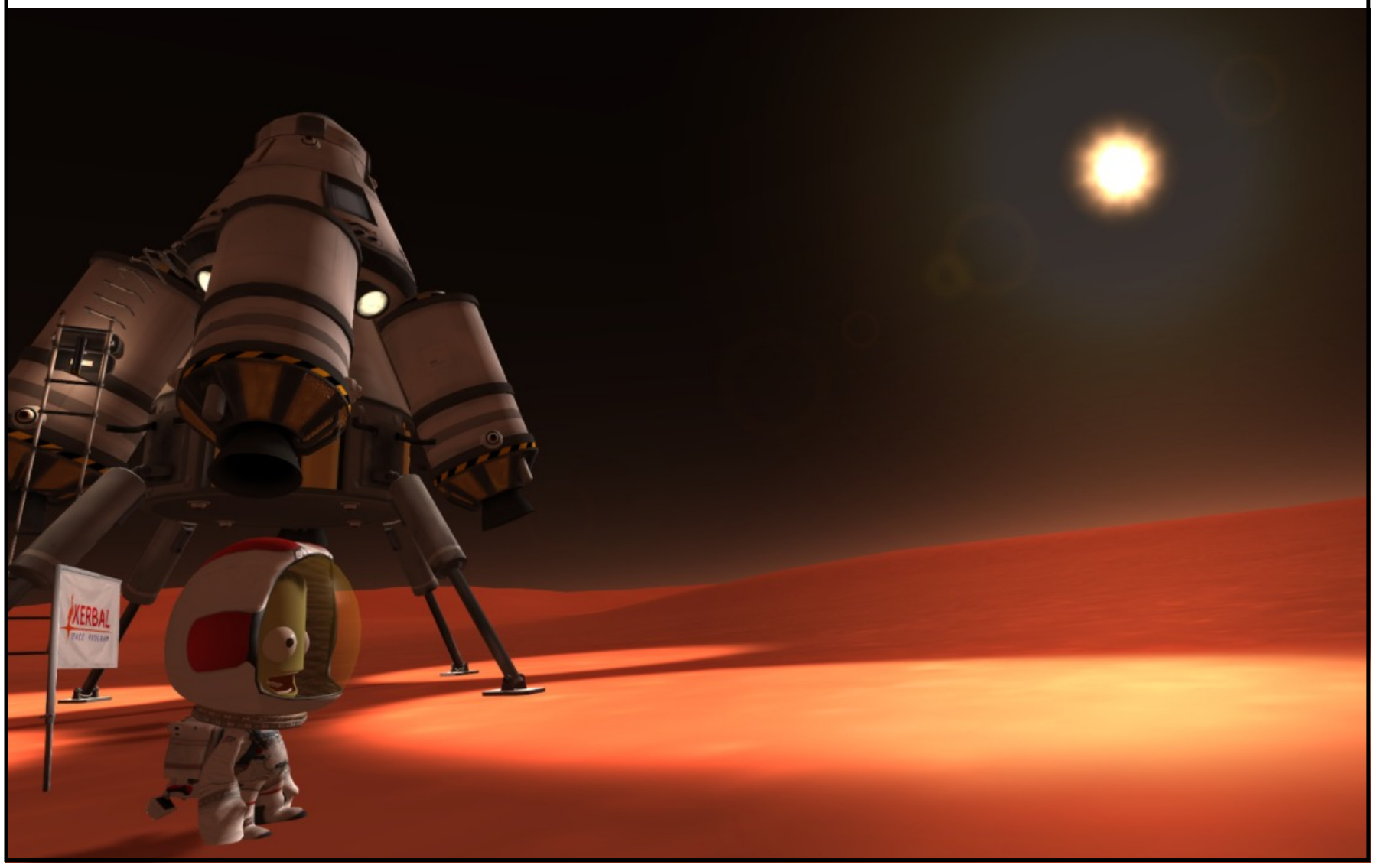
Have you ever wanted to run your own space program? How hard can rocket science be anyhow? Thrust shoots out the bottom and your rocket goes up, right?

Kerbal Space Program is a PC video game where you can manage your own space program and build your own rockets. Test your creations by launching hapless Kerbal astronauts into space, or into the ground, or just to explode on the launch pad. It turns out rocket science is pretty hard but a lot of fun!

KSP provides you with various rocket parts and through trial and error you'll take your first timid steps by launching a satellite into orbit. As your skill increases you might orbit Mun (Kerbal's Moon) or even venture out into deep space and land on the many solar system bodies available. There will be spectacular crashes but also great triumph as you figure out how to navigate to distant planets, hoping you designed your craft well enough to land and plant your flag for the first time.

Build your own rovers, construct a lunar base, and create space stations while trying not to leave too many Kerbals stranded on distant worlds. Did you forget fuel for a return trip home? That's a perfect excuse for a clandestine rescue mission; space is your play thing!

KSP is both a lot of fun and teaches many of the basics about space flight, orbits and launch windows. KSP can be purchased from www.kerbalspaceprogram.com or via Steam www.steampowered.com.



Kepler 186-F: Earth 2.0 or Earth's Galactic Cousin? by Derek Taylor

Tremendous advancements in our ability to observe the heavens has lead to the discovery of many new exo-planets. Although many observers have discovered exo-planets, NASA's Kepler telescope has drastically lengthened our known list of exo-planets. Many of the exo-planets discovered by the Kepler telescope appear to be celestial bodies incapable of sustaining carbon based life, similar to life found on Earth. However there are a select few exo-planets that may appear to have Earth-like characteristics, hence the ability to sustain carbon based life.

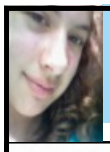
Of the few earth-like exo-planets that the Kepler telescope has observed, the exo-planet bequeathed the name "Kepler 186-F" has stood out amongst its peers, orbiting Kepler 186 only a mere 490 million light years away from Earth. On the outskirts of the orbital zone of the red dwarf star Kepler-186, Kepler 186-F is the only planet of five planets that orbit Kepler 186 that may have the ability to sustain carbon-based life. The exo-planets, Kepler 186 B-E, absorb far too much radiation from Kepler 186 to sustain life.

On the contrary, Kepler 186-F orbits on the outer boundaries of the habitable zone, thus having the potential to sustain life. Based upon the size of Kepler 186 and the orbit of Kepler 186-F, it is estimated that Kepler 186-F absorbs approximately 32% of the radiation that Earth would absorb from its sun. Although this level of radiation is on the outer boundary of habitable, Kepler 186-F is considered habitable for the entirety of its 129.9-day orbit of Kepler 186.

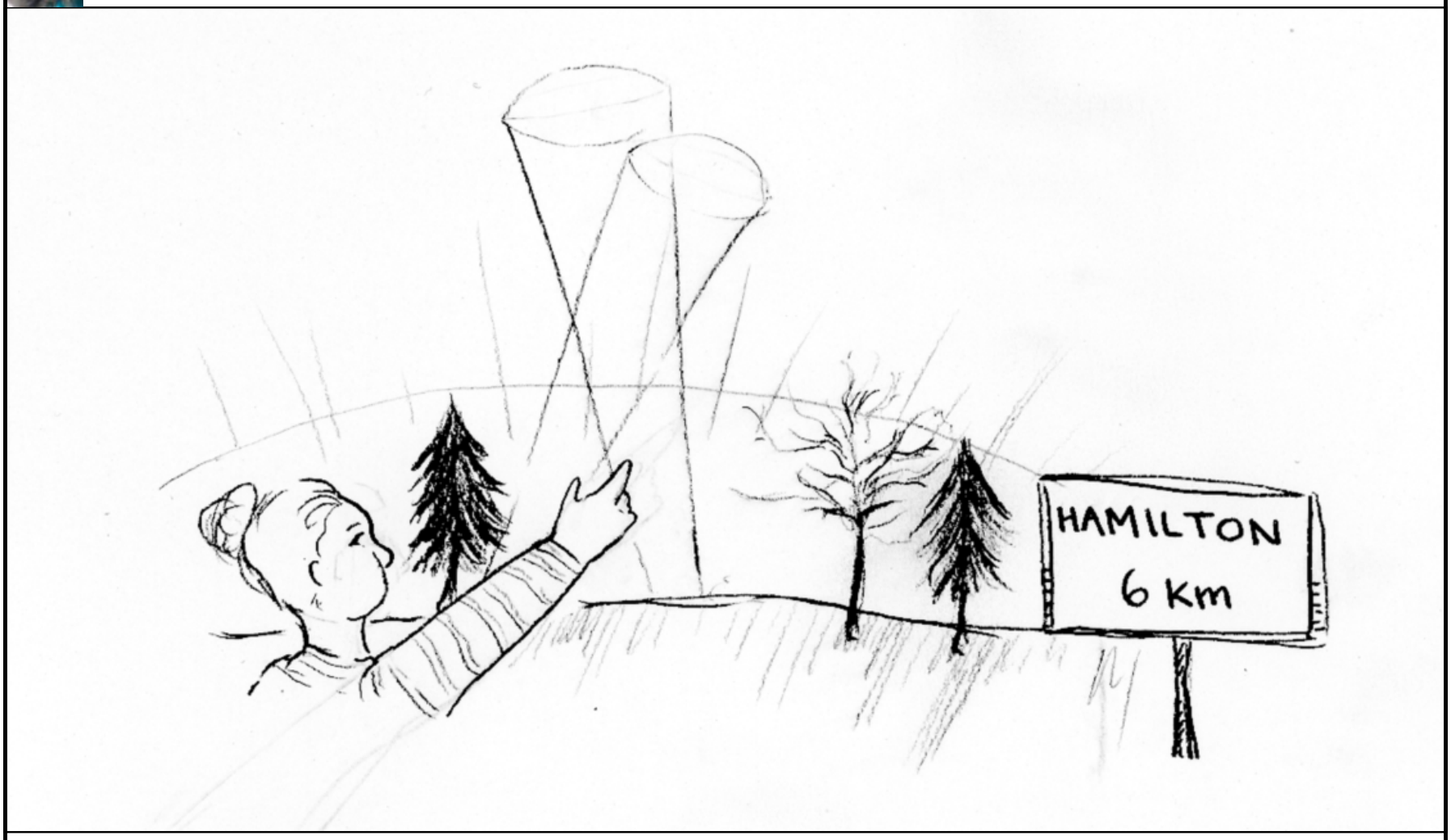
The characteristics of Kepler 186-F that have deemed it to be "earth-like" by many observers lie within the composition of its atmosphere and its physical composition. The composition of the atmosphere of Kepler 186-F is estimated to consist of many of the same elements as Earth's atmosphere. Similar to Earth, a significant percentage of Kepler186-F's surface is understood to be comprised of H_20, with deep reservoirs akin to Earth's deep oceans.

Although there are many similarities between Earth and Kepler 186-F, there are also significant differences between the two celestial bodies. The greatest difference lies not in the composition of the planet; rather within the relation between the planet and its star. Kepler186-F orbits at approximately 32.5 million miles from Kepler 186. Kepler 186 is a Red Dwarf Star, with a solar mass of .48M. Given the relatively small nature of Kepler 186, Kepler 186-F will only receive approximately 88% to 25% of the illumination that Earth receives from the Sun. Given the drastic differential of solar energy that Kepler 186-F receives; the climate would be significantly erratic when compared to Earth. The size differential between Earth and Kepler 186-F must also be taken into consideration. Although Kepler 186-F is only 1.1 Earths, the 10% size differential will create a thicker atmosphere, thus altering the climate.

Since the discovery of Kepler 186-F on April 17th, 2014, the media and scientific community have been abuzz with anticipation that we may have found our galactic sibling. There has been significant speculation that Earth dwellers could one day inhabit Kepler 186-F, once the inevitable day arrives that our sun dies or the ever more likely possibility that human action makes earth unsustainable for human life. However, this possibility of emigrating to Kepler 186-F is beyond improbable and borderline impossible. Putting aside the lack of required technology and our likely inability to co-ordinate an Earth-sized mass emigration, it is unlikely that Kepler 186-F could sustain human life. The inconsistent energy that it receives from Kepler 186 and thicker atmosphere would create significant temperature swings and erratic climate patterns. Opposed to being our sibling, Kepler 186-F is more akin to our third cousin, twice removed. Kepler 186-F would be unable to sustain human life. Despite this conclusion, it is still important to observe and study Kepler 186-F and similar exo-planets. Expanding our knowledge of other "earth-like" planets not only pushes the boundaries of what we know about the Universe, but it also helps us to better understand ourselves.



Cartoon Corner by Alexandra Tekatch



The Northern Lights as seen from the Binbrook Conservation Area

Treasurer's Report by Steve Germann

Treasurer's report for March 2015 (Unaudited)

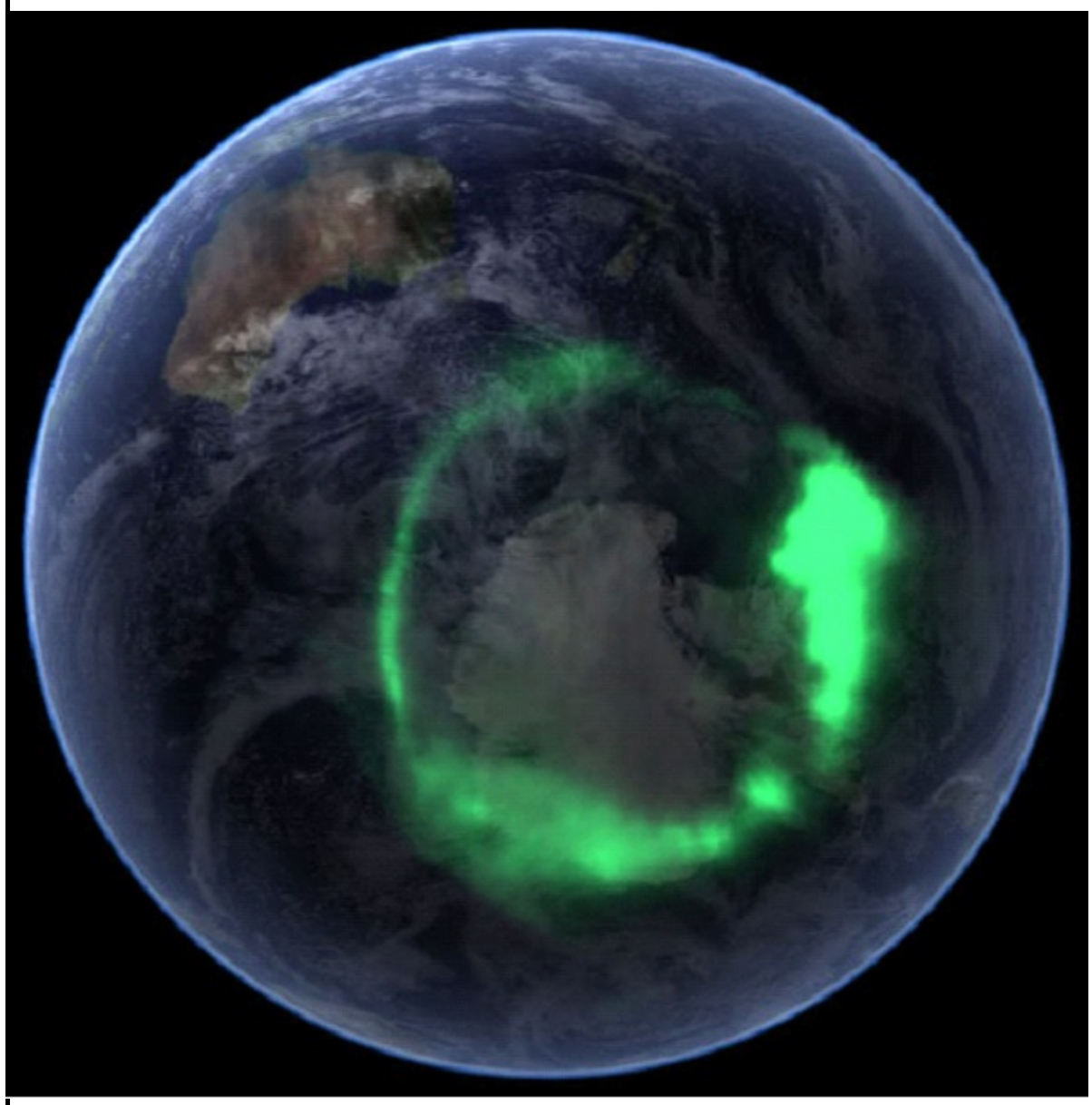
Opening balance:	$8,092.70
Revenue:	$249.00
Expenses:	$384.20
Closing Balance:	$7,957.50

Revenue consisted of $69 from 50/50, $60 from calendar sales, and $120 from memberships.
Expense was planispheres, $384.20.

Calendar revenue is now $2,875 for approximately $756 in net revenue.
Thanks to everyone who bought a calendar.

The Cold Never Bothered Me Anyway

By Ethan Siegel



Auroral overlays from the IMAGE spacecraft.

Image credit: NASA Earth Observatory (Goddard Space Flight Center) / Blue Marble team.

For those of us in the northern hemisphere, winter brings long, cold nights, which are often excellent for sky watchers (so long as there's a way to keep warm!) But there's often an added bonus that comes along when conditions are just right: the polar lights, or the Aurora Borealis around the North Pole. Here on our world, a brilliant green light often appears for observers at high northern latitudes, with occasional, dimmer reds and even blues lighting up a clear night.

We had always assumed that there was some connection between particles emitted from the Sun and the aurorae, as particularly intense displays were observed around three days after a solar storm occurred in the direction of Earth. Presumably, particles originating from the Sun—ionized electrons and atomic nuclei like protons and alpha particles—make up the vast

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majority of the solar wind and get funneled by the Earth's magnetic field into a circle around its magnetic poles. They're energetic enough to knock electrons off atoms and molecules at various layers in the upper atmosphere—particles like molecular nitrogen, oxygen and atomic hydrogen. And when the electrons fall back either onto the atoms or to lower energy levels, they emit light of varying but particular wavelengths—oxygen producing the most common green signature, with less common states of oxygen and hydrogen producing red and the occasional blue from nitrogen.

But it wasn't until the 2000s that this picture was directly confirmed! NASA's Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) satellite (which ceased operations in December 2005) was able to find out how the magnetosphere responded to solar wind changes, how the plasmas were energized, transported and (in some cases) lost, and many more properties of our magnetosphere. Planets without significant magnetic fields such as Venus and Mars have much smaller, weaker aurorae than we do, and gas giant planets like Saturn have aurorae that primarily shine in the ultraviolet rather than the visible. Nevertheless, the aurorae are a spectacular sight in the evening, particularly for observers in Alaska, Canada and the Scandinavian countries. But when a solar storm comes our way, keep your eyes towards the north at night; the views will be well worth braving the cold!

William J. McCallion Planetarium

McMASTER UNIVERSITY, HAMILTON, ONTARIO

- **Public shows every Wednesday (7:00pm)**
- **Public transit available directly to McMaster campus**
- **Tickets $7 per person; private group bookings $150**
- **Different shows every week**
- **Upcoming shows include:**
  - **Apr 1: Introductory Astronomy for Kids (1st Wed of every month)**
  - **Apr 8: Moons of the Solar System**
  - **Apr 15: Themed Astronomy for Kids Show – Myths**
  - **Apr 22: A History of Cosmic Perspectives**
  - **Apr 29: Cosmology**

For more details, visit

www.physics.mcmaster.ca/planetarium

UPCOMING EVENTS

April 4, 2015 - 7:30 pm — *Cosmology Group Meeting*. Contact chair for meeting location.

April 10, 2015 - 7:30 pm — *General Meeting* at the Hamilton Spectator Auditorium. Our main speaker will be John Gauvreau. John is a longtime member of the H.A.A., and is our Education Director. He was an astronomy instructor at Mohawk College for 20 years, and has spoken at a wide variety of venues. John's talk will be entitled "New Horizons; Space Exploration Today".

April 17, 2015 - 7:30 pm — *Spring Telescope Clinic* at the Hamilton Spectator Auditorium.

April 25, 2015 - 8:00 pm - 11:00 pm — *Public Stargazing Night* at Bayfront Park in Hamilton.

May 8, 2015 - 7:30 pm — *General Meeting* at the Hamilton Spectator Auditorium.

2014-2015 Council

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Contact Us
Hamilton Amateur Astronomers
PO Box 65578
Dundas, ON
L9H 6Y6
www.amateurastronomy.org

General Inquiries:
secretary@amateurastronomy.org

Membership:
membership@amateurastronomy.org

Meeting Inquiries:
chair@amateurastronomy.org

Public Events:
publicity@amateurastronomy.org

Observing Inquiries:
observing@amateurastronomy.org

Education:
education@amateurastronomy.org

Newsletter:
editor@amateurastronomy.org

Webmaster:
webmaster@amateurastronomy.org

Observing site for the HAA provided with the generous support of the
Binbrook Conservation Area
Come observing with the HAA and see what a great location this is for stargazing, a family day or an out-door function.
Please consider purchasing a season's pass for $79 to help support the park.
http://www.npca.ca/conservation-areas/binbrook/
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HAMILTON AMATEUR ASTRONOMERS