



Event Horizon

Volume 20, Number 10
October 2013

From The Editor

Twenty years ago, I backed out of volunteering to be Event Horizon's first editor. That honour went to Stephen Sheeler. In fact, you can check out Stephen's [first issue](#), and all of our other issues, on our club website. I encourage you to do so because the newsletter has captured club history better than any other resource could.

For the club to continue to grow and evolve with the times, a continuous flow of new ideas and perspectives is necessary. This is especially true for our newsletter and I'm pleased to report that Bob Christmas has stepped forward to take on the duties of Event Horizon editor. Bob has held the positions of Chair, Webmaster, Secretary and Councillor on the HAA council. He has my support and I am confident that he will bring a new and fresh energy to Event Horizon!

Over the past four years, I've had the privilege of working with very talented contributors and I want to thank them again for giving so much back to the club.

(Continued on [page 2](#))



Chair's Report by Jim Wamsley

October marks the end of another year for the Hamilton Amateur Astronomers. We will be having our Annual General Meeting this month, when we will be confirming and/ or electing the club's new council. I would like to thank everyone on last year's council, as well as the other volunteers that have made it one of the club's best years. It has been my pleasure to chair this council for the club. I will speak more about last year's council in next month's E.H.. I do encourage every member to get more involved in the running of the club. Put your name in the hat for a council position, or just come out to council meetings. Everyone is welcome, just ask any councillor for the date and times.

I would also like to thank all the speakers we have had the opportunity of listening to at meetings. We have had a wonderful lineup of speakers on a wide variety of astronomy related subjects. All of the speakers, whether they were professional astronomers or club members, were extremely interesting and engaging. I know it will be difficult to duplicate a lineup like that in the future.

Coming up in October at the AGM, our Observing Director, John Gauvreau, will be treating us to one of his very *(Continued on [page 2](#))*

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Chair's Report (continued)

special talks. Not just "The Sky This Month" that we all enjoy so much, but an extended talk entitled, "The State of the Universe Address". I'm sure we will all enjoy it very much. I'm told this talk will be of special interest to our newer and novice members, a counterpoint to the advanced talks we have had from the professional astronomers this past year. As well this month, on October 9th, weather permitting, we will be getting the "Astronomy 101" classes out for their observing session. On October 19th, we will be resuming our Astro Photography group meeting. Please contact me by e-mail if you are interested in attending this group and I will give you information on time and location. In the past this has been a fun group. Please bring any astro equipment you wish for "show and tell".

November is the start of the 20th anniversary year for the H.A.A. and if you haven't heard, on Nov. 2nd we will be celebrating with a Banquet, at the Hamilton War Plane Heritage Museum. I will harp at you one final time. This October's meeting will be the last meeting that tickets will be available for sale. After that, you will have to contact Ann, Steve, Brenda or myself, and go to their home to get your tickets. Sunday Oct. 20th is the deadline for all ticket sales as,

after that, we must give the W.P.H.M. the final count. Don't miss out on a great meal and an excellent speaker, Bob McDonald, all in a fabulous venue. If that's not enough, there will be great door prizes supplied by Camtech (The Scope Store), K.W. Telescope- Perceptor, and Unihedron (Sky Quality Meter). Tickets are only \$45.00 each, a great value, so please purchase your tickets and come and join us for a fun night.

On Nov. 8th, rather than having our normal meeting night, we will be putting on our fall Telescope Clinic. This is your opportunity to bring your scope in to show it off, or get help with problems you may be having with it. Come out to see the scopes of other members and ask them questions about their astro equipment, eg: reasons why they chose it and what they like or dislike about it. Our scope clinics have always been very popular and well attended, please join us.

On Nov. 16th, our Cosmology discussion group will get back under way for another season. All in all, a great start to the club's third decade.

I am looking forward to seeing all of you at the A.G.M. Please feel free to come and see me with ideas, concerns, or speakers you would like to see come to the club.

From The Editor (continued)

Your efforts have been recorded and will never be forgotten!

Our regular contributors are an editor's dream: John Gauvreau has been outstanding as Observing Director. His columns have been a combination of poetry and science. I look forward to reading them every month! Mario's Astronomy Crossword has been a very popular feature. Greg Emery's Through the Looking Glass always offers fresh insights. Last, but not least, is Alex's Cartoon Corner. A smile to end each issue!

I cannot forget our Webmaster(s)! First Bob Christmas and then Don Pullen have made sure the newsletter gets posted on time in spite of the editor barely making her own, self-imposed, deadline. Thanks, again, for your patience!

Finally, a big hug and thank you to Bill Tekatch. My own, personal, I.T. Department. Without whom there may not have been a newsletter some months!

My personal thanks to you all for making this the most rewarding job in the club!

Ann Tekatch, Editor Emeritus

Masthead Photo: This month's image of the Andromeda Galaxy, M31, is by Andrew Bruce. Andrew took this photo from his backyard using a Canon EOS Rebel T3i dslr at ISO400 on an Orion ED80 refractor with a 0.8x focal reducer. The image includes 29 stacked 5 minute exposures.

Hamilton Amateur Astronomers 20th Anniversary Banquet

At
Canadian Warplane Heritage Museum
Hamilton International Airport
9280 Airport Rd., Mount Hope, ON
Celebrate our 20th anniversary in style!

Tickets will be available at our general meetings or you can contact Ann Tekatch (editor@amateurastronomy.org), Brenda Frederick (moonspinner@sympatico.ca), or Steve Germann (treasurer@amateurastronomy.org), Jim Wamsley (chair@amateurastronomy.org)
Or call (905)627-4323

Special Guest Speaker
Bob MacDonald
"Vacations in Space"



Saturday, November 2, 2013
Doors open at 5:00 pm
Cocktails at 6:00 pm
Buffet Dinner at 7:00 pm
Cash Bar
HAA Members & Guests
\$45.00 per person

LAST DAY to buy tickets is
Sunday, October 20!
No tickets will be sold
at the door.



The Sky This Month: October by John Gauvreau

The Sky This Month October 2013

- October 3 - Uranus at opposition
- October 4 - New Moon
- October 6 - Moon between Mercury and Saturn, low in west
- October 7 - Peak of Draconid Meteor Shower
- October 8 - Crescent moon near Antares
- October 8 - Mercury at greatest elongation, low in west at dusk
- October 11 - First Quarter Moon
- October 11 - Three shadows on Jupiter at once
- October 15 - Mars 1 degree north of Regulus, low in east before dawn
- October 18 - Full Moon
- October 18 - Comet ISON 1 degree from Mars
- October 20 - Peak of Orionid Meteor Shower
- October 26 - Last Quarter Moon

Every year there is a little tradition that I always observe. I never know just when it's going to happen, and once it does it is swiftly forgotten, but at the time it always puts a smile on my face. What is this annual occurrence? Simply the first time each year that I see Orion, looming in the east, marking the passing of the season and the coming of winter. This year it occurred just a couple of nights ago, when I couldn't sleep and decided that I would step outside to see the waning, third quarter moon. I grabbed my little 90mm refractor and popped it onto my alt-az mount (ah, one of the *(Continued on [page 4](#))*

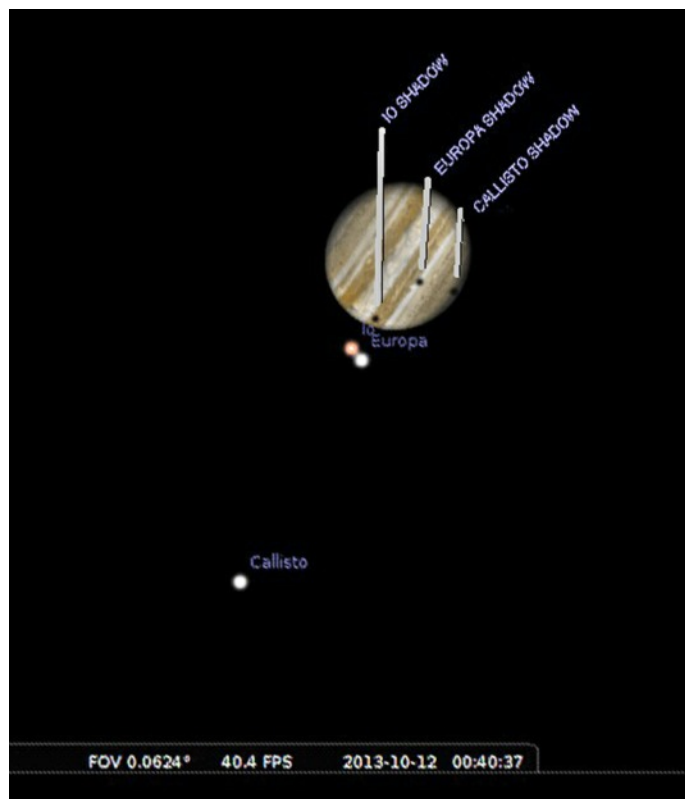
The Sky This Month (continued)

advantages of a small scope is that it allows you to be out observing in just a few minutes) and even took a few shots of the moon. (*One of which can be seen at right - ed.*) But with all the light pollution where I live, right in Hamilton, it took me a few minutes before I really looked at the stars and noticed that yes, there it was, Orion sitting on its side and rising over the trees. Being so large and recognizable, it is a favorite of many and always a treat. So, even though it means that summer is passing and winter is coming, and even though it means that soon I will be thinking twice about popping out for a quick look because it will be so cold, I'm still happy to see Orion and I let my thoughts drift back over the years to all those other 'first nights' when Orion arrives on the scene.



Of course, sitting right next to Orion, in the constellation Gemini, sits Jupiter, grandest of all the planets. With Saturn sinking low in the west and disappearing by the end of the month, we look to the other planets to fill the void. Venus is well up in the west, but it never rises very high this apparition and although bright, it doesn't provide a very satisfactory telescopic view. Uranus is at opposition in the constellation Pisces this month, and if ever there is a time to observe this distant planet, it is now. As small as it is because of the great distance, its subtle hues make this blue orb a telescopic delight. But still we yearn for something more substantive, something more fulfilling to take Saturn's place. And so we find ourselves staying up late or getting up early to catch a look at Jupiter. Largest of all the planets, if

it doesn't have the aesthetic splendor of Saturn, it offers much more of interest to the observer. Constant changes in the cloud bands and the ongoing dance of its satellites provide an unending array of observing targets.



Worthy of observation on any night, we get a special treat on the morning of October 12th, between the hours of 1am and 4am we get to watch two of Jupiter's moons transit across the face of the planet. (*See image at left*) For about two hours in the middle of that period, both Io and Europa appear in front of the southern equatorial belt. Even better, for about an hour starting about 12:40, the shadows of those two moons join the shadow of Callisto for a very rare and unusual triple shadow transit. These three inky black shadows will be well worth losing a little sleep for. On the mornings of October 19th and 26th we have opportunities to see pairs of shadows.

(Continued on [page 5](#))

The Sky This Month (continued)

The planet that we didn't mention in the above paragraph is Mars. It is travelling through Leo right now, and as Leo is a spring constellation and this is autumn, you will have to go to some lengths to see it. Getting up early, around 6am, will be well worth the effort in order to follow Mars as it passes by Regulus, the brightest star in Leo. Only a degree apart at their closest on October 15th, for a few days before and a few days after you can watch the movement of Mars across the sky as you compare its position to Regulus. Although both are 1st magnitude, Regulus is a little brighter than Mars, and you should be able to notice the difference. You will also clearly see the colour difference, and as Mars is so vividly colored, how will Regulus look in comparison? Although its spectral class indicates that it should be a blue-white star, we usually don't notice a strong colour in Regulus. With red-orange Mars right beside it, will it look blue in comparison? They will make a fine telescopic pair, and a lovely naked-eye double in the morning sky.



Sharing the wonders of the universe with others, through these pages, at the meetings or at public venues is always an incredibly rewarding experience. I have enjoyed the advantage of having the job of sharing the sky with you all each month, but so many members have done this over the past year and shared with me their impressions of their experiences. In last month's newsletter Don Pullen listed all the public talks that he has done, and encouraged others to do the same. I can recall Jim Wamsley visiting schools, senior centers and conservation areas, Mario Carr spoke at the Rotary club and Toastmasters, and I have spoken at some Hamilton Libraries, elementary schools, a seniors (Continued on [page 6](#))

The Sky This Month (continued)

center, some conservation areas and just last week, thanks to Steve Germann, in front of 100 members at the Burlington Probus Club. Each of our public observing sessions see a good dozen telescopes and up to twice that many members talking to hundreds of people and sharing views through the scopes. Sharing our knowledge with other members is perhaps the best way to educate ourselves in this wonderful hobby and science. For all the books I have read, I have learned more from other members and their experiences, and we all have something of value to share. I encourage everyone to speak at a meeting, write an article for the newsletter or find a venue to share your unique view of the cosmos. One such opportunity comes up at the end of this month. On October 31st you may find many young people arriving on your doorstep in search of treats. Along with the traditional candy, a view through a telescope that you have set up in your yard will give them something that no other house will, and a memory that will last long after all the candy has been eaten.

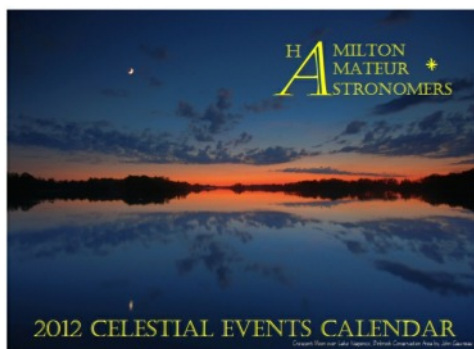
I always finish off my column with an invitation to send in any photos or observations that you would like me to share with your fellow members. As this is the last of The Sky This Month columns that I will be writing, I encourage you all to give the same support to the next observing director that I have enjoyed. I have, over the years, received a great amount of support from many members, in the form of comments, questions, stories and images, but mostly encouragement and appreciation. I am greatly appreciative and have found this effort greatly rewarding. I couldn't begin to name everyone, but I will single out Ann Tekatch, who as editor of the *Event Horizon*, has been supportive and encouraging and a great pleasure to work with.

The upcoming year will bring the much anticipated Comet ISON, a beautiful total lunar eclipse and a partial solar eclipse and I look forward to all these celestial events and more..

See you out there!

John
observing@amateurastronomy.org

2014 HAA Calendar Photo Submissions



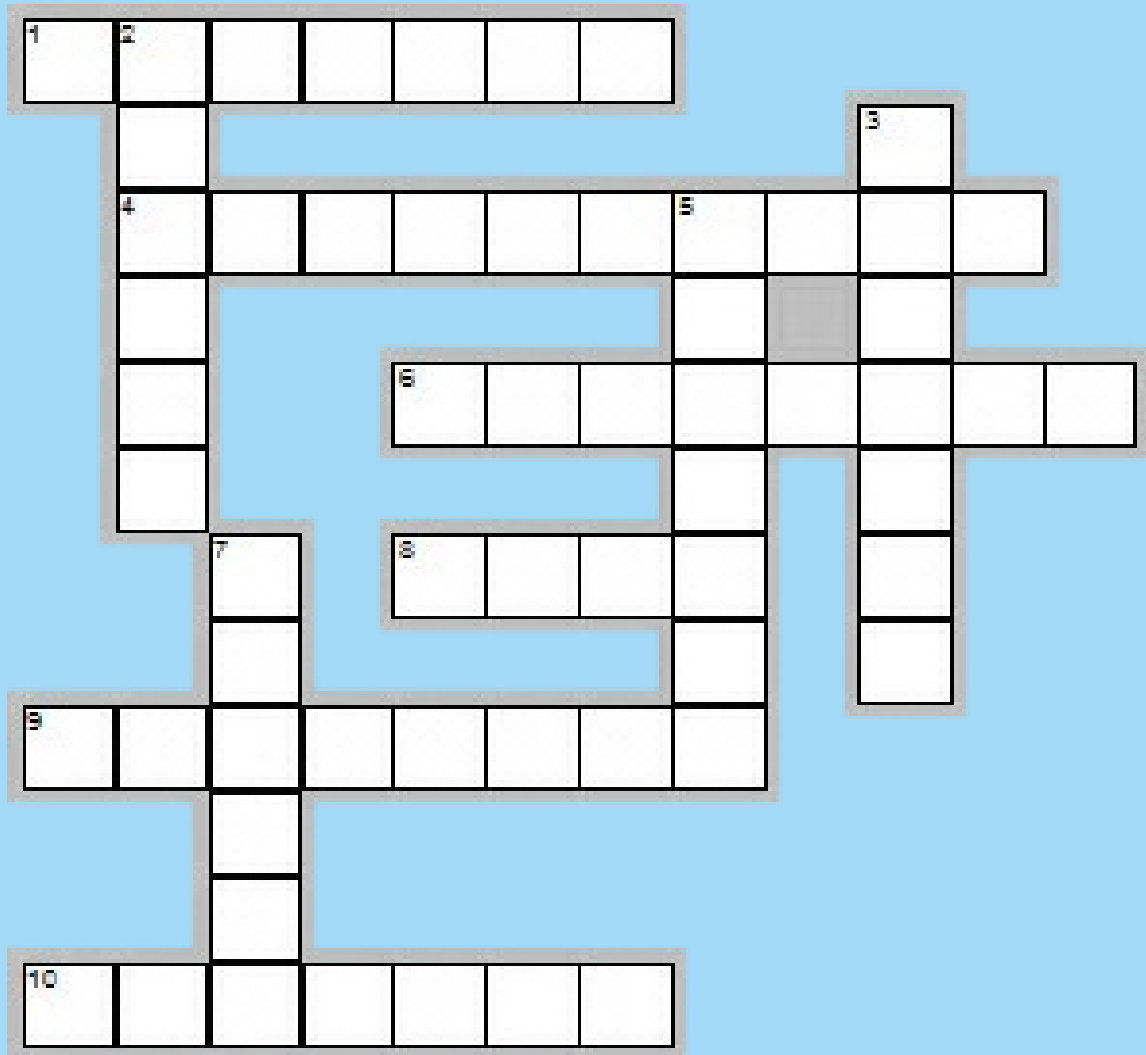
The HAA is accepting image submissions for its 2014 calendar. The images should be submitted by email to the observing@amateurastronomy.org in JPG format. Submit images using the highest resolution possible to ensure good quality print. Include the imager's name, the image date, and a brief description of the image and information about what equipment and settings you used. Images must be submitted in Landscape/Horizontal orientation NOT Portrait/Vertically oriented.

Images need not be astro-photographs but should be of an astronomical theme (ie., images of the night sky, sun, deep-sky objects, or any HAA club event such as meetings, public nights or star parties would be acceptable).

The images must have been taken by you and must be originals. Only submissions from HAA members will be considered. **Submission deadline is September 30, 2013.**



Astronomy Crossword by Mario Carr



ACROSS

1. On October 11 there will be a rare triple shadow transit on this planet.
4. What is a MOON STARER with the same letters?
6. For the next two weeks after Oct. 3 this type of light can be seen in the predawn sky.
8. This comet will be only one degree away from Mars on Oct. 18.
9. The first October meteor shower.
10. On Oct. 16 Venus is above this star low in the evening sky

DOWN

2. This planet is at opposition on Oct. 3
3. On Oct. 6 the moon, Saturn and this planet are very close to each other low in the evening sky.
5. The second October meteor shower
7. This summertime favorite is tipping over pouring out the last bits of summer.

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



September Meeting Summary by Bob Christmas

HAA Chair Jim Wamsley began September's meeting by expressing on behalf of the club our deepest condolences to Second Chair Joe McArdle on the tragic loss of his mother.

Jim then made various announcements regarding our Perseids night & picnic in August, HAA Calendar photo submissions, the October AGM & Council positions, and the Grimsby public night.

Mike Jefferson then talked about getting back into doing spectroscopy, and showed an image of Nova Delphini 2013's spectrum (more on Nova Delphini below).

Our main speaker of the evening was Dr. David Galbraith from the Royal Botanical Gardens, who talked about his trip to some of the darkest skies in North America, entitled, "An Astronomer's Arizona Travelogue". He mentioned that in Arizona, skies are clear about 87% of the time!

He showed images of M27, the Dumbbell Nebula, the galaxy M51 and the minor planet Ceres he took from home, remotely, before his trip, using the Sierra Stars observatory in Arizona.

During his trip, David went to the Lowell Observatory near Flagstaff, AZ, where Percival Lowell observed Mars and Clyde Tombaugh discovered Pluto. He visited the Barringer Meteor Crater and took a cool panoramic image that gives one the vivid perception of just how large Barringer Crater is.

David also visited the Down By the River bed & breakfast near Tombstone, AZ, as well as Biosphere II.

There were lots of questions from a captivated audience at the conclusion of this talk, which is always a great thing. Thanks very much David!

We had our usual halftime break, after which Alex Tekatch and Les Webb drew the door prizes and the 50/50.

Afterward, Kevin Salwach presented another edition of "This Day In Astronomy". He mentioned the Soviet probe Luna 2 impacting with the Moon in 1959, and Marc Garneau blasting off in the Space Shuttle on his first mission in orbit in 1984, among

other happenings on this day. Kevin always does a great job with his presentations!

Jim Wamsley then reminded Astronomy 101 students that their upcoming observing field trip was coming soon.

HAA observing director John Gauvreau then talked about The Sky This Month for September. He started by talking about the aforementioned Clyde Tombaugh, and that he actually met Clyde!

John mentioned Nova Delphini 2013 that occurred this past summer, showing photos of the nova taken by himself, David Tym and Don Pullen.

He then showed HAA member Jeff Moore's images of the Moon & Venus, M17 and Saturn, as well as Jeff's video of the Moon through his telescope. Cool!

John then talked about the current solar maximum, and that this maximum is actually weaker than the solar maxima of previous 11-year solar cycles.

He then did his tour of September sky sights, including the constellations Pegasus, Andromeda, Cassiopeia and Perseus, as well as the Summer Triangle of bright stars, Vega, Deneb and Altair. He mentioned some deep sky objects like M27 and the Coathanger asterism.

Finally, Jim reminded the membership of our AGM in October, as well as upcoming Cosmology Discussions.

After the meeting, some of us met back up at Crabby Joe's in West Hamilton for further discussions and banter.

More of Kevin's Astronomical Sketches by Ann Tekatch

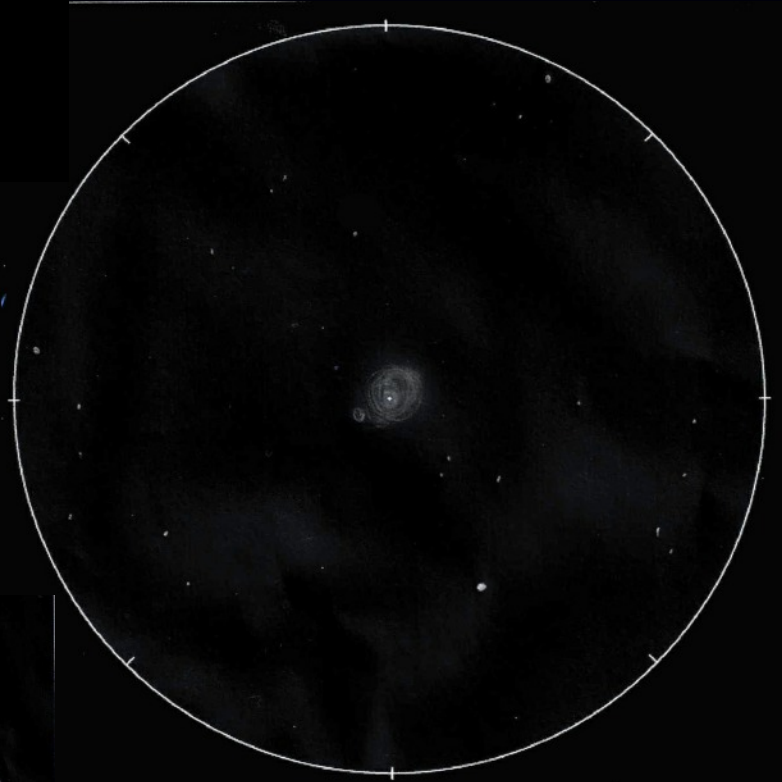


Kevin Salwach likes to sketch objects as he sees them in the eyepiece of his 10" Dobsonian telescope. Last month, we featured his sketch of Comet Pan-STARRS on the masthead of the newsletter. Here are a few more of Kevin's sketches. Clockwise from left: M27 The Dumbbell nebula, M51 The Whirlpool Galaxy and NGC 6826.

Kevin uses pencil on white paper to do his at-the-eyepiece sketches, then scans the finished image and inverts it to get a more natural-appearing white on black image.

Many amateur astronomers record their observations with a sketch. (Not all sketches are as nicely done as Kevin's, though!)

There is an [astronomical sketching](#) forum on Cloudy Nights that showcases the work of amateurs around the world and offers tips on materials and techniques.



A [book](#) was published by some of the forum's members and I highly recommend it to anyone interested in trying their hand at this, the oldest form of astronomical imaging.

I encourage you to try drawing what you see the next time you peer into a telescope. It will sharpen your observational skills and leave you with a personal record of the night's viewing.





Through the Looking Glass by Greg Emery

It is hard to believe that the month has gone. Last year at this time I was taking surfing lessons in Hawaii and preparing to fly to Shanghai. Now I am thinking of cleaning the eaves troughs and raking the leaves in preparation for the snow that will undoubtedly be coming. I have managed to get a look at the night sky, a little anyways.

The night sky offers some challenges when viewing. The constellations are typically very wide and require naked eye observation to be seen in their entirety. But naked eye means a light gathering ability of 1 unit and a magnification of 1 times or 1x. [Light gathering ability](#) is a measure of the amount of light utilized or captured. The larger the number, the fainter an object that can be seen. Magnification increases the apparent size of an object. A telescope (using my 12.5" Newtonian as an example) has a light gathering ability of about 160 and a magnification factor ranging from 45 to about 250 times. This increased functionality comes at a price - and not just a monetary one. A telescope sees a very, very small piece of the sky. That small piece is viewed in much greater detail. Binoculars utilize both eyes at once. They have larger light gathering ability than the naked eye, but less than the typical telescope. Binoculars offer low magnification while still allowing us to view moderate pieces of the sky. All of these tools are useful, it is somewhat a matter of choice and your objectives as to which to use and when. As part of my re-education I will be using all three.

Being a denizen of the northern hemisphere, I started at the most practical place - Polaris. Polaris or the North Star is very close to the North Celestial Pole (NCP) and appears to remain stationary over the hours, days and months. We can use this to help anchor ourselves - provided you can find Polaris. I know that the one constellation I have always been able to recognize is the Big Dipper (which is actually an [asterism](#), not a constellation but...). The Big Dipper is part of Ursa Major and is close enough to the NCP to be always visible. I like to use the Big Dipper to find Polaris and a few other things too!

The first map below (Figure 1) shows how I utilize the Big Dipper to find Polaris and a few other things as well. If we look at the Big Dipper and draw a line from the bottom star of the bowl furthest away from the handle through and beyond the top star of the bowl - the line will extend to Polaris. This line is represented by the red line in Figure 1. Sticking with Figure 1 we can use the bowl of the big Dipper to find to galaxies. This time, instead of drawing a line using the two end stars of the bowl, draw a line diagonally through the bowl, and extend it roughly twice as far as the diagonal length. This puts you in the neighbourhood of two galaxies, one of which is an irregular galaxy, the other elliptical. With binoculars they will be visible together in the same field of view. With binoculars you will see them as faint fuzzy

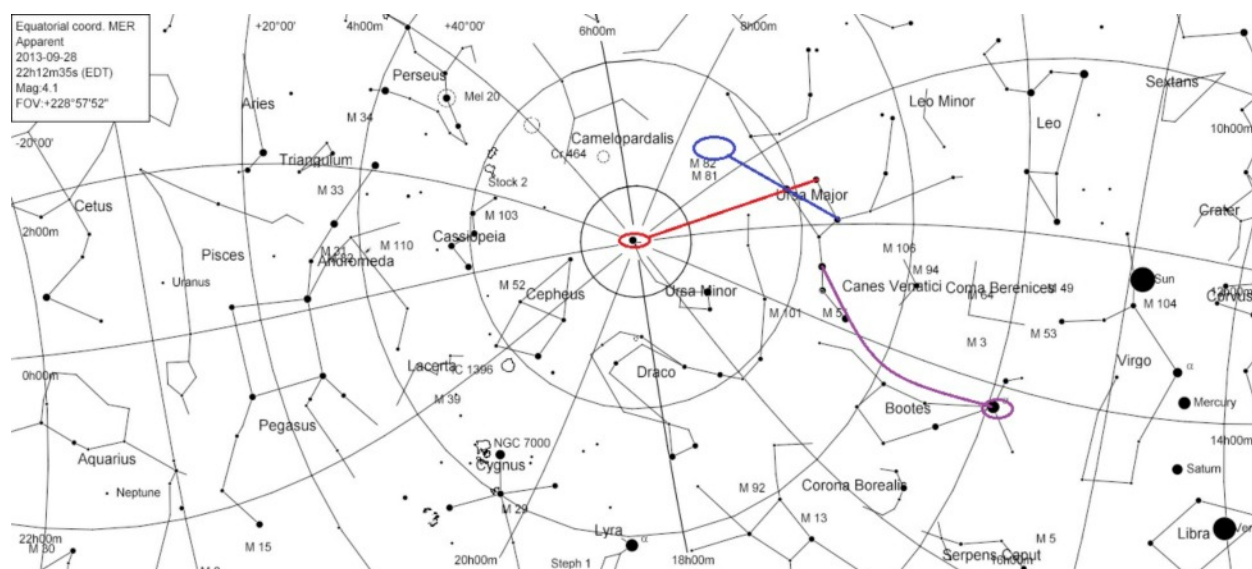


Figure 1: Navigating near the North Celestial Pole

(Continued on [page 11](#))

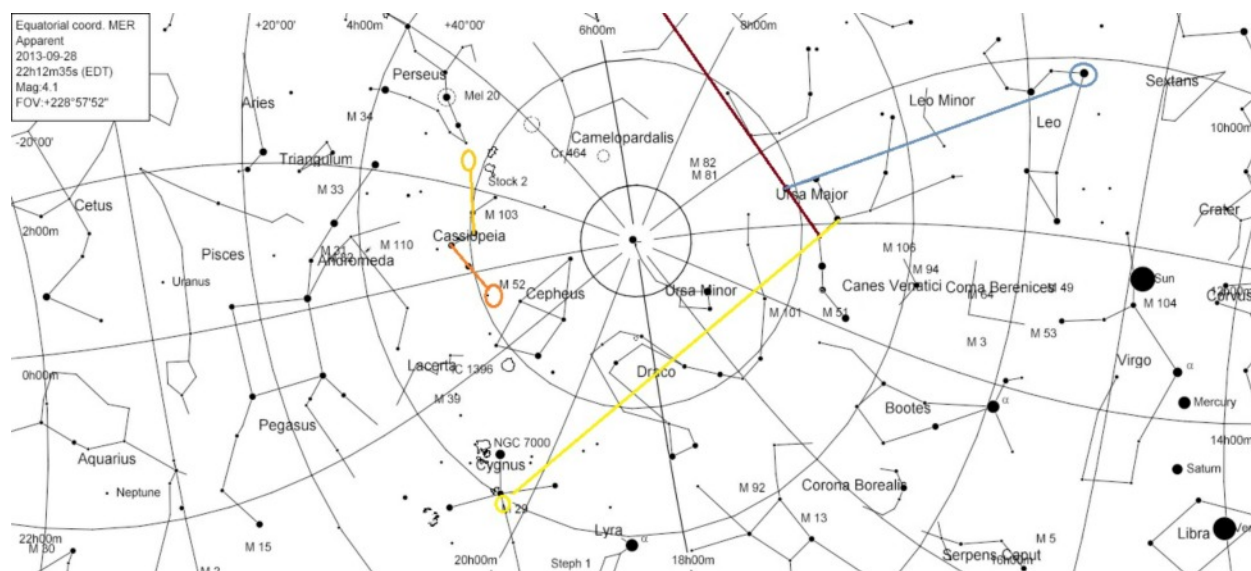
Through the Looking Glass (continued)

things, one of which brighter with a distinct oval shape, the other will have no definable shape. This is diagrammed with the blue line in Figure 1.

One saying that I have literally heard at least 100 times since taking up astronomy - and which I am guilty of uttering on more than one occasion myself - is starting at the Big Dipper's handle you "Arc to Arcturus and Spike to Spica". The purple line in Figure 1 indicates the first part of the journey.

We can also use the Big Dipper to find other stars and constellations. When beginning with astronomy, the constellations on the computer or in the book look so nice and neat, easy to find and quite obvious. Go outside and look up at the sky (preferably at night - a clear night). There are no lines for constellation boundaries or stick figures showing how the Big Dipper becomes a large bear. Being able to find constellations is not as easy as it seems. Using the Big Dipper, we can draw similar lines as we did in Figure 1, only this time the lines are longer. Draw a line along the top of the bowl of the Big Dipper and extend it away from the handle. It will pass very, very close to a bright star called Capella in the constellation Auriga. Capella is a star that has been used for navigation for a long period of time. The constellation Auriga lies within the bright band of stars across the sky called the Milky Way. There are a handful of star clusters in the constellation and whether using binoculars or a telescope you will definitely want to get to know this constellation. This is represented by the muddy red line in Figure 2. Capella is just beyond the boundary of Figure 2.

Figure 2: Navigating a little further away from the NCP



Two other pointers from the Big Dipper will yield the star Regulus in the constellation Leo the heart of the constellation Cygnus. Leo is a late Winter or Spring constellation. If you delight in seeing faint fuzzy patches that we call galaxies (or if you like to pretend you see a faint fuzzy patch) then the region of the sky around Leo and the neighbouring constellations will be of special interest to you. The constellation Cygnus is a summer or early Fall constellation. It has something for just about everybody to see. The pointer to Regulus is depicted as the blue line in Figure 2, while that to the heart of Cygnus is yellow.

The Big Dipper is not the only constellation or asterism that can be used to create pointers. Close by to Ursa Major (Big Dipper) is the constellation Cassiopeia. Cassiopeia is easily recognizable as the M or W near Polaris.

(Continued on [page 12](#))

Through the Looking Glass (continued)

Using Cassiopeia to navigate requires that you can identify the shape of a house (the constellation Cepheus). The two end stars in Cassiopeia closest to the house can be used to make a pointer going towards the house. The distance between the two stars is used to extend the pointer towards the house. This places you on or near an open cluster of stars catalogued as M52. If we label these two stars in Cassiopeia as 1 and 2, then a line drawn from star 3 through star 4 and extended about one and a half times the same distance again you will stumble across an object (actually two objects) that is a favourite of mine. From a relatively dark site you can see this with your naked eyes as a fuzzy patch. Binoculars reveals this as two beautiful open clusters sitting side by side - hence the name "double cluster". A telescope with the correct eyepiece (45 x magnification for my telescope and an AFOV of 1.8) gives a stunning image. A telescope with too high a magnification prevents you from seeing both clusters at the same time. Both of these pointers are also included in Figure 2.



- Public shows every Wednesday (7:00pm)
- Public transit available directly to McMaster campus
- Tickets \$5 per person; private group bookings \$100
- Different shows every week
- Upcoming shows include:
 - **Oct 2: Introductory Astronomy for Kids (1st Wed of every month)**
 - **Oct 9: Life in the Universe 2: The Search**
 - **Oct 12: International Observe the Moon Night**
 - **Oct 16: Celestial Motions**
 - **Oct 23: Southern Night Skies**
 - **Oct 30: Invisible Universe**
- For more details, visit www.physics.mcmaster.ca/planetarium



Treasurer's Report by Steve Germann

September 2013 (unaudited)

Opening Balance:	\$4461.44.
Revenue	\$1312
Expenses	\$169.50
Closing Balance	\$5603.94

Major revenue items included Banquet Ticket sales \$765, 50/50 \$37, donations \$10, and Memberships \$450, and return of the advance for picnic supplies, \$50 for 2013-2014 year. The expense was our Post Office Box rental, \$169.50

We have sold \$2025 worth of Banquet Tickets at this time. **Please get your ticket soon.**



Jean and Mike Measure the Speed of Light by Mike Jefferson

An article in the February, 2012 issue of "Sky and Telescope" enticed Jean and me into performing the experiment shown in "Ingenious Experiments - Chasing Light Speed", to do our own measurements of the speed of light.

The article is a history of the various methods scientists have used to refine the speed of light, over historical time. Beginning with the Danish astronomer, Ole Remer's experiments with Jupiter's eclipses of Io, and ending with British physicist Louis Essen's and later experiments to refine the fastest possible speed in the cosmos, the article gives an historical overview of our efforts to pin it down.

It also includes an experiment that may be done at home, using a microwave oven, stopwatch, ruler and scientific calculator to perform the experiment and the calculation yourself. The 'recipe' for the experiment may be found on p. 38 of the cited (above) issue.

So, how did we do it? We found 2 places (antinodes) in the oven where a dab of butter melts the fastest and recorded both times - ~35+ seconds to 2 decimal places and the distance between them in cm. Then we doubled that ~30 cm distance to obtain the wavelength and got very close to 60 cm. This was multiplied by the microwave frequency (f) of 2.45 gigahertz. Since $c = f \times \text{wavelength}$, we got our value of c .

If you work carefully enough you can get to within 5% of c . Our best work achieved only 17% of c ! With a little fiddling and fudging we managed to coax 245, 000 km/second out of it. The actual value is more like 297,000 km/second! However, we had a lot of fun doing it. It is a great activity for the family on a rainy day or when the sky conditions are not good enough for observing or other astronomical activity.

Jean ran the stopwatch and calculator. Mike ran the microwave, judged when the butter samples had melted down, measured the distance between the antinodes and fudged the figures - just a little!!

Lots of fun!



SkyStopper Equatorial Platform

The SkyStopper equatorial platform, custom made for your telescope and latitude, can be yours in just a week, for only \$649 plus shipping. (Local pickup save \$25 and all the shipping)

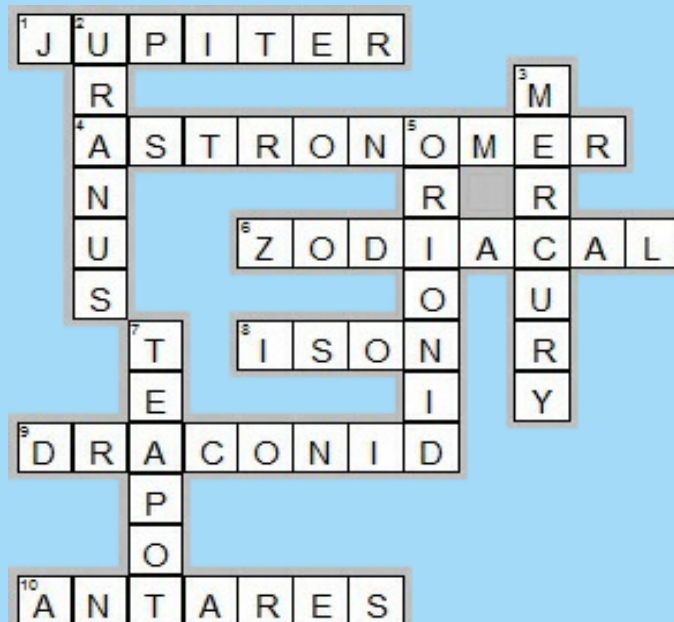
Features:

- handles high power eyepieces without drift
- patent pending dual direction guide capability guides in any part of the sky, not just the meridian
- do guided astrophotography and manual fine centering with your Dob
- effortless tracking through the zenith
- compatible with push-to digital setting circles
- compatible with goto Dobs that can stop their clock drive
- runs on 12v accessory power from your tank
- star, sun, moon, half-solar, and tuned rates
- easy to assemble, adjust and maintain
- adjustable bubble level allows quick setup at a variety of sites
- made in Canada, ships from Canada
- quick release magnetic linkage
- infra red remote control with audio acknowledgement
- pushbutton override possible instead of remote
- extra long levelling feet for range of latitudes
- high weight capacity and stability
- typically 90 minutes run time
- quick rewind or re-center
- low power
- dimmable led display

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Answers to Astronomy Crossword on Page 7





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UPCOMING EVENTS

October 11, 2013 - 7:30 pm Annual General Meeting at the Hamilton Spectator Auditorium. John Gauvreau will present "The State of the Universe".

October 19, 2013 - 7:30 pm Astrophotography Group meeting in the basement of Jim Wamsley's apartment building. Contact chair@amateurastronomy.org for details.

October 20, 2013 - LAST DAY TO BUY TICKETS FOR THE BANQUET!!!

November 2, 2013 - Hamilton Amateur Astronomers' 20th Anniversary Banquet at Hamilton's Warplane Heritage Museum. Contact Steve Germann, Ann Tekatch 905-575-5433 (editor@amateurastronomy.org), Brenda Frederick or Jim Wamsley for tickets.

November 8, 2013 - 7:30pm Telescope Clinic at the Hamilton Spectator Auditorium. Instead of our regular general meeting, we will have our Telescope Clinic.

2012-2013 Council

Chair	Jim Wamsley
Second Chair	Joe McArdle
Treasurer	Steve Germann
Membership Director	Matthew Mannering
Observing Director	John Gauvreau
Event Horizon Editor	Ann Tekatch
Recorder	Mike Jefferson
Secretary	Bob Christmas
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