Event Horizon

Volume 22, Number 4
February 2015

From The Editor

Happy Winter!

This month's issue has a member gallery of images of Comet C/2014 Q2 (Lovejoy) that a few of us managed to obtain, despite the bitterly cold temperatures.

Enjoy!

Bob Christmas, Editor

Chair's Report by Jim Wamsley

I hope you have all had a chance to get out in the cold, and get a look at comet Lovejoy. It is putting on a fine display, and can be viewed with small binoculars, or with nothing more than your naked eye, if you have young eyes, like our featured speaker for February, Kevin Salwach. I'm afraid my old eyes need all the telescopic help they can get, also I'm finding that my blood must be getting thin, as I really have a problem standing in the cold, behind a scope, or even holding binos steady, without shivering. I must be becoming a warm weather observer.

As I said, our featured speaker this month is Kevin Salwach. This young man inspires me; he has been an active club member for quite some time now. He could be found in the audience at meetings, or out at Binbrook observing, accompanied by his Mom, or Dad. More recently he has been getting experience at public speaking, by giving short talks at meetings, entertaining us with his "This Date in History" talks. He will now be delivering a talk that I'm sure all our members, beginners and experienced observers alike, will enjoy, on what you can see in astronomy with just you own eyes. Kevin has also become involved with the H.A.A.'s council, becoming a councillor at large this year; he has proven to be an amazing asset to the club.

(Continued on page 2)

IN THIS ISSUE:

Chair's Report (continued)

One thing our club can do to help nurture other young people learn about science and possibly pass their knowledge on to others, is the Bay Area Science and Engineering Fair, (B.A.S.E.F).

For over 50 years, the Bay Area Science & Engineering Fair has provided a forum for students in the Hamilton/Halton area to develop their scientific skills and prepare for national and international competition. BASEF, one of the oldest and largest science fairs in Canada - is a registered charity and relies entirely on volunteers and sponsors. The Bay Area Science and Engineering Fair is a competition to all grade seven through twelve students from Hamilton, Halton Region, Haldimand County, Norfolk County, Brant County and Six Nations. Students may attend any public, separate or private school or be home schooled. Participants must be under the age of 21 before June of the BASEF year.

In the past, the H.A.A. has been involved with BASEF by offering a special award to the student or students with the best project displaying knowledge of Astronomy or Physics.

Going forward, the H.A.A.'s council has decided to extend our involvement with BASEF, not only offering our special award of $200.00 to a winning student, but to become an official sponsor of BASEF at the bronze level, by giving $500.00 to the organization in order to help out with all the other costs involved to run the fair. We recognize that with the economy what it is today, this worthy cause needs all the help it can get. I also encourage any club member finding themselves in the position to help either monetarily or by volunteering, to please do so.

Well that's enough of me running on about my pet projects. In other club news, don`t forget that the Cosmology discussion group meets at my place on Saturday February 7th at 7:30 and the next Astro Photo group meeting will be March 7th. Don't forget to contact me if you would like to borrow a club loaner scope. I hope we soon see the weather moderate, and we all can get out to Binbrook and observe together. See you out there.

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: *Comet C/2014 Q2 (Lovejoy), by David Tym.*
Imaged on January 14, 2015 from Dundas, ON, with Canon XT through Celestron CGEM 800Edge HD telescope, at f/10. Stack of 52 raw 45-second exposures at ISO 800 totaling a 39 minute exposure.
See more images of C/2014 Q2 in the Comet Lovejoy Gallery on Pages 7 and 8.

The Sky This Month for February 2015 by Matthew Mannering

As I sit down to write this column I can't help but notice that nightfall is coming a little later every day. At 6pm Venus shines brightly about 15 degrees above the horizon in the west and Jupiter is just rising in the east. The temperature at night has been brutally cold. When it does warm up the clouds roll in as usual. So for something different to do, I decided to load Linux Mint Cinnamon 17.1 as a dual boot option on my laptop. You may wonder why I would bother with Linux? Well for one thing, you get a photo editor very similar to PhotoShop for free. I'll write more about Linux in a separate article later. Venus and Mercury put on a wonderful evening show beginning in early in January and ending around the 22nd. I was out several times in that period taking photos of them at their closest approach and then in subsequent days as they moved apart. Did you notice the angle relative to the horizon as they moved away from each other? That angle would be the plane of the ecliptic that all of the planets follow (some better than others). After the 22nd, Mercury was setting with the evening twilight and starting to move in front of the Sun.

January saw three wonderful shadow transits of the moons of Jupiter. I missed the double transit of the 9th but was able to watch the whole January 16th shadow transit of two of Jupiter's moons. The temperature was terribly cold at -20 degrees Celsius, but the view was very steady. Usually I can't see an actual moon as it moves in front of Jupiter, but it was so clear that I could see Io against the clouds of Jupiter for most of its transit.

On the 23rd/24th of January there was a triple shadow transit; the last one visible from Earth until 2032. Unfortunately, I was totally clouded out in Brantford. Several members reported seeing the first part of the event with two shadows present before being clouded out. There are some great videos and pictures of the event on sites like Spaceweather.com and Cloudy Night.com. What was so interesting about this event was that two of the shadows merged for a few minutes at one point and later Io superimposed itself on Callisto's shadow. It would have been amazing! Oh well, I guess I'll try again in 17 years.

Comet Lovejoy has continued to impress all through January with many astro imagers making the most of the opportunities that appeared. Some of the nicest shots show a 20 degree long tail (40 moon diameters) with a well-defined nucleus and coma. The prettiest shots show Lovejoy passing the Pleiades with the tail extending back past the Hyades open cluster in Taurus. I enjoyed spotting it on at least seven nights. At its brightest, I could see evidence of the tail very faintly even when viewing from the city. Lovejoy will start to dim now as it moves away from us, but it should remain binocular visible for some time to come.

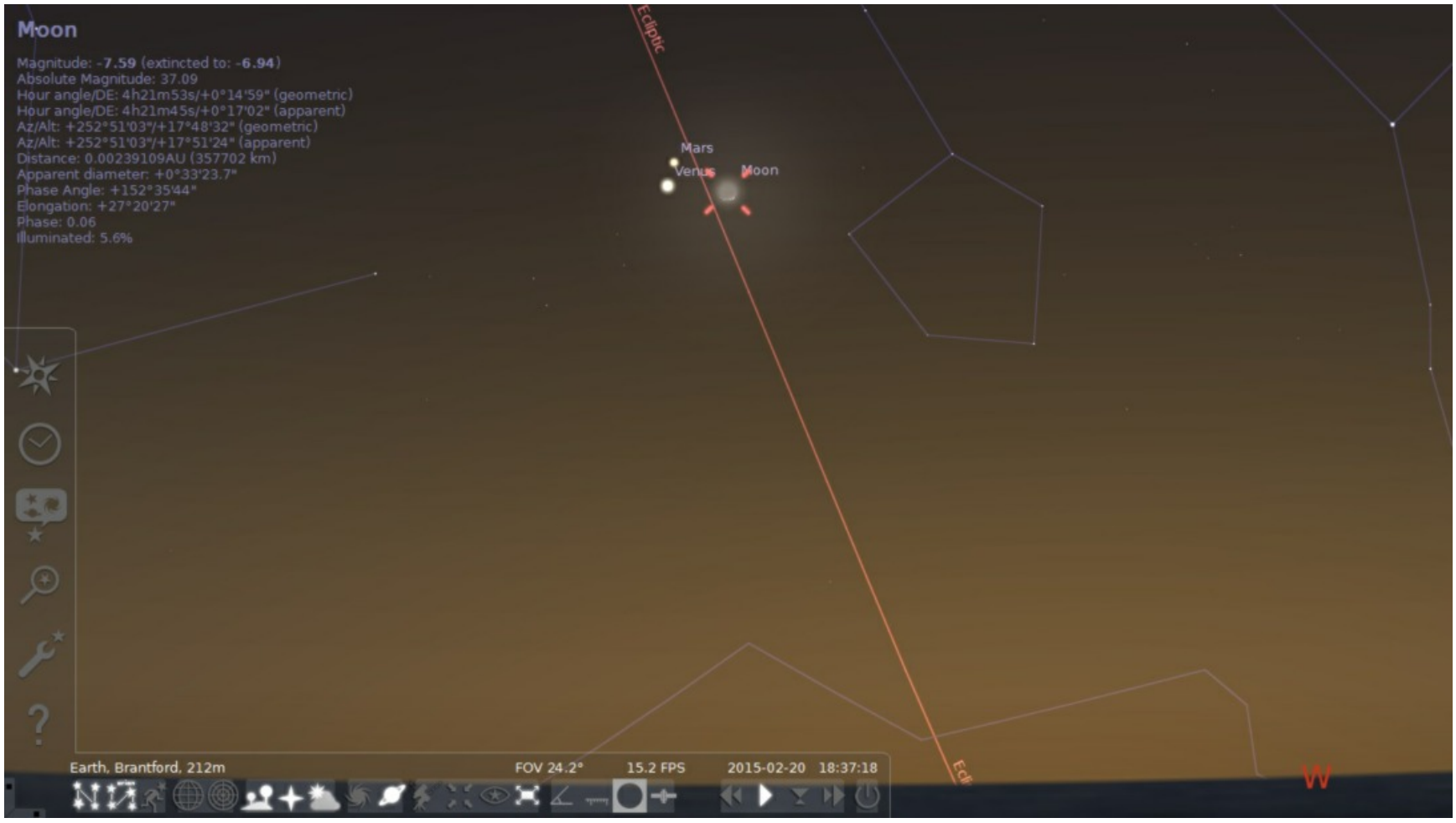
The other event of note was the passing of **Asteroid 2004 BL86** about 750,000 miles away. Radar imaging shows an oval shaped lumpy rock about 300-400m in diameter with its own tiny moon. This is the closest approach by a large known near Earth object until 2027 when 1999 AN10 comes to within one quarter million miles. Many people created time-lapse photos or videos of the event which are also available on-line. The best video of the event at this point was taken by the Goldstone Solar System Radar. It's available online. Here's a still image from the video. *(Continued on page 4)*

Asteroid 2004 BL86 and its moon

Image credit: NASA-JPL

The Sky This Month (continued)

So what can we look forward to seeing (hopefully) in February? Let's start with a couple of conjunctions. The **Moon** (just past new), **Venus** and **Mars** with make a nice 1.5 degree wide grouping in the west after sunset on the 20th. The next night, Mars and Venus will appear ½ degree apart in the same location low in the west. Look for both of these events shortly after 6:30pm.



The other event worth looking at with binoculars is the coming together of the Moon and the Hyades on the night of the 25th. The moon will come to within ½ degree (one moon diameter) from the orange star Aldebaran.

Jupiter comes to opposition on the night of the 6th. This means that for all intents and purposes, the Earth will be directly in between Jupiter and the Sun. Does this mean a partial solar eclipse by the Earth from Jupiter's perspective? Running a simulation using Stellarium suggests that the Earth will miss crossing the face of the Sun by 7.5 arc minutes (1/8 of a degree). I've included a computer generated image of the opposition. Jupiter is down at the right hand corner of the image. The Spirograph-like scribble around Jupiter shows the orbits of the four largest moons.

[See chart of Jupiter at opposition at top of next page.]

Opposition also means that the disc of Jupiter will be at its largest around this time at 45 arc seconds. Jupiter will rise at sunset and won't set until sunrise. In other words it won't get any better than this for observing Jupiter for the rest of the year. When observing Jupiter take your time and wait for the moments of great seeing. In those moments count how many cloud bands you can see and look for the red spot. Remember the red spot is quite pale right now and doesn't stand out very well from the cloud band it's in. It is identifiable as a lump on the outer edge of the southern equatorial belt. You can check the red spot table in the February Sky and Telescope magazine on page 51 or use an App for example to find the times when the spot is centered on the disk. Please note that in my copy of Stellarium the red spot transit predictions are completely wrong. You will probably find the same thing in your copy. I plan to write a short column on how to fix this.

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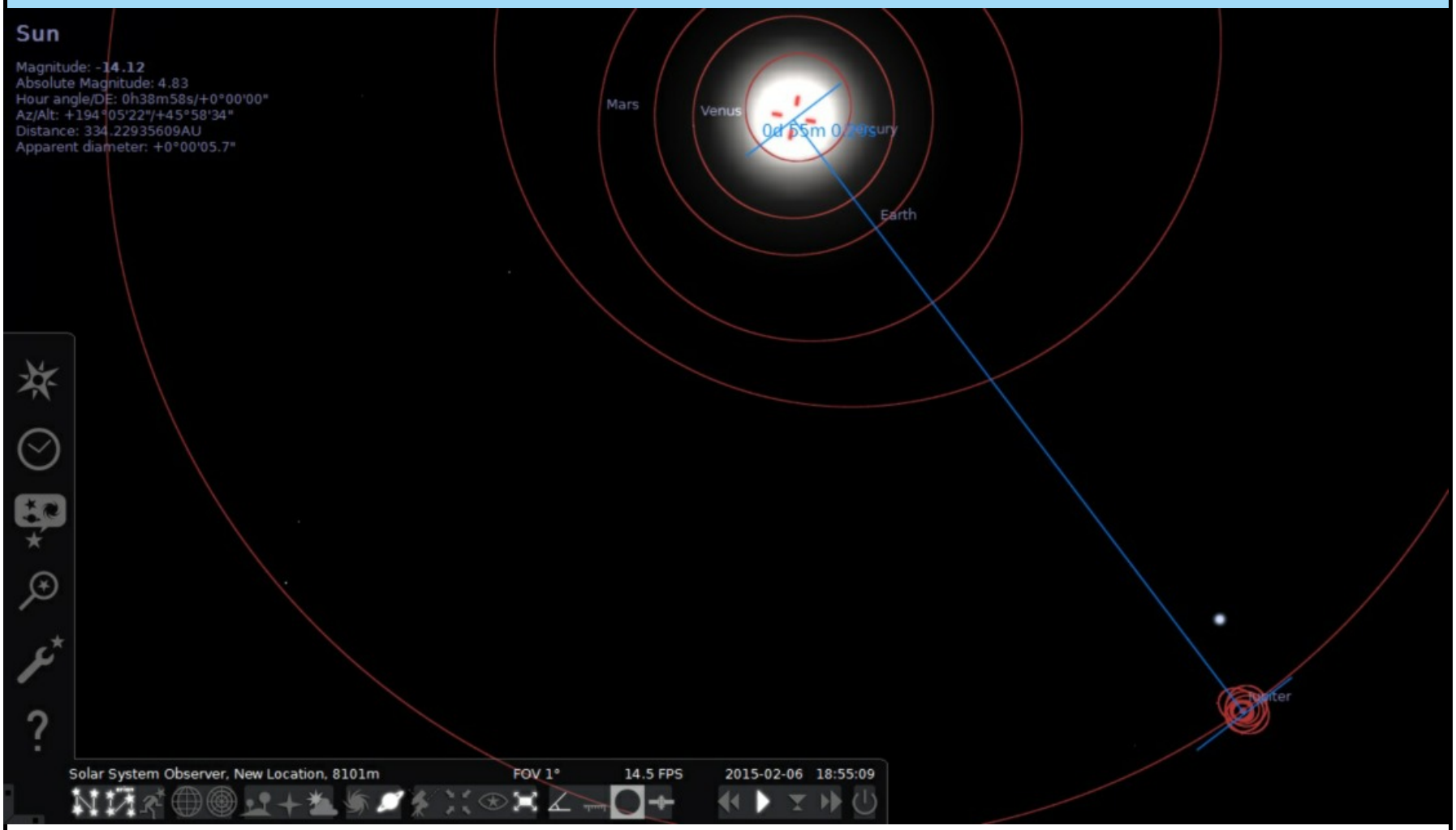
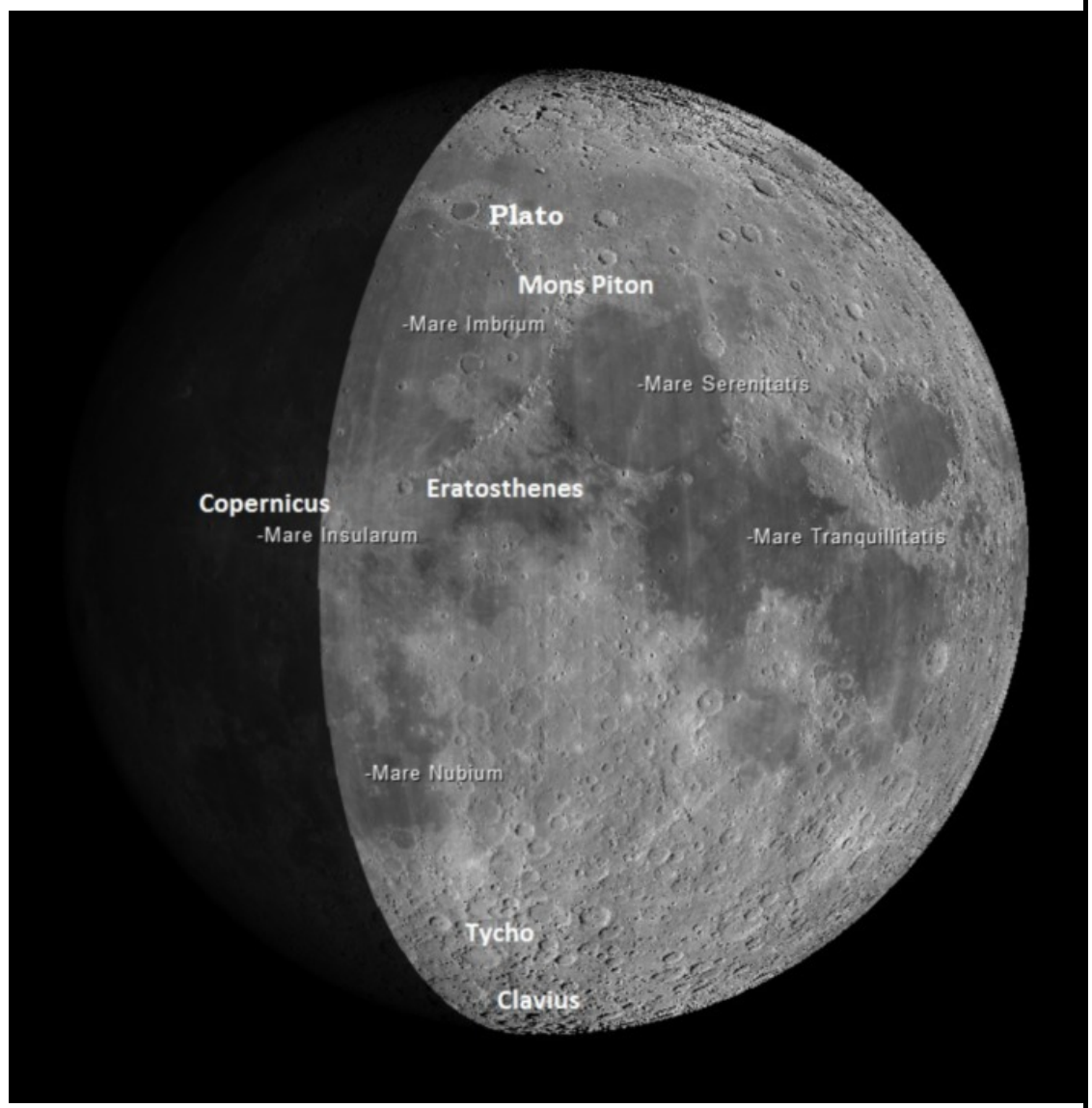
The Sky This Month (continued)



The Moon:

Libration this month is as follows: The Northern limb will be most exposed on the 1st and 28th and the Southern limb on the 15th. The Eastern limb will be most exposed on the 25th and the Western limb on the 13th.

Now, how about a few targets on the Moon at month's end? Just past first quarter is a great time to see some very distinct craters along a line from one end of the Moon to the other. Using The Virtual Moon Atlas (available for free online) or a good hard copy Moon Atlas, look along the terminator on day nine (Feb. 27th) of the Lunar cycle. You should be able to spot (in order), Plato, Mons Piton, Eratosthenes, Copernicus, Tycho and Clavius. Other than Mons Piton, these are all craters that stand out from the rest and well worth a prolonged visit. When Mons Piton (a solitary mountain peak) is near the terminator, it casts a long shadow across the basin of Mare Imbrium.



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The Sky This Month (continued)

The Planets:

- ***Mercury*****,** after a wonderful evening display, has just passed inferior conjunction. It is now headed towards a morning apparition that favours the southern hemisphere. It reaches greatest elongation west on February 24th. Your best chance of seeing it would be in the week leading up to the 24th at 6:30am. It will be very low in the sky.
- ***Venus*** remains low in the south west all through the month. At the beginning of the month look for Venus at about 6pm. At months end look for Venus at 6:30pm. The main reason for this is that sunset happens 1/2 hour later at the end of the month and Venus is at its best about ½ hour after that.
- ***Mars*** continues to be low in the south west this month and sets by 8:15pm. Watch during the month as Mars and Venus swap positions in the sky. At the beginning of the month Mars appears up and slightly to the left (east) of Venus. While at months end, Venus will be up and slightly to the left of Mars.
- ***Jupiter*** is at its prime this month. Wait for it to reach at least 15 degrees above the horizon before you start observing it seriously. In fact, 25 degrees would be better. The air is very turbulent near the horizon and the planet will appear to boil in your eyepiece. Therefore, any time after 7:30pm views will be acceptable but after 8:30 would be better. From that time on, you have the rest of the night!
- ***Saturn*** rises at 3:00am on the 1st and at 1:30am by months end. We still have a while to wait to be able to see it in the evening hours.
- ***Uranus*** is still in Pisces. On the 1st it will be 40 degrees above the horizon in the south west at dusk and will set by 10:30pm. By months end it will set by 9pm. Early next month on March 4th Uranus and Venus come to within a ¼ of a degree of each other and Mars will be 5 degrees down and to the right (west). The best time to look at this should be around 7:15pm.
- ***Neptune*** is approaching superior conjunction and is disappearing into the evening twilight.

Other Events:

-February 3rd:	Full Moon.
-February 6th:	Jupiter at opposition. Zodiacal light in the West after evening twilight for the next 2 weeks.
-February 12th:	Last quarter Moon.
-February 18th:	New Moon.
-February 20th:	Thin crescent Moon, Mars and Venus in a 1.5 degree wide triangle.
-February 21st:	Mars and Venus ½ degree apart in the evening low in the west.
-February 25th:	First quarter Moon. Moon in the Hyades close to Aldebaran.
-February 27th:	Check out those craters on the Moon.

Comet Lovejoy Gallery

Comet Lovejoy, with the Pleiades and Hyades, by **Everett Cairns**

Taken with Nikon D800 with Sigma A50mm at f/2, piggybacked on an old Japanese refracting telescope. Exposure 160 seconds. Taken from Lynden, ON, January 16, 2015.

Comet Lovejoy in motion, by **David Tym**

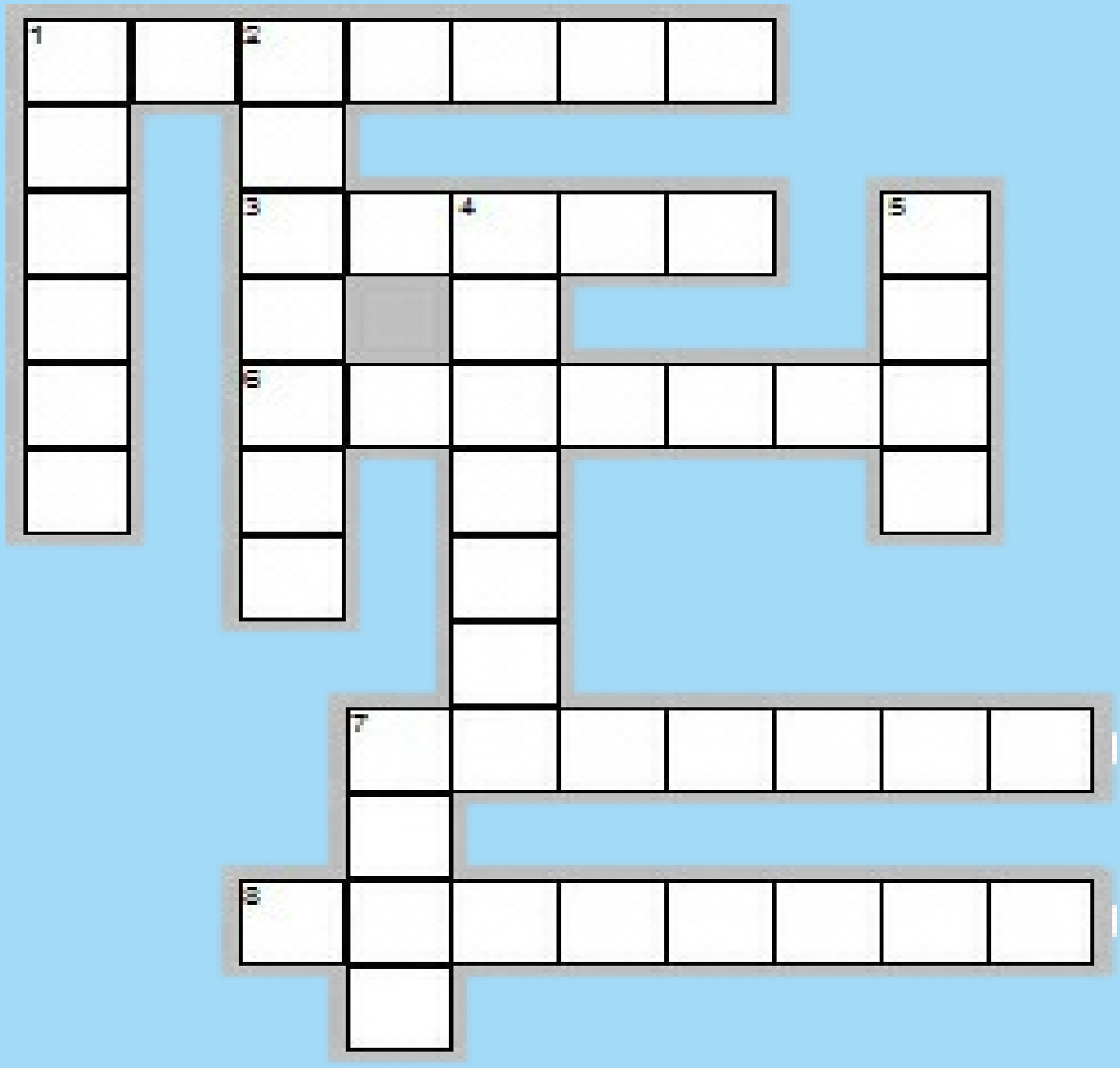
Taken with Canon XT through Celestron CGEM 800Edge HD telescope on January 14, 2015 from Dundas, ON.

Comet Lovejoy Gallery (continued)

Comet Lovejoy in Taurus, by **Bob Christmas**

Taken with Canon 40D through Tamron 300mm lens on SP EQ mount from Caledonia, ON
January 13, 2015 (inset: same night, raw images stacked on head of comet).

Astronomy Crossword by Mario Carr



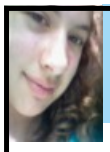
Across

1. Feb. 13 HAA star performer
3. This planet climbs higher in the southwest evening sky as the month progresses.
6. On Feb. 6, this planet is at opposition meaning we're between it and the Sun.
7. On Feb. 24, this planet is at its greatest angle away from the Sun.
8. For two weeks after Feb. 7, sunlight reflecting off dust particles in the solar system known as this type of light can be seen in the western evening sky from a dark location.

Down

1. This planet can be seen in the dawn sky
2. A comet with an 8,000 year orbit around the Sun.
4. This planet disappears behind the Sun on Feb. 26.
5. On Feb. 21 and 22, Venus and this planet are extremely close in the western evening sky.
7. On Feb. 20 this object, Mars and Venus are extremely close in the western evening sky.

Answers can be found on page 14. (No peeking!)



Cartoon Corner by Alexandra Tekatch

Get your kids involved in astrophotography and they won't have money for drugs or alcohol!

NASA's Space Place

Minor mergers have massive consequences for black holes

By Dr. Ethan Siegel

When you think of our sun, the nearest star to our world, you think of an isolated entity, with more than four light years separating it from its next nearest neighbor. But it wasn't always so: billions of years ago, when our sun was first created, it very likely formed in concert with thousands of other stars, when a giant molecular cloud containing perhaps a million times the mass of our solar system collapsed. While the vast majority of stars that the universe forms—some ninety-five percent—are the mass of our sun or smaller, a rare but significant fraction are ultra-massive, containing tens or even hundreds of times the mass our star contains. When these stars run out of fuel in their cores, they explode in a fantastic Type II supernova, where the star's core collapses. In the most massive cases, this forms a black hole.

Over time, many generations of stars—and hence, many black holes—form, with the majority eventually migrating towards the centers of their host galaxies and merging together. Our own galaxy, the Milky Way, houses a supermassive black hole that weighs in at about four million solar masses, while our big sister, Andromeda, has one nearly twenty times as massive. But even relatively isolated galaxies didn't simply form from the monolithic collapse of an isolated clump of matter, but by hierarchical mergers of smaller galaxies over tremendous timescales. If galaxies with large amounts of stars all have black holes at their centers, then we should be able to see some fraction of Milky Way-sized galaxies with not just one, but *multiple* supermassive black holes at their center!

It was only in the early 2000s that NASA's Chandra X-ray Observatory was able to find the first binary supermassive black hole in a galaxy, and that was in an ultra-luminous galaxy with a double core. Many other examples were discovered since, but for a decade they were all in ultra-massive, active galaxies. That all changed in 2011, with the discovery of two active, massive black holes at the center of the regular spiral galaxy NGC 3393, a galaxy that must have undergone only minor mergers no less than a billion years ago, where the black hole pair is separated by only 490 light years! It's only in the cores of active, X-ray emitting galaxies that we can detect binary black holes like this. Examples like NGC 3393 and IC 4970 are not only confirming our picture of galaxy growth and formation, but are teaching us that supermassive relics from ancient, minor mergers might persist as standalone entities for longer than we ever thought!

Check out some cool images and artist reconstructions of black holes from Chandra: http://chandra.harvard.edu/photo/category/blackholes.html

Kids can learn all about Black Holes from this cool animation at NASA's Space Place: http://spaceplace.nasa.gov/black-holes.

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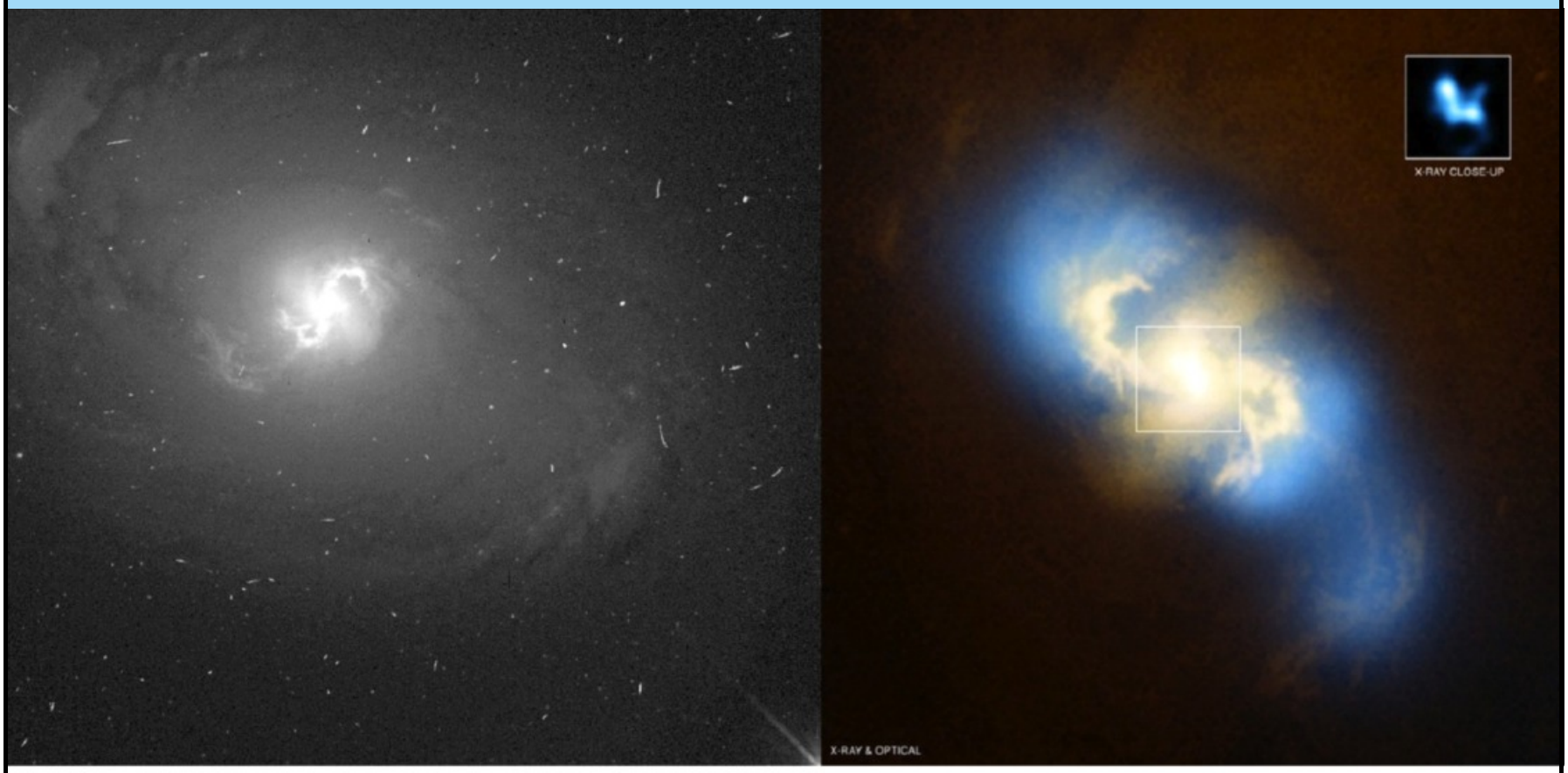
NASA's Space Place (continued)



Images credit: NGC 3393 in the optical (L) by M. Malkan (UCLA), HST, NASA (L); NGC 3393 in the X-ray and optical (R), composite by NASA / CXC / SAO / G. Fabbiano et al. (X-ray) and NASA/STScI (optical).

Treasurer's Report by Steve Germann

Treasurer's report for January 2015 (Unaudited)

Opening balance:	$7,694.20
Revenue:	$782.50
Expenses:	$50.00
Closing Balance:	$8,426.70

Revenue included $50 equipment sales, $315 Memberships, $390 Calendar Sales, and $57.50 50/50

Expenses included $50 for speaker honorarium.

William J. McCallion Planetarium

McMASTER UNIVERSITY, HAMILTON, ONTARIO

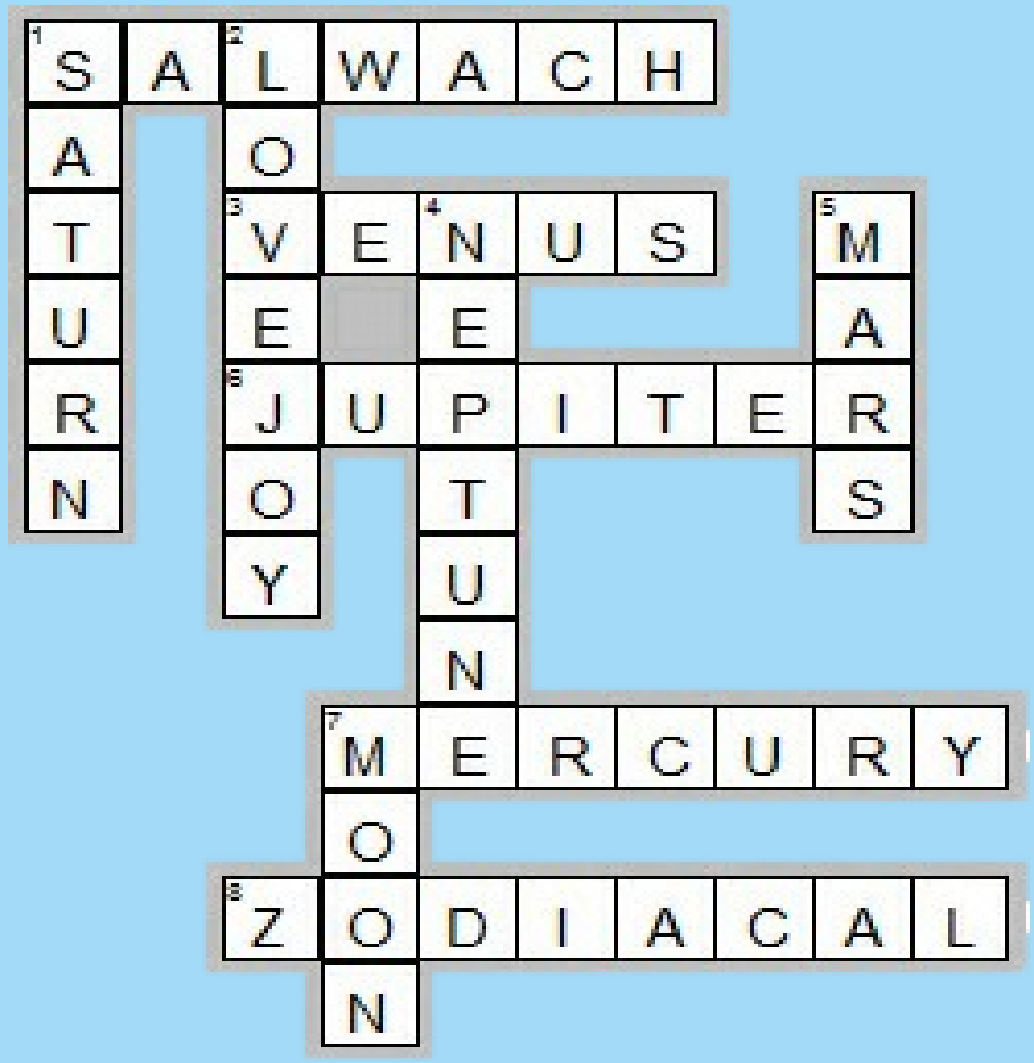
- **Public shows every Wednesday**
- **Public transit available directly to McMaster campus**
- **Tickets $7 per person; private group bookings $150**
- **Different shows every week**
- **Upcoming shows include:**

  - **Feb 4: Introductory Astronomy for Kids (1st Wed of every month)**
  - **Feb 11: The Scale of the Universe**
  - Feb 18: *no shows (Reading Week)*
  - **Feb 25: Weird Space**

For more details, visit

www.physics.mcmaster.ca/planetarium

Answers to Astronomy Crossword on Page 9



UPCOMING EVENTS

February 7, 2015 - 7:30 pm — *Cosmology Discussion Group Meeting*. Contact H.A.A. Chair for location.

February 13, 2015 - 7:30 pm — *General Meeting* at the Hamilton Spectator Auditorium. Our main speaker will be **Kevin Salwach**. Kevin is an H.A.A. Councillor-at-Large, and has been an H.A.A. member since 2009. His talk will be "Astronomical Observations for the Unaided Eye".

March 7, 2015 - 7:30 pm — *Astrophotograghy Group Meeting*. Contact H.A.A. Chair for location.

March 13, 2015 - 7:30 pm — *General Meeting* at the Hamilton Spectator Auditorium.

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Check out the newly-redesigned Hamilton Amateur Astronomers **Website**
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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 outdoor 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