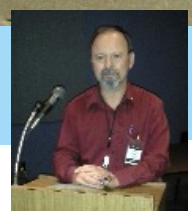
Volume 23, Number 6
April 2016

Event Horizon

From The Editor



Chair's Report by Bernie Venasse

SPRING !!!!!

A time to resurrect those scopes and bring out the sky charts and viewing lists. Hopefully, there will be more frequent clear night as the season warms.

The Binbrook Conservation Area was opened on March 4 for those wanting to experience a Messier Marathon. Unfortunately, the west horizon was clouded until near 9PM reducing the number of objects that could potentially be seen. Despite the early cloud and cold breeze I still managed to log quite a number. How many did you manage?? A few of us were back out at BCA on the 12th and had a good evening in spite of the bright moon. Jupiter looked phenomenal!!

Close to a dozen members made the journey to Grimsby for the first Outreach session of the year and it was a resounding success. I would like to offer a great thank you to each and every volunteer that participated. Our next event is at McQuesten Park on April 16th. … See you there!!!

Saturday, April 23rd is the date for the Scope Clinic / Open House. It will run from 1 to 4 PM and take place in the auditorium of the Spectator building. If the skies cooperate there may be some Solar viewing demonstrations taking place in the parking lot.

Volunteers …. We are starting to plan for this summer's Perseid event at BCA. We need people to assist with parking control. It would be nice if we had a few people set up scopes as well.

They say, "April showers bring May flowers". Well, here's hoping April brings some clear skies too!

Happy reading!

Bob Christmas, Editor

editor 'AT' amateurastronomy.org

IN THIS ISSUE:

H.A.A.'s Loner Scope Program

We at the HAA are proud of our Loner Scope Program.

If you don't have a telescope of your own and want to make use of one for a month or so, you can borrow one of our fine loaner scopes.

Please contact Jim Wamsley, at 905-627-4323, or e-mail Jim at: *secretary'AT'amateurastronomy.org*, and we'll gladly get one signed out for you.

HAA Helps Hamilton

To support our community, we collect 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.

Our donations go to Hamilton Food Share, which delivers them to various food banks around the Hamilton area.

If you would like to help or have any questions about this initiative, please contact the H.A.A.

Hamilton Food Share
Hunger. It's just unacceptable.

Masthead Photo: *The November 2014 HAA Telescope Clinic, by John Gauvreau.*

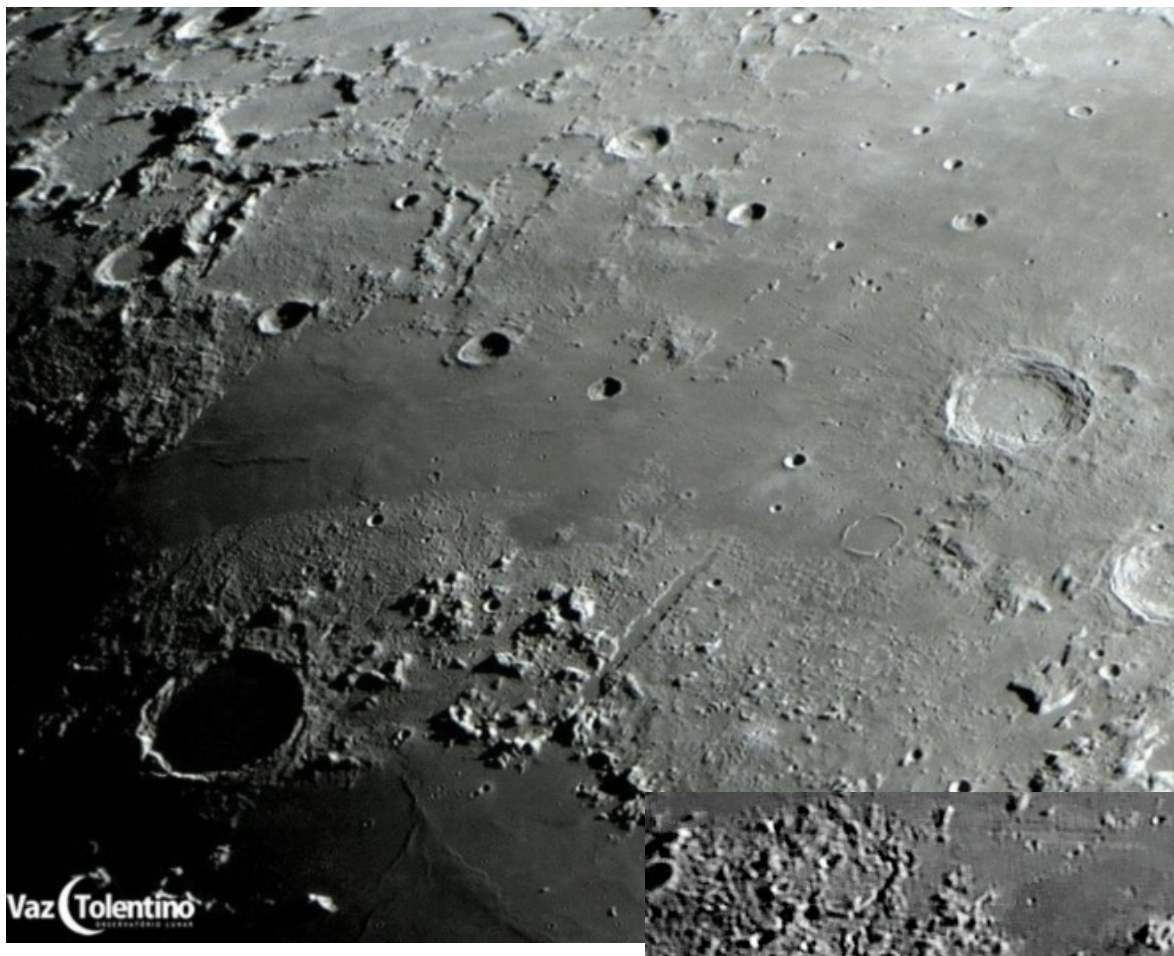
Time to gear up for this Spring's Telescope Clinic & Open House, which will be on Saturday, April 23, 2016, 1 - 4 pm in the afternoon, at the Hamilton Spectator Auditorium.

The Sky This Month for April 2016 by Matthew Mannering

March has been the best month for observing in a long time. I was able to get out four times and had some great views of Jupiter and the Moon. The Great Red Spot (GRS) on Jupiter was small but the colour was a deep red instead of the usual salmon colour. I was able to see the mid latitude cloud bands and the dark polar regions exceptionally well.

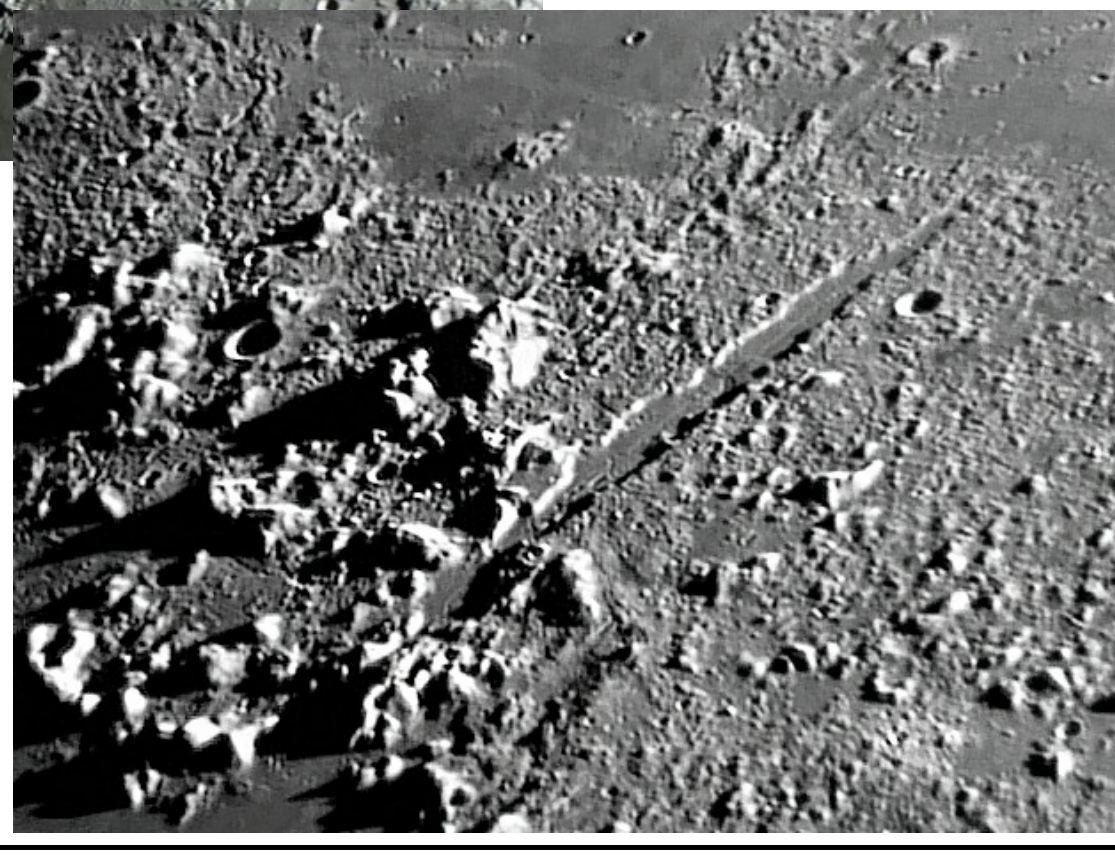
The steady seeing really made a difference when viewing the Moon. For the first time Les, Ed and I saw the rille that runs down the centre of **Vallis Alpes** (the Scar). The Scar is a lava flooded rift valley which runs through the Alps mountain range. The rille is a very narrow feature less than a kilometer wide that can only be seen when the light and shadows are just right and normally requires a scope of at least 8 inches. The view was so steady on this night that we clearly saw it in both of our five inch scopes. Here are a couple of images I found online of this region. You can see the scar running through the mountain range in the lower centre of the first image. In the second image you can see the rille running down the middle of the scar. The next time Vallis Alpes is near the terminator try to see the central rille for yourself. Depending on libration, the best days to see this feature would be Days 7-9 of the lunar cycle.

(Continued on page 4)



Wide-angle view of Vallis Alpes area

Credit: Ricardo José Vaz



Close-up view of Vallis Alpes

Credit: Sylvain Weiller

The Sky This Month (continued)

On March 21st I went out to photograph Jupiter and the Moon when they were separated by 2.7 degrees. I took the following picture using an 80mm semi-apo refractor and a canon t4i camera on a tripod. Jupiter is the little dot at the upper left corner of the image. Exposures for the full Moon are the same as for regular daylight photography. The ISO can be lowered to 200 or so and still maintain a fast shutter speed. The low ISO also allows you to crop the image and still enjoy wonderful detail. The beauty of digital cameras is that you can experiment with different exposure/ISO combinations and not have to worry about wasting film. If you are really organized, unlike myself, then you can keep a log of what works photographically for different lunar phases and use that information next time to cut down on the number exposures taken to get it right.

The Moon and Jupiter, March 21, 2016 --- credit: Matthew Mannering

The HAA had its first public night of the year at the Niagara Tourism Centre in Grimsby back on March 19th. The evening was a great success with many people stopping to take a look through various scopes. The sky was very clear and steady so they were treated to fine views of Jupiter and the Moon. The next public night is on April 16th at T.B. McQuesten Park, 1199 Upper Wentworth St, Hamilton and that is followed by a Scope Clinic at the Hamilton Spectator on April 23rd from 1-4pm.

And now for a quick heads up about an event on **May 9th**. We will be treated to a **transit of Mercury** across the face of the Sun. Viewing this event requires a telescope as *(Continued on page 5)*

The Sky This Month (continued)

Mercury is too small to be seen without magnification. Only attempt to observe this if you have the proper equipment for viewing the Sun! Any solar observing without the correct equipment will lead to permanent blindness! The event starts with first contact at about 7:13:30am Hamilton time with the Sun only 12 degrees above the horizon. Last contact occurs 7.5 hours later at 2:41:27pm. A transit of Mercury won't occur again until November 11, 2019 so try not to miss this one.

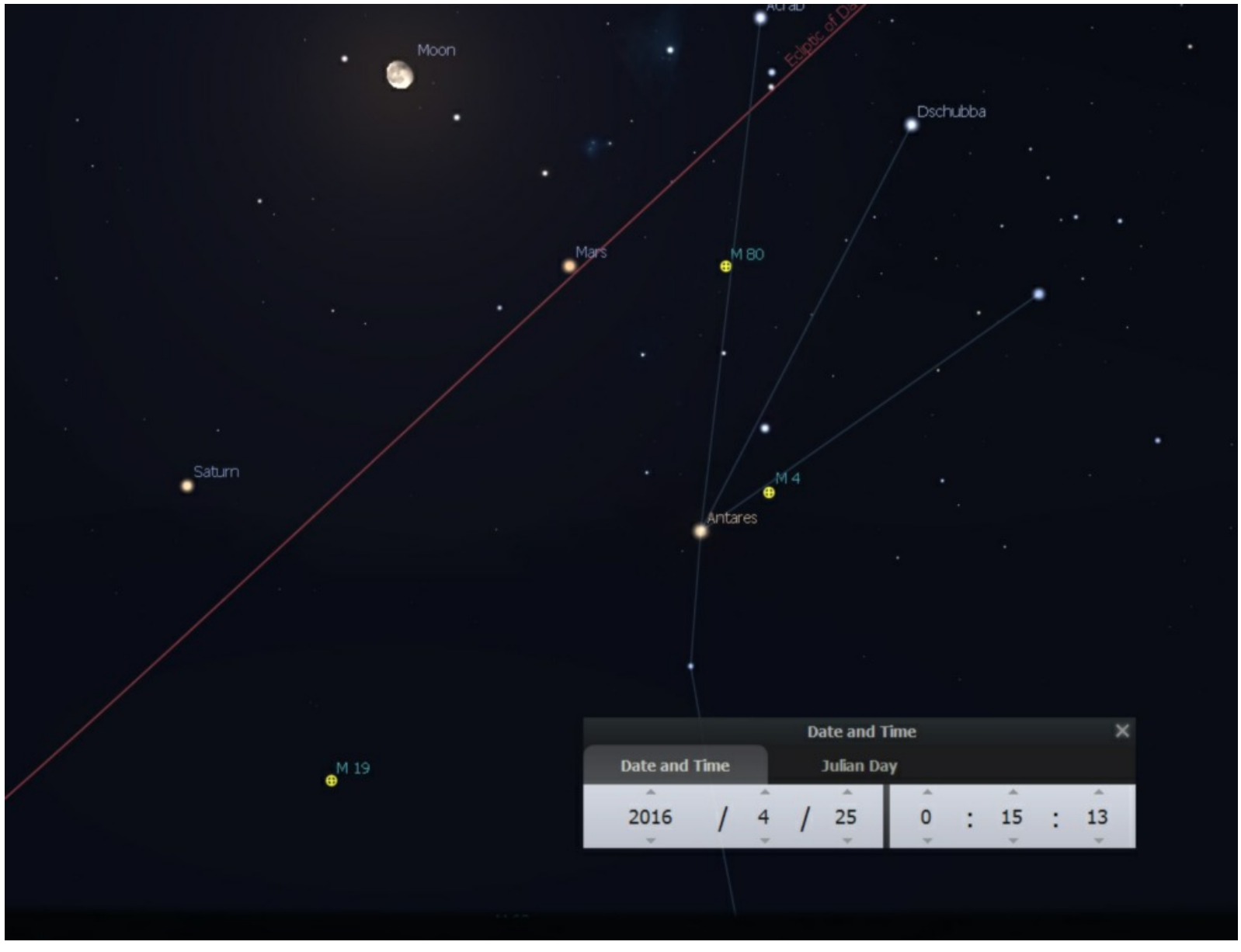
The Moon

There's a lot happening involving the Moon this month. On the evening of April 8th at 8:15pm look toward the western horizon for a 3.5% lit Moon. It will be about 7.5 degrees south (to the left) of Mercury which will only be about 10 degrees above the horizon.

Then on the 10th in the evening the Moon will occult Aldebaran at around 6:37pm. Aldebaran will reappear at about 7:46pm. Sunset isn't until 8pm so this is a full daylight event with the Moon only 17% lit about 50 degrees above the horizon in the south west.

As I have already mentioned Vallis Alpes (the Scar) is a very interesting feature which is best viewed when near the terminator. If you can get out the evenings of April 14th /15th you'll have a great view of the valley.

On the night of the 24th from midnight till dawn on the 25th the **Moon, Mars, Saturn and Antares** will make a beautiful grouping low in the eastern sky.



Libration this month is as follows: The Northern limb will be most exposed on the 12th while the Southern limb will be most exposed on the 26th. The Eastern limb will be most exposed on the 14th and the Western limb on the 2nd and 30th.

(Continued on page 6)

The Sky This Month (continued)

The Planets

(Rise and set times are given for when the planet reaches 5 degrees above the horizon)

- ***Mercury*** makes its best appearance for the year this month. Optimum viewing occurs about 45 minutes after sunset from April 7th to April 24th. Try to find a location with a clear view of the western horizon.

- ***Venus*** is very close to the Sun this month.

- ***Mars*** will reach opposition on May 22nd but don't wait for May to start observing it. By the end of April, Mars will have grown to a disk diameter of 16 arc seconds which is the largest it's appeared to us in ten years. Look for magazine articles that discuss detail you can see on Mars during this time period. Make sure you sketch what you see so that you can identify surface features after the observing session. Mars rises at about 1am at the beginning of the month and by 11pm at month's end.

- ***Jupiter*** is already high in the sky after sunset. On April 8th at 8:30pm Europa's shadow is just to the right of center on the northern equatorial cloud band and the GRS is just to the left of center on the southern equatorial cloud band.

- ***Saturn*** rises about 40 minutes after Mars. The rings are wide open at this time and if you include the rings as part of Saturn's overall diameter, it appears to be only 10% smaller than Jupiter.

- ***Uranus*** is in conjunction with the Sun this month and isn't visible.

- ***Neptune*** is very low and close to the Sun in the eastern morning sky all month.

Events

-April 7th: — New Moon.

-April 10th: — Moon occults Aldebaran in the evening.

-April 14th: — First Quarter Moon.

-April 22nd: — Full Moon.

-April 24th: — Nice Moon, Mars, Saturn and Antares grouping after midnight and through till dawn on the 25th.

-April 30th: — Last Quarter Moon.

Gravitational Wave Astronomy Will Be The Next Great Scientific Frontier

By Ethan Siegel

Imagine a world very different from our own: permanently shrouded in clouds, where the sky was never seen. Never had anyone see the Sun, the Moon, the stars or planets, until one night, a single bright object shone through. Imagine that you saw not only a bright point of light against a dark backdrop of sky, but that you could see a banded structure, a ringed system around it and perhaps even a bright satellite: a moon. That's the magnitude of what LIGO (the Laser Interferometer Gravitational-wave Observatory) saw, when it directly detected gravitational waves for the first time.

An unavoidable prediction of Einstein's General Relativity, gravitational waves emerge whenever a mass gets accelerated. For most systems -- like Earth orbiting the Sun -- the waves are so weak that it would take many times the age of the Universe to notice. But when very massive objects orbit at very short distances, the orbits decay noticeably and rapidly, producing potentially observable gravitational waves. Systems such as the binary pulsar PSR B1913+16 [the subtlety here is that binary pulsars may contain a single neutron star, so it's best to be specific], where two neutron stars orbit one another at very short distances, had previously shown this phenomenon of orbital decay, but gravitational waves had never been directly detected until now.

When a gravitational wave passes through an objects, it simultaneously stretches and compresses space along mutually perpendicular directions: first horizontally, then vertically, in an oscillating fashion. The LIGO detectors work by splitting a laser beam into perpendicular "arms," letting the beams reflect back and forth in each arm hundreds of times (for an effective path lengths of hundreds of km), and then recombining them at a photodetector. The interference pattern seen there will shift, predictably, if gravitational waves pass through and change the effective path lengths of the arms. Over a span of 20 milliseconds on September 14, 2015, both LIGO detectors (in Louisiana and Washington) saw identical stretching-and-compressing patterns. From that tiny amount of data, scientists were able to conclude that two black holes, of 36 and 29 solar masses apiece, merged together, emitting 5% of their total mass into gravitational wave energy, via Einstein's $E = mc^2$.

During that event, more energy was emitted in gravitational waves than by all the stars in the observable Universe combined. The entire Earth was compressed by less than the width of a proton during this event, yet thanks to LIGO's incredible precision, we were able to detect it. At least a handful of these events are

(Continued on page 8)

expected every year. In the future, different observatories, such as NANOGrav (which uses radiotelescopes to the delay caused by gravitational waves on pulsar radiation) and the space mission LISA will detect gravitational waves from supermassive black holes and many other sources. We've just seen our first event using a new type of astronomy, and can now test black holes and gravity like never before.

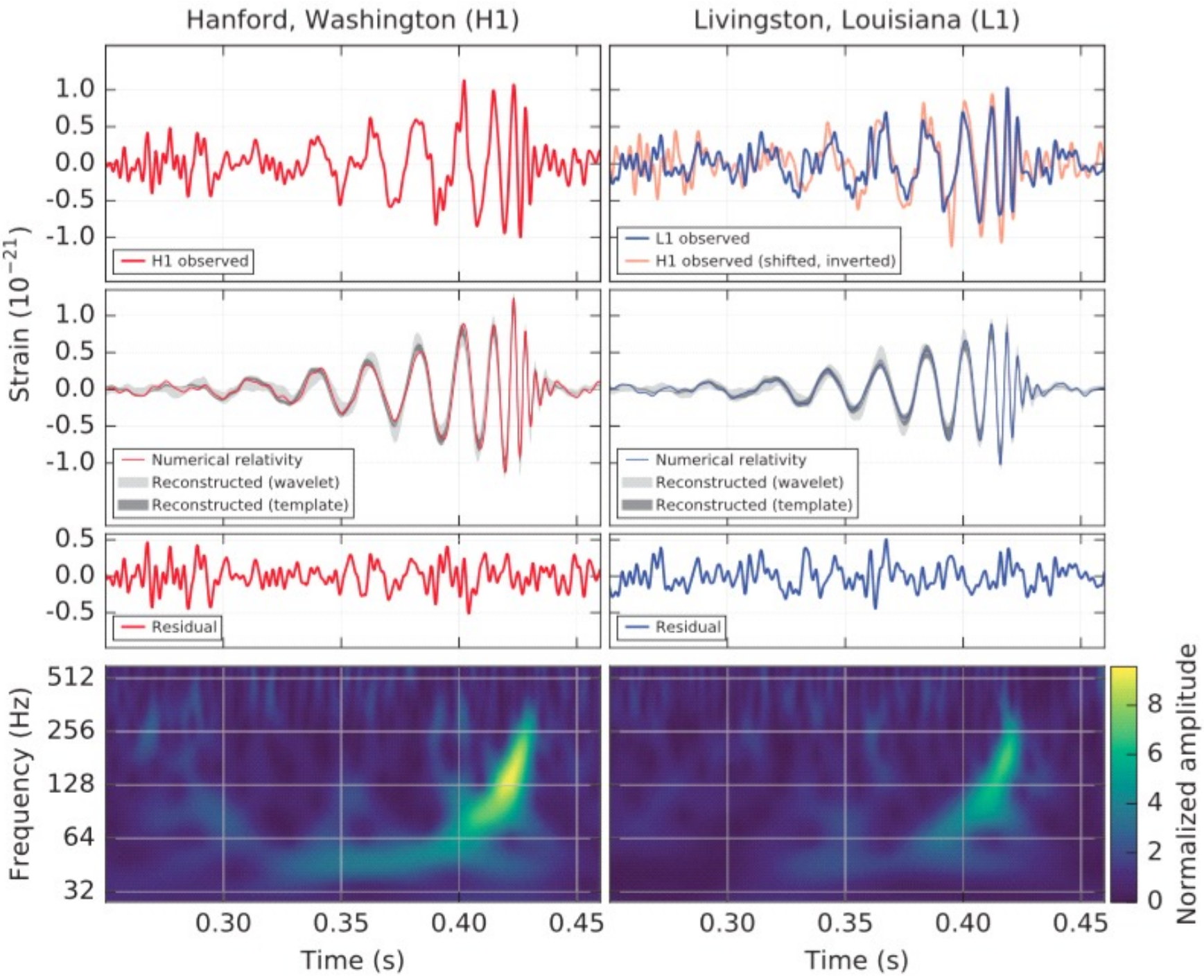


Image credit: Observation of Gravitational Waves from a Binary Black Hole Merger B. P. Abbott et al., (LIGO Scientific Collaboration and Virgo Collaboration), Physical Review Letters 116, 061102 (2016). This figure shows the data (top panels) at the Washington and Louisiana LIGO stations, the predicted signal from Einstein's theory (middle panels), and the inferred signals (bottom panels). The signals matched perfectly in both detectors.

This article is provided by NASA Space Place.
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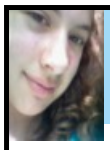
Eye Candy

Gibbous Moon, by **Tom Kelly**

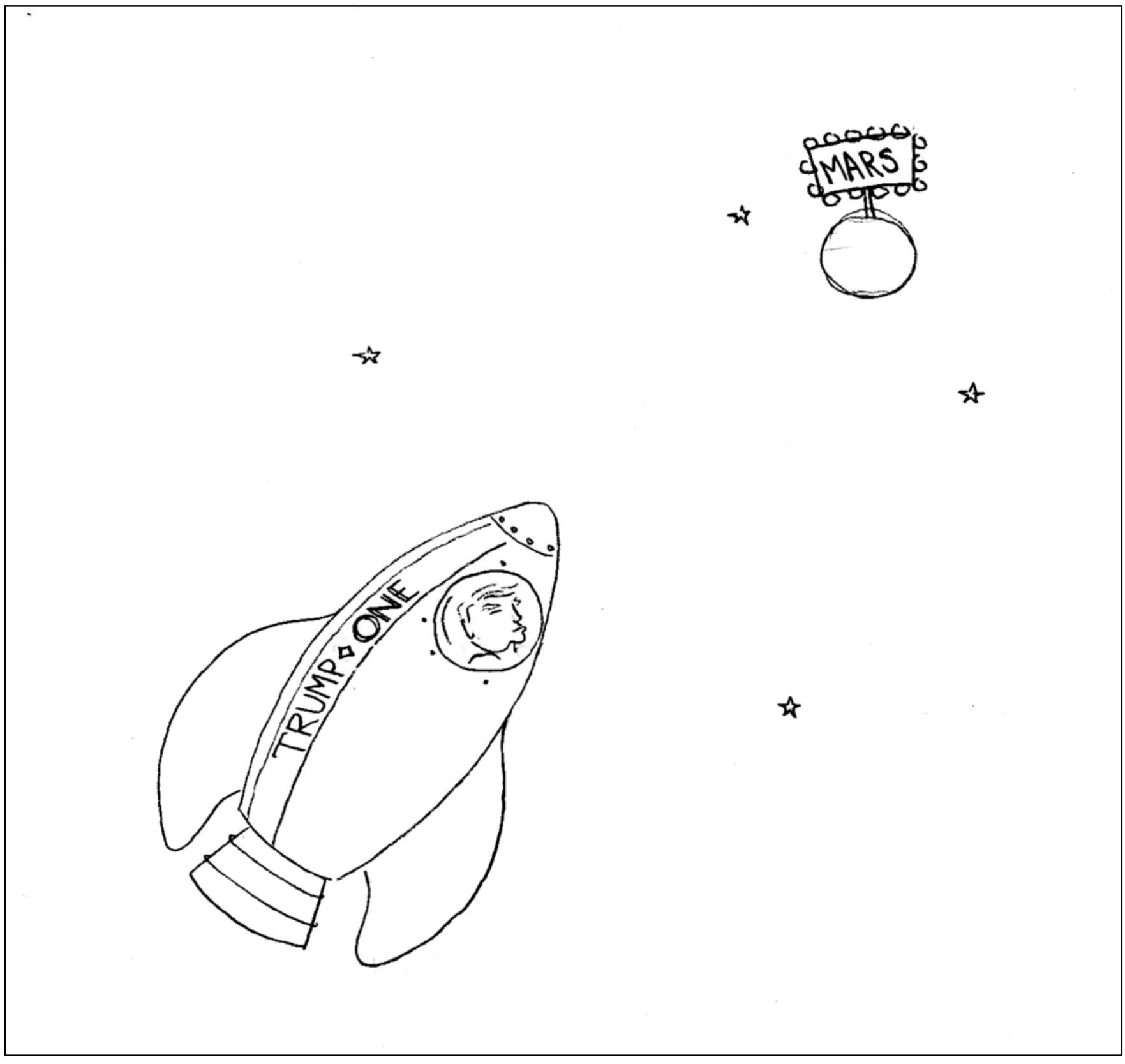
Taken through the HAA's 8" Dobsonian loaner scope, snapped freehand through the eyepiece with his Apple iPhone 5s!

The Moon and Jupiter on March 21, 2016, by **John Gauvreau**

Taken through his 70-300mm telephoto zoom lens.



Cartoon Corner by Alexandra Tekatch



One way.

Treasurer's Report by Steve Germann

Treasurer's Report for March 2016 (unaudited)

Opening balance:	$8,769.58
Revenue:	$115.00
Expenses:	$535.62
Closing Balance:	$8,348.96

Expenses were for door prizes, $38.42, and new brochures. $497.20 with HST for 3000 brochures.

Revenue for 50/50 was $40 and for new memberships $75.

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 6: Introductory Astronomy for Kids (1st Wed of every month)**
  - **Apr 13: Rust and stardust**
  - **Apr 20: The Great Debate: Galaxies and their place in the universe**
  - **Apr 27: Navigational Astronomy**
- **For more details, visit www.physics.mcmaster.ca/planetarium**

UPCOMING EVENTS

April 15, 2016 - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium. Our main speaker will be longtime HAA member **Don Pullen**. His talk will be "Gravity Waves - A heavy subject made light".

April 16, 2016 - 7:30 pm - 11:00 pm — *Public Stargazing Night* at McQuesten Park in Hamilton.

April 23, 2016 - 1 pm - 4 pm — *Spring Telescope Clinic* at the Hamilton Spectator Auditorium. Many types of telescopes will be on display, and experts will be on hand to answer questions. You can also bring your own scope & get tips and pointers on its use. Whether you have a scope, are thinking of getting one, or just want to learn more about exploring our amazing universe.

May 13, 2016 - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium.

2015-2016 Council

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Check out the H.A.A. **Website**
www.amateurastronomy.org

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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 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