



Event Horizon



From The Editor

We've been fortunate to have excellent weather these past several weeks, and there are lots of awesome images taken during this period in this month's Eye Candy section!

Thank you to all who have contributed images and articles this month!

Clear Skies,

Bob Christmas,
Editor

editor 'AT' amateurastronomy.org

Chair's Report by Sue MacLachlan

Here we are in October. The days are starting to get a little shorter which makes the nights longer and we can get out to the telescopes earlier in the evening. The summer constellations are setting in the west and the winter constellations are rising earlier and earlier every day. I never tire of looking at Orion in all his splendor every fall and winter.

Please mark *Friday October 17th, 2025* in your calendar. This is the date of our Annual Meeting for the HAA Association. The annual meeting will be followed by a Special Meeting of the HAA Not-for-Profit Corporation. The first Council for the HAA Not-for-Profit Corporation will be voted in at the Special Meeting. If you are interested in volunteering your time to serve on the new Council please contact Sue MacLachlan at chair@amateurastronomy.org.

Please consider joining the Friday October 17th meeting in person or on Zoom to ensure quorum is reached which will enable the club to move forward with some of the final steps in the incorporation

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Chair's Report (continued)

process. Notice of the resolutions being presented on October 17 was sent out to members this past September.

Before the Annual and Special meeting begin we will be joined by *Matteo Statti*, who is studying astronomy and astrophysics at York University. Matteo will be presenting a short talk about the Rev. D.B. Marsh Telescope.

On Sunday November 9 at 3:00 pm, the *Dundas Valley Orchestra* will be presenting a concert called *Our Space Odyssey* at St Paul's United Church, 29 Park Street W., Dundas. Astrophotographs from a number of our members will be featured throughout the concert. There will be activities for children before the concert and the HAA will have an information table at the reception afterwards. Admission is free but cash donations are accepted at the door. Come out and hear the wonderful live music and see our own HAA astrophotographers' and artists' work set to music.

On Saturday November 22, 2025 we will be holding a *Telescope Clinic* at Valley Park Library 970 Paramount Dr, Stoney Creek, ON L8J 1L8. Mark the date in your calendar to come out, display your gear and help new amateur astronomers with their telescopes.

The speaker for November will be *Doug Turner*, editor of the HAA Celestial Events Calendar. Doug will be joined by the astrophotographers whose pictures are in the 2026 calendar. This will also be your first opportunity to purchase a calendar or two. So, come out to the meeting and be the first to get your 2026 Celestial Events Calendar hot off the press before they sell out!!

As you know, I am stepping down as Chair of the HAA Association so this is my last Chair's report. My two year term as Chair has just flown by. I joined Council in January 2017 as a councillor-at-large and have served on Council continuously until now. The last two years have been busy with finding a new meeting location, promoting the 2024 eclipse, implementing Google Workspace to streamline the work that Council does, moving to a new modern accounting system, completing an inventory of club equipment, writing club policy, working through the incorporation process, and booking a wide range of guest speakers for the monthly meetings among a myriad of other things. I want to thank everyone that has served on Council over the last two years. I appreciate all of the time and effort that you have all put in to help to make the HAA the best that it can be for the members. I also want to thank the members who have provided support to both myself and to the Council. Thank you.

As always, I look forward to seeing everyone on Friday October 17th at St. Matthew on-the-Plains Anglican Church at 126 Plains Road E. Burlington and on Zoom for those who cannot attend in-person.

Clear skies,

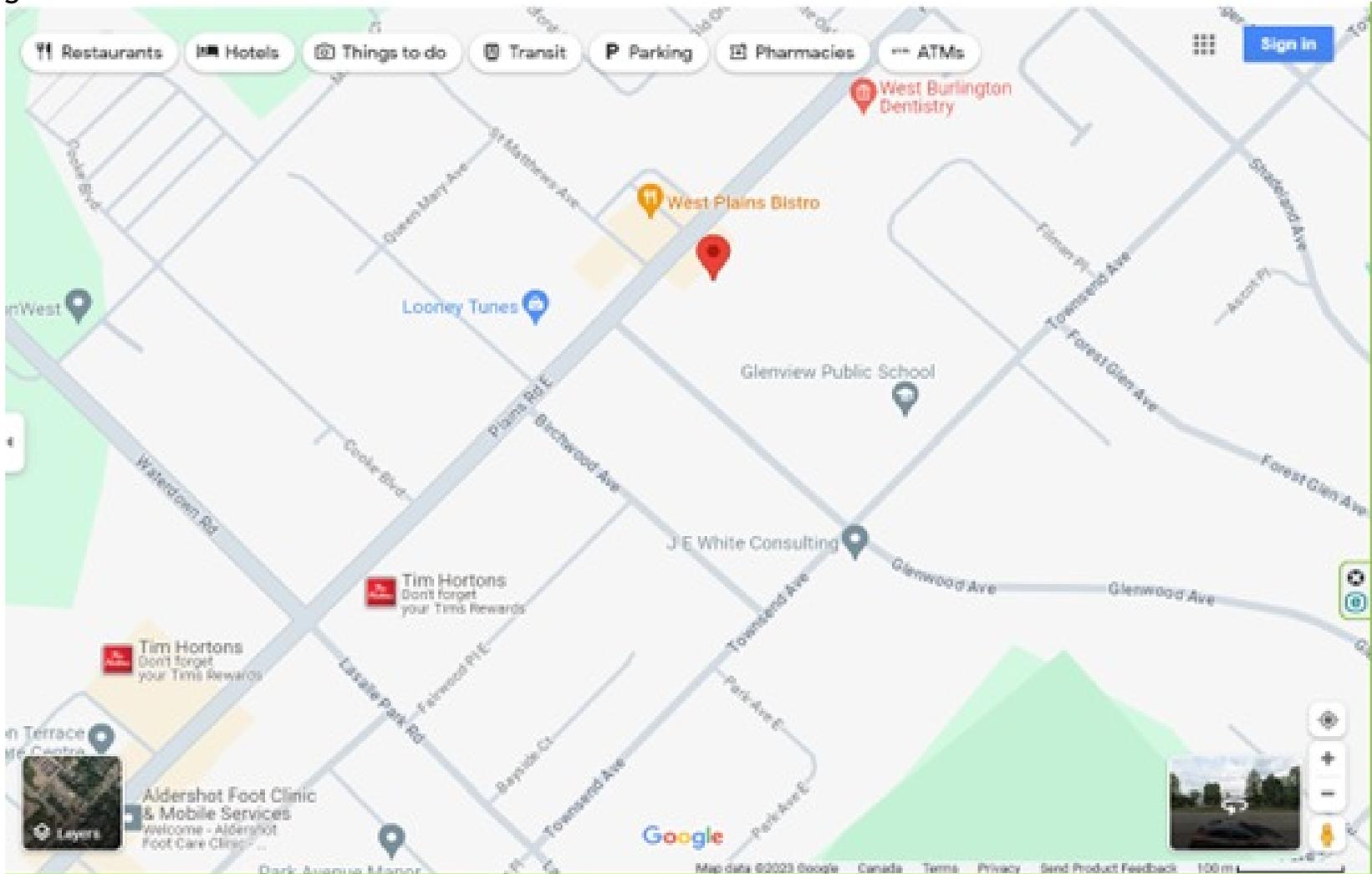
Sue MacLachlan *chair 'AT' amateurastronomy.org*

Masthead Photo: *The Pacman Nebula (NGC 281) in Cassiopeia, by Alex Kepic.*

Taken with a ZWO ASI294 MC Pro Camera through a Celestron C8 XLT scope on an AM5 Mount, using an IDAS-LP3 Light Pollution Filter and Askar Colour Magic D1 & D2 Filters.

Meeting Location

Our upcoming meeting is scheduled for *October 17th, 2025*, at St. Matthew on-the-Plains Anglican Church. St. Matthew's is located at 126 Plains Road East, Burlington, Ontario. Doors open at 7:00 and the meeting begins at 7:30.

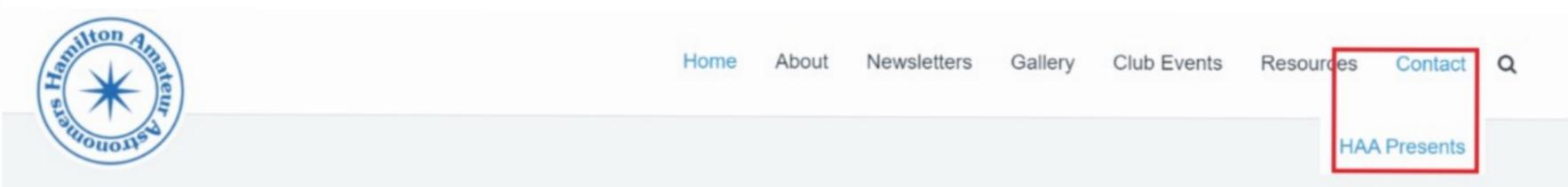


*St Matthew on-the-Plains Anglican Church (indicated with red locator)
Image generated using Google Maps*

“HAA Presents”

Members of the public of any age in the GTHA can now request an in-person or virtual presentation from the HAA directly on our website.

Simply navigate to www.amateurastronomy.org and select “Contact” from the top menu bar and then click on “HAA Presents” (see image below). You will be presented with a request form and once all required fields are entered, click on the “Submit” button and you will see a confirmation message that your request has been successfully submitted.



Once received, our Public Education Director, Jo Ann Salci, will respond to your request within 5 business days to discuss next steps. If you have any questions, feel free to send an email to: haapresents@amateurastronomy.org.

2025-2026 Event Dates

Saturday Oct. 4, 2025	Moon and Saturn Public Viewing	Bayfront Park, Hamilton; Wait for email confirmation
Friday Oct. 17, 2025	Monthly Meeting Annual General Meeting	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Sunday Nov 9, 2025	Dundas Valley Orchestra Concert in Partnership with the HAA	St Paul's United Church, 29 Park Street West, Dundas 2:00 - 5:00 pm
Friday Nov. 14, 2025	Monthly Meeting Speaker: Doug Turner and the Calendar preview	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Saturday Nov. 22, 2025	Telescope Clinic	Valley Park Library, Stoney Creek 12:00 - 5:00 pm for members 1:00 - 4:00 pm for public
Friday Dec. 12, 2025	Monthly Meeting Seasonal Social Speaker: John Moores, author of <i>Daydreaming in the Solar System</i>	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Friday Jan. 9, 2026	Monthly Meeting Speaker: Akbar Ahmed Chowdhury	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Friday Feb. 13, 2026	Monthly Meeting Speaker: Keith Momberquette: Astrophotography	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Saturday Feb. 14, 2026	Telescope Clinic/ Kids Workshop: Tentative	Valley Park Library, Stoney Creek
Friday Mar. 13, 2026	Monthly Meeting Speaker: TBD	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Friday Apr. 10, 2026	Monthly Meeting Speaker: TBD	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Friday May 8, 2026	Monthly Meeting Speaker: TBD	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington
Friday Jun. 12 2026	Monthly Meeting Speaker: TBD	St. Matthew on-the-Plains Anglican Church, 126 Plains Rd, Burlington

HAA Helps Hamilton

The H.A.A. is accepting and collecting donations from our members and guests for local food banks at our general meetings. The H.A.A. has always valued its relationships with food banks in the community, particularly [Hamilton Food Share](#).

If you can't make an in-person meeting, you can make a donation directly to your local food bank.



Welcome, HAA Explorers!

Have you ever observed the work of scientists and astronomers on the news and wondered how it would feel to conduct your own experiment? What if you could explore the marvels of space just as astronauts do? Scientific experiments are great ways to expand your knowledge in enjoyable ways. You don't need a rocket ship to feel like a real space explorer! With a few simple materials, you can investigate the same questions scientists ask in space. Today's topic is about all of the fascinating space experiments that you can conduct in your own home.

1. DIY Moon Surface

The Moon's surface tells a story of meteor impacts. You can make your own!

- **Materials:** flour, cocoa powder, marbles or rocks, baking pan.
- **Steps:** Fill the pan with flour, dust cocoa on top (for color contrast), and drop marbles from different heights.
- **Challenge:** Measure crater sizes, then predict: What happens if you drop from double the height? What happens if you drop the marbles on an angle?
- **Purpose:** Energy from impacts changes crater depth and width, just like real meteors.

2. Constellation Projector

Astronomers study star patterns. Build a constellation projector to bring the night sky indoors!

- **Materials:** toilet paper roll, black construction paper, flashlight, push pin.
- **Steps:** Poke pinholes into paper in the shape of constellations. Tape it to one end of the roll. Shine a flashlight through in a dark room.
- **Extra:** Make multiple "star slides" and swap them to see different constellations.
- **Purpose:** This models how stars form patterns we see from Earth.

3. Baking Soda Bottle Rocket

- **Materials**

1. Empty plastic soda bottle (500 mL or 1 L)
2. Vinegar (~150 mL for 500 mL bottle)
3. Baking soda (1-2 tbsp)
4. Small square of paper towel (time-delay packet)
5. Launch stand (bucket of sand or stable cradle)
6. **Safety goggles & adult supervision in an outdoor area with lots of space (no pun intended!)**

- **Steps**

1. Pour vinegar into the bottle.
2. Wrap baking soda in the paper towel to make a packet.
3. Drop the packet in, quickly seal with a cork/stopper or loosely screw the cap, place on the launch stand with the cap side down, and step back.
4. **LIFTOFF!** When CO₂ builds, the bottle shoots up.

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HAA Explorers 2.0 --- DIY Space Experiments! (continued)

- **Challenge**

Try different amounts of vinegar and baking soda. Which mix launches highest?

- **Scientific explanation:** The vinegar + baking soda reaction makes CO₂ gas. Pressure builds and the escaping gas pushes the bottle up (action = reaction).

Here's a [little video](#) that shows another way to make a rocket!

Make sure to stay safe when conducting experiments and ask for help if needed. Have fun, Explorers!



Examples of constellation patterns you can use

Image Credit: <https://ameliasamazing.spaceadventures.com/constellations/>



The Sky This Month for October 2025 by Kevin Salwach

Happy October everyone. Summer is officially behind us, the nights are getting longer, the air is getting cooler, and in my opinion at least, it's now the best time of the year. Who doesn't love a good Fall evening? I hope you've all been getting out as often as you can recently - there's been a stretch of pretty good nights the last few weeks, and hopefully that follows us into October - there is plenty to see this time of year and plenty going on in the night sky this month, so let's get right into it.

Like usual, let's look at our naked eye Fall sky, starting off in the west. In the middle of the month on the night of our meeting (and remember - due to Thanksgiving, our AGM is one week later than usual this month - October 17), around 9PM, you get your final glimpses of the summer constellations before they disappear until spring. Sagittarius is almost completely set, with Ophiuchus following it an hour later, and Aquila following an hour after that. Bootes and Hercules sink low towards the horizon in the northwest at the beginning of the night, and towards north, the Big Dipper straddles the horizon as well as it circles around Polaris. Moving up to zenith, Cygnus is still prominent, with the Summer Milky Way arching down below it. However the Summer Triangle is soon replaced by Pegasus and Andromeda by midnight, with M31 almost directly overhead by the early hours of the morning. Over in the east, the "water constellations" I talked about in September are now on full display in their best positions of the year - Pisces, Cetus, Aquarius, and Piscis Austrinus, are decently high above the eastern horizon from nightfall until the early morning, with Eridanus the river following behind them past midnight. Cepheus, Perseus and Cassiopeia are also high up in the northeast, giving you a large swath of the sky to pick out a plethora of great deep sky objects all month.

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The night sky looking west at 9PM on Friday, October 17. Image generated using Stellarium

The Sky This Month for October 2025 (continued)



The night sky looking towards zenith at 9PM on Friday, October 17



The night sky looking east at 9PM on Friday, October 17. Images generated using Stellarium

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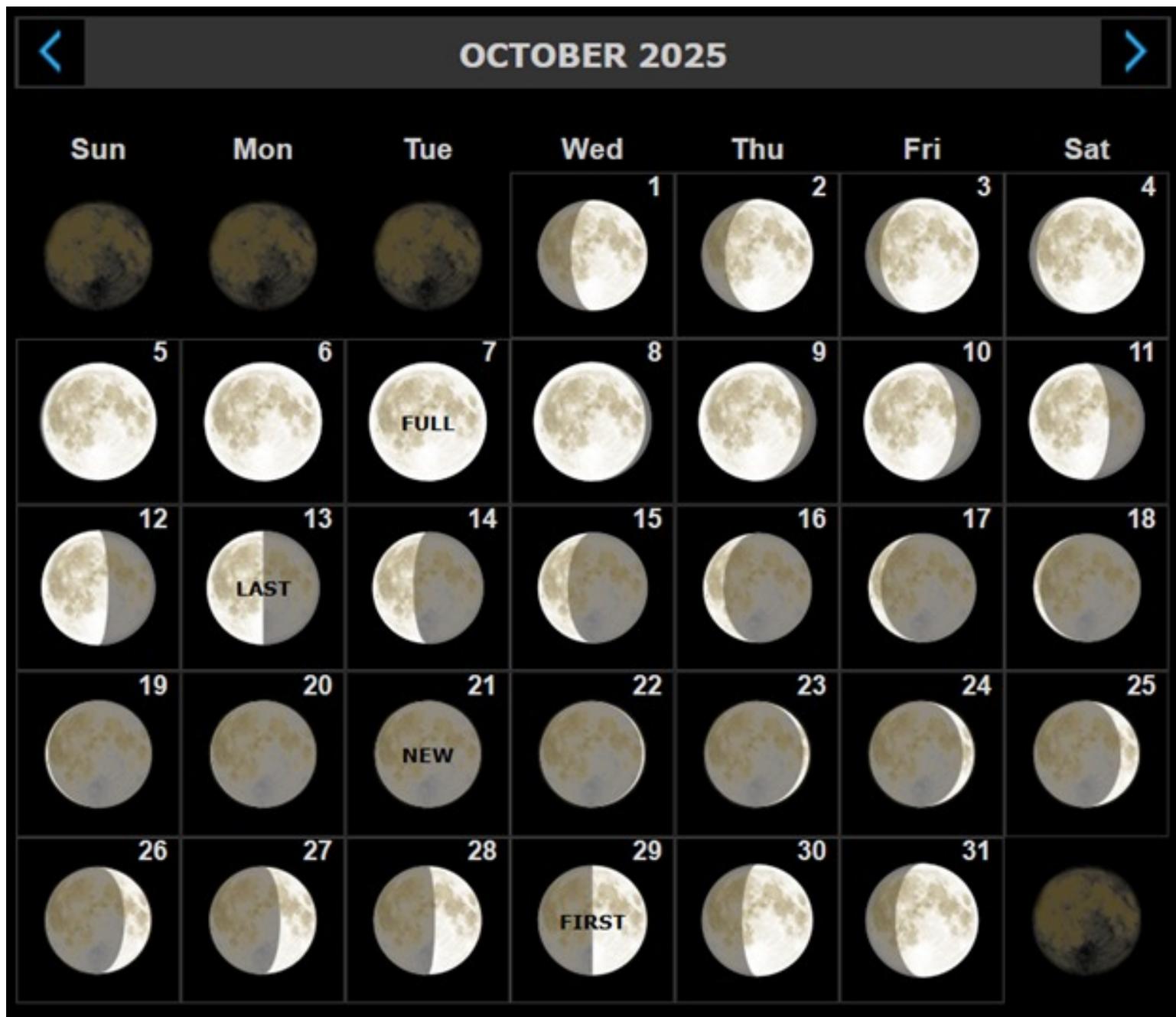
The Sky This Month for October 2025 (continued)

The Moon

We start off October with a waxing gibbous Moon, coming to Full on the night of the 7th. Last quarter is on the 13th, with New Moon on the 21st and First Quarter on the 29th. The weekend of our meeting, and the following week are your best nights this month for a dark, moonless sky.

The Moon has a few noteworthy events this month:

- 3 degrees away from Saturn in the evening sky on October 6
- !!! The Moon passes almost directly in front of The Pleiades on the night of October 9/10th - start your observing around 11:00 and keep watching until 2:00 as it occults several of the stars in M45
- CHALLENGE - beginning at 3PM in the afternoon (full daylight) on the 16th, the slim crescent Moon passes just a few arc seconds above Regulus in the low western sky. The closest approach is at 3:15, just missing an occultation. If you find yourselves with exceptionally clear skies that day, take out your scope and try some high magnification. At magnitude 1.35, Regulus is theoretically bright enough to pick out in a scope in daylight - although it is going to be quite the challenge and requires near perfect conditions to see this conjunction
- At 9:00 exactly on the night of the 30th, the Moon occults Deneb Algedi, the brightest star in Capricornus, magnitude 2.85 - it reappears on the other side of the Moon at 10:14PM



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The Sky This Month for October 2025 (continued)

The Planets

Now on to the planets. *Mercury* is again too close to the Sun this month for much observing. On the evening of the 19th, it is a few degrees away from Mars just a few minutes after sunset - but you will need a true western horizon to see them, and both have set within an hour of the Sun going down. Otherwise, another no-go month for the inner planet. *Venus* is visible in the morning sky all month long, though it sinks lower and lower and rises later and later as the month goes by. It is joined by a crescent Moon a few degrees away on the morning of the 19th. By month's end, Venus rises around 6:30, with the Sun only an hour behind it. Still - plenty of opportunity the whole month to catch some glimpses of the brightest planet. For the second month in a row, *Mars* joins Mercury hiding near the Sun. Nothing noteworthy for the red planet this month, if you manage to even see it at all. *Jupiter* is again well placed in the late night/early morning sky, rising around midnight at the beginning of the month and earlier and earlier as October moves on. It is visible for several hours up to sunset, giving you plenty of chances to see its Galilean Moons and their wandering shadows. *Saturn* has a strong showing again this month. At the start of October, it rises when the sun sets and is up all night until just before sunrise. By the end of the month, it sets around 3AM, and has decreased slightly in brightness, but nonetheless its visible for you all of October to see, with the rings remaining almost edge on. *Uranus* is visible in Taurus for much of the night this month, while *Neptune* follows close behind Saturn.

Deep Sky Objects

Lastly, moving onto our deep sky. Last month I gave a few difficult objects for our star party goers to try and find. This month I'll tailor it towards our beginner stargazers. The northeastern sky in October gives you a slew of the best deep sky objects you can get. Focus in this month on the constellations of Cassiopeia, Perseus, Andromeda, Triangulum and Pegasus, to see the full spectrum of what the cosmos has to offer. Among plenty of other objects, the most noteworthy, brightest and best looking are:

- ***M31, the Andromeda Galaxy*** and its satellites *M32* and *M110*. At magnitude 3.4 its bright enough to see with the naked eye in a dark sky, and is one of the easiest Messiers to see in binoculars or a telescope both large and small
- ***M33, The Triangulum Galaxy***, another great galaxy slightly to the east and down towards the horizon from *M31*. At magnitude 5.7, it's a lot harder than *M31* to find - you'll need some dark skies and a bino or a wide field telescope to catch this big, almost face on spiral
- ***NGC 869/884 - The Double Cluster in Perseus***, at magnitude 3.8 this duo of bright, dense open clusters overlapping each other is one of the finest sights the sky has to offer, easy to find, easy to see, and an absolute stunner in a small telescope
- ***M15***, I've mentioned it before - at magnitude 6.4 this bright, big globular just off the head of Pegasus is a dense, great looking cluster in any sized scope
- ***NGC 7789*** - at magnitude 6.7, this bright, dense and even open cluster in Cassiopeia is one of my favorite night sky objects. At medium power in a mid sized scope, it fills up the whole field of view with more stars than you can count, with tonnes of different colors from red to white to blue
- Some other great open clusters - ***M34, M103, M52, NGC457, NGC663***
- Some great double stars - ***Eta Cassiopeiae, Iota Cassiopeiae, Gamma Cassiopeiae, Gamma Andromedae, Almach, Archird, Mu Cephei***

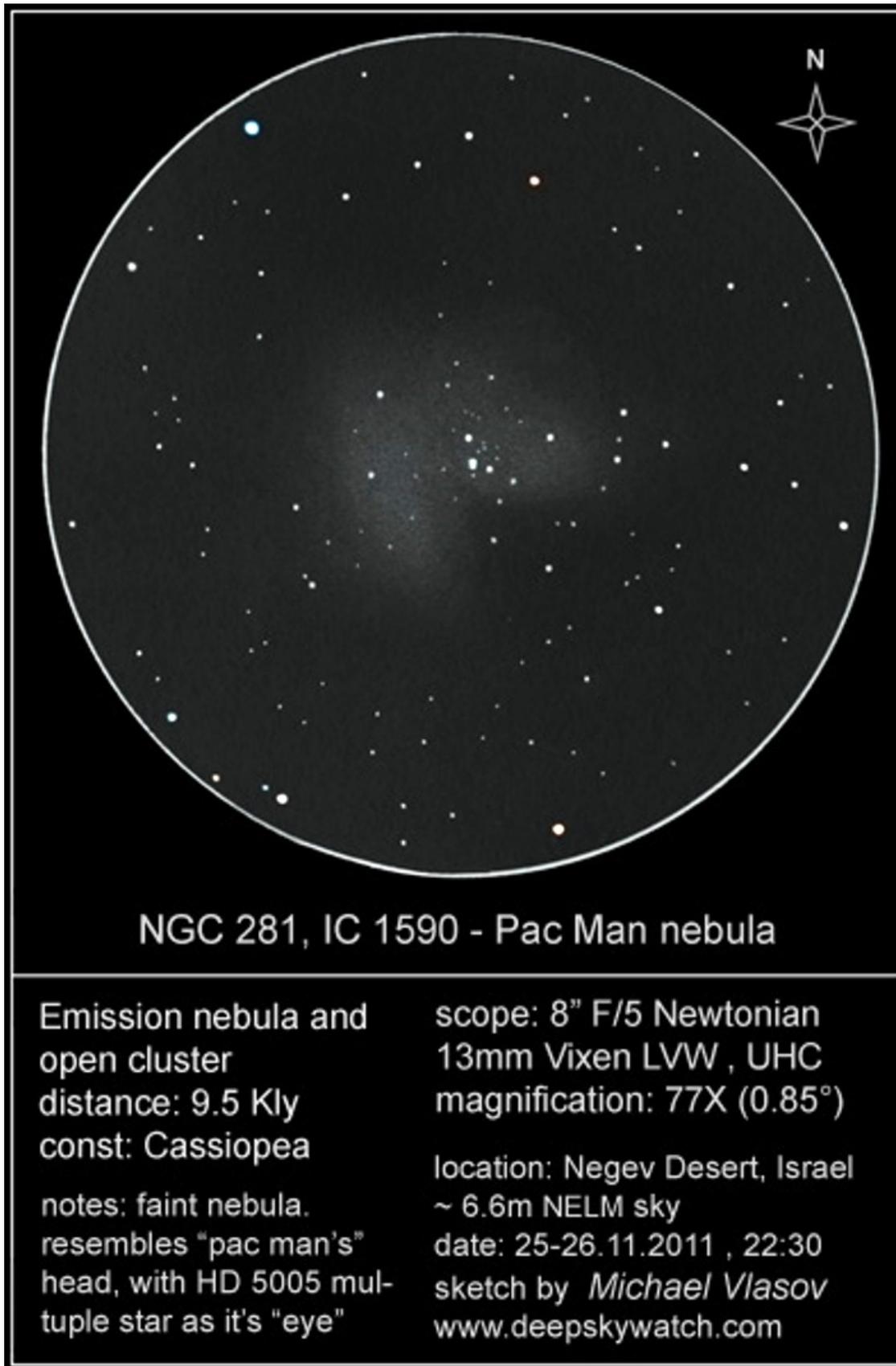
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The Sky This Month for October 2025 (continued)

Beginner Challenge Object: NGC281 - The Pacman Nebula

This HII nebulous region just off the “W” of Cassiopeia is a difficult challenge for our beginner observers. Embedded within it is the open cluster IC1590, around magnitude 7.4. The nebula itself is faint - it is certainly more of a photographic object than visual but with a 6-8 inch scope under some clear, dark skies you should be able to pick out the fuzzy nebula with a chunk of it “missing”, giving it its name - with averted vision, suddenly it will pop into view looking just like Pacman, about to take a bit out of the stars around it.

Good luck, happy observing, clear skies, and I’ll see you all in November!



NGC 281 in an 8" Newtonian, courtesy of Michael Vlasov at deepskywatch.com



5 Smart Scopes Reviewed and Compared by Ken Leedham

In this article I will be reviewing and comparing the various ‘smart’ telescopes I have been working with for the past year or so. As of the time of writing this, all of these scopes are still widely available, and I believe they are still the latest offerings from their various manufacturers (other than the smaller S30 being offered from Seestar).

I will not be trying to cover every little detail of using each of the scopes, as that would be way too much to cover in one article. I will focus on the major features of the scopes, the pros and cons of each, and my conclusions as to which offer the best power and value. I would like to back up my personal conclusions by showing the best images I have been able to capture with each scope, but that is not really possible here, so for the sample images, please see the video version of this review on my YouTube channel:

<https://youtu.be/Akq1iPWwXZc>

My major focus will be on deep-sky astro-photography, which is my main purpose, though I will address other uses of the scopes in passing.

Overview

Scope	Type	Sub Type	Aperture	Focal Length	Focal Ratio	Sensor	Image Size	Image View	Pixel Size	Storage	Battery	Weight	Price
Seestar S50	Refractor	3-element	50mm	250mm	F/5	IMX462	1920x1080	0.72°x1.28°	2.9µ	64 Gb	6,000mAh	5.5 lbs	\$733
Dwarf 3	Refractor	Not clear?	35mm	150mm	F/4.3	IMX678	3840x2160	2.93°x1.65°	2.0µ	128 Gb	10,000mAh	2.9 lbs	\$854
Celestron Origin	Compound	RASA	152mm	335mm	F/2.2	IMX178	3096x2080	0.85°x1.27°	2.4µ	45 Gb	97.9Wh	41.6 lbs	\$6,298
Vespera Pro	Refractor	4-element	50mm	250mm	F/5	IMX585	3536x3536	1.6°x1.6°	2.0µ	225 Gb	10,000mAh	11 lbs	\$5,337
Equinox 2	Reflector	Newtonian	114mm	450mm	F/4	IMX347	2088x1536	0.57°x0.78°	2.9µ	64 Gb	15,000mAh	19.8 lbs	\$3,375

Notes: The Celestron Origin comes with a LiFePO4 battery for which no capacity in mAh is given. It seems to give similar observing time to the Seestar S50. All scopes can be powered using some kind of external battery pack for more time. I have done this for a long night with all except the Equinox 2

The weights given for the Celestron Origin and the Equinox 2 are total weights, including the custom tripods that come with those scopes. The Origin splits into 3 parts (tripod, mount, and optical tube), each weighing 15 lbs or less (though the optional equatorial wedge adds more weight). The Equinox 2 tube is integrated with the mount, for a weight of about 15.4 lbs, with the tripod relatively light at 4.4 lbs. The weights for the other scopes are just for the integrated units, since you are probably going to use them with your own tripod of choice.

Prices are the best I found in Canada, in Canadian dollars. Your price, of course, may differ somewhat. The price for the Origin was including a carrying case for the optical tube, and a Celestron duo-band filter intended specifically for the Origin (though the Origin does take standard 1.25" or 2" filters). The price for the Vespera Pro was including the (expensive) proprietary UHC and Nebula filters. The price for the Equinox was just for scope. They offer a backpack carrying case, but it's priced at around \$600 Canadian which seems ludicrous for a backpack to me. I bought a padded telescope bag from Amazon for \$125 to transport the Equinox 2, or others.

I feel I have to start by covering the basic parameters for each of the scopes. I apologize, this is a whole lot of numbers, but I don't believe I can review and compare the scopes without laying out and comparing these basics.

The **Seestar S50** is a 3-element refractor with an aperture of 50mm and a focal length of 250mm, giving it a focal ratio of F/5. It uses an IMX462 sensor, producing images that cover an area of sky 0.72 x 1.28 degrees, 1920 x 1080 pixels. It can produce larger images using mosaic capture, but this takes enormous elapsed time in my experience. The pixel size of the sensor is 2.9 microns. The scope has 64 Gb of internal storage, and a battery of 6,000 mAh capacity, enough for a few hours work, but probably not for a long night (in my experience). The unit weighs 5.5 lbs. Canadian price of 733 Canadian dollars, including tax.

The **Dwarf 3** has two lenses, a telephoto lens and a wide-angle lens. The wide-angle lens is not really relevant for deep-sky photography, so I'm not going to address that. The telescopic lens has an aperture of 35mm and a focal length of 150mm, giving a focal ratio of F/4.3. I am not clear as to the exact lens type - they say it uses ED glass and is 'periscopic', whatever that means. Certainly it does seem to produce sharp images. This scope uses an IMX678 sensor, producing images that cover an area of sky 2.93 x 1.65 degrees, 3840 x 2160 pixels. The pixel size of the sensor is 2 microns. The scope has 128 Gb of internal storage, and a battery of 10,000 mAh capacity, enough for quite a few hours. The unit weighs 2.9 lbs. Canadian price of 854 Canadian dollars, including tax.

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5 Smart Scopes Reviewed and Compared (continued)

The *Celestron Origin* is a compound scope, somewhat similar to a Schmidt-Cassegrain. Specifically it is a Rowe-Ackermann Schmidt Astrograph, with a single mirror, and a camera in the centre of the front plate. The aperture is 152mm (with an obstruction for the camera), with a focal length of 335mm, giving a focal ratio of F/2.2, the fastest of all these scopes by a considerable margin. It uses an IMX178 sensor, producing images that cover an area of sky 0.85 x 1.27 degrees, 3096 x 2080 pixels. The pixel size of the sensor is 2.4 microns. The scope has 45 Gb of internal storage. It uses a LiFePO4 battery for which no capacity in mAh is given. It seems to give similar observing time to the Seestar S50. The total weight is 41.6 lbs, but this is split into three parts, tripod, mount, and optical tube assembly, each weighing less than 15 lbs. The optional equatorial wedge adds about another 15 lbs. Canadian price of 6,298 dollars Canadian including tax; this price included a carrying case for the optical tube and a Celestron duo-band filter (but not the equatorial wedge).

The *Vespera Pro* is a refractor with a 4-element lens with an aperture of 50mm and a focal length of 250mm, giving a focal ratio of F/5 (the same as the S50). This scope uses an IMX585 sensor, producing images that cover an area of sky 1.6 degrees square, 3536 x 3536 pixels. The pixel size of the sensor is 2 microns. The scope has 225 Gb of internal storage, and a battery of 10,000 mAh capacity, enough for quite a few hours. The unit weighs 11 lbs. Canadian price of 5,337 Canadian dollars, including tax. This price included about \$1,000 for the proprietary UHC and duo-band filters.

The *Equinox 2* is a reflector, with the camera mounted on a spider in the centre of the open front aperture. The aperture is 114mm, with a focal length of 450mm, giving a focal ratio of F/4. This scope uses an IMX347 sensor, producing images that cover an area of sky 0.57 x 0.78 degrees, 2088 x 1536 pixels. The pixel size of the sensor is 2.9 microns. The scope has 64 Gb of internal storage, and a battery of 15,000 mAh capacity. The scope weighs 19.8 lbs, split between the integrated scope and mount at 15.4 lbs, and the proprietary tripod at 4.4 lbs. Canadian price of 3,375 Canadian dollars, including tax.

Now I am going to address the main pros and cons of each scope, as I see them, primarily for the purpose of deep-sky astro-photography.

Seestar S50: Pros & Cons

Pros:

Easy to transport

Easy to use

Can produce good images, within the limits of its resolution (1920 x 1080)

Good for medium sized deep-sky objects, e.g. Lagoon Nebula

Can do wider with mosaic, but not very practical for me, due to time required

Built-in UHC and Duo-band filters

Quite modestly priced

Can do solar, with included solar filter

Has a mosaic mode (but very slow to complete)

Cons:

Small image size, not good for printing, or for very large screens

Quite slow, needs long exposures (enormous exposures for largest mosaics)

The Seestar S50 is easy to transport and to use. It can produce good images, within the limits of its small native sensor resolution, and the long exposures required. It can produce much larger images using its mosaic mode, but I have not found this terribly practical, given the very long capture times required (but I do show a couple of S50 mosaics in the video version of this review). The scope has built-in UHC and

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5 Smart Scopes Reviewed and Compared (continued)

Duo-band filters, which is very convenient and eliminates extra expense - but you can't use filters of your own choice. It is quite modestly priced, certainly compared to much of the competition. It can do solar work, and comes with an included solar filter. The greatest limitation of this scope, in my opinion, is the small native image size, meaning that its non-mosaic native images are only really suitable for viewing on screens, and don't capture very fine detail. Quite long exposures will generally be required to get satisfactory results, and the capture times become enormous for large mosaics. The S50 comes with a hard carrying case and a mini-tripod, but realistically you will probably want to use it with your own tripod of choice, and it mounts with a standard 3/8" screw fitting.

Dwarf 3: Pros & Cons

Pros:

- Very light and easy to transport and use
- Can take excellent, fairly wide-field images (e.g. Lagoon and Trifid in one image)
- Images are very good size, suitable for wide use
- Built-in UHC and Duo-band filters
- Quite modestly priced
- Can do solar, with included solar filter

Cons:

- Short focal length
- Not so suitable for smaller objects, such as most galaxies (though good for groups)
- Small aperture (but this doesn't really seem to limit the wide images)
- Does need longish exposures

The Dwarf 3 is very light and easy to transport and use. It can take excellent wide-field images at a very good size, suitable for wide use, and capturing quite fine detail. Like the S50, it comes with included UHC and duo-band filters, and a solar filter, and is quite modestly priced. It has a short focal length, and is not really very suitable for small objects, but it captures impressive wide views. Longish exposures will be required. Though rather outside the scope of this review, it can also do excellent day-time nature photography and video. The Dwarf 3 comes with a soft carrying case. No tripod is included. It mounts with a standard 1/4" screw fitting.

Celestron Origin: Pros & Cons

Pros:

- Fast, best for quickly capturing worthwhile images
- Quite easy to use, once set up
- Good for medium sized deep-sky objects, e.g. Lagoon Nebula
- Pretty good image size, good for quite wide use
- Takes standard 1.25" or 2" filters (not included)

Cons:

- Fairly heavy, quite a bit of work to transport and set up
- No wide-field mode
- Quite expensive
- Cannot do solar

The Celestron Origin is the fastest of all these scopes, by a considerable margin, meaning that it is definitely the best for capturing worthwhile images without great exposure times. More exposure is better for most objects, but you can get some good results from the Origin with exposures of 10 minutes or so. This scope

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5 Smart Scopes Reviewed and Compared (continued)

captures about the same area of sky as the S50, but in much finer resolution. It is most suitable for medium sized deep-sky objects. It takes standard filters in either 1.25" or 2" size, so you can use whatever filters you choose. No filter is included per se, but the price I quoted did include a duo-band filter, and I'd definitely suggest getting this Celestron filter made specifically for this scope. That price also included the padded case for the optical tube assembly, and again I'd really suggest getting this, to protect the delicate assembly during transport. This scope is, of course, by far the heaviest, and requires the most work to set up (though nothing unmanageable). It does not have any kind of wide-field or mosaic mode. It is a lot more expensive than the S50 and the Dwarf 3. It cannot do solar at all.

Vespera Pro: Pros & Cons

Pros:

- Quite easy to transport and set-up (though surprisingly heavy for its size)
- Takes excellent, square, wide-field images
- Excellent image size, suitable for wide use
- Optical quality high (best of the refractors, 4-element apo)
- Can do solar, with optional filter (not included)
- Has a mosaic mode, but is natively so wide, that I have never used the mosaic mode

Cons:

- Quite slow, needs longish exposures, but seems to capture faster than the S50, despite the same F/5 focal ratio (presumably sensor is faster?)
- Quite expensive
- Can only use proprietary filters, which are expensive
- Images are so large (~25 MB per frame) that they take a long time to process - but you can hardly blame it for that
- Not quite as flexible in terms of exposure customization

The Vespera Pro is quite easy to transport and use, though it is surprisingly heavy for its size. It includes a carrying case, as do the S50 and the Dwarf 3. The carrying case is hard and well padded. It comes with a mini-tripod, but realistically you will probably want to use it with your own tripod of choice, and it mounts with a standard 3/8" screw fitting. It takes excellent, square, wide-field images, which are of a very good size, the largest of all the scopes, making them suitable for wide use. It has, I believe, the best optical quality of all of the refractors, with a 4-element apochromatic lens. It can do solar, with an optional proprietary filter, which is not included, and which I did not get. It does have a mosaic mode to capture even wider images, but the native images are already quite wide, and I have never tried the mosaic mode of this scope. On the negative side, it is quite slow, requiring longish exposures, though it does seem to be able to do more in less time than the S50, despite having the same F/5 focal ratio, presumably because the sensor and software work faster. It is definitely quite expensive - over seven times the cost of the S50, when the UHC and Duo-band filters are included (as they are with the S50). This might seem almost ridiculous, but in my experience it can produce much better results than the S50. It can only use proprietary filters, so you can't make your own choice, and the filters are expensive. On the other hand, the scope automatically senses which filter is fitted, which is convenient. The frames produced by the Vespera Pro are by far the largest of any of these scopes, about 25 Mb each, so stacking and processing take much longer than for images from the other scopes - but you can hardly blame it for producing large, fine images. It is not quite as flexible in terms of customizing exposure parameters as most of the other scopes, but I have not found this to be a problem.

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5 Smart Scopes Reviewed and Compared (continued)

Equinox 2: Pros & Cons

Pros:

Honestly, hard to say much good about this scope, compared to current competition
Fairly easy to transport and set up

Cons:

Hard to use. Requires manual focusing and collimation.

Collimation is horribly difficult

Does not really produce good images whatever you do with it, from my experience, as compared to the other scopes considered here

Quite expensive

Cannot do solar

Lastly the Equinox 2. I really find it hard to say much positive about this scope. It's fairly easy to transport and set up, but that's about the best I can say. It requires manual focusing (whereas all of the other scopes considered here auto-focus well). It does include a Bahtinov mask, so the focusing is not too onerous. On the other hand, it absolutely requires manual collimation, and tends to keep going out of collimation; and the collimation process is horrendous - you're trying to view a small circle on your phone or tablet screen whilst turning the collimation screws on the back of the scope with a tool, but if you turn a screw more than a tiny amount, the circle goes off the screen, and you probably won't be able to get it back, requiring many attempts to complete successful collimation (for me, at least). And even after I did my best with collimation and focusing, the images from this scope never seemed really sharp and clear (examples in the video). This scope is also quite expensive, less than the Origin and the Vespera Pro, but much more than the S50 and the Dwarf 3, either of which would be a much superior choice, in my opinion. There is no solar filter provided for it, and I don't believe it could be used for solar. *(Continued on [page 17](#))*



Selection of images through various smart scopes. Image Credit: Ken Leedham (all)

5 Smart Scopes Reviewed and Compared (continued)

So, here are my conclusions.

Conclusions:

Best value for money: Dwarf 3

Excellent wide-field deep-sky images, at a quite modest price. Can also do solar, and fine day-time nature photography. Very easy to transport and set up.

Most capable overall: Celestron Origin

Can capture excellent images of many deep-sky objects, with much shorter exposure times than any of the other scopes discussed, so it really does give you the most power, if you can live with the price.

Economical Combination: Dwarf 3 & Seestar S50

You can buy both of these scopes for less than the price of any of the other three discussed, and that would give you a wide range of capabilities, so long as you can live with small size of the basic S50 images (and longer exposures aren't too much of a problem for you).

Honorable Mention: Vespera Pro

The Vespera Pro is a very capable scope, quite easy to use, and it can produce excellent, fairly wide-field images. It is the same F/5 as the S50 (though sensor seems faster), so longer exposures are going to be required. The quality of the images is much better than from the S50, due to the much better sensor, giving larger images with finer resolution. It also uses a 4-element apochromatic lens. Good though it is, it's quite pricey, so I'd only recommend it after the Dwarf 3 and the Origin.

Not recommended: Equinox 2

I cannot see any reason to recommend this scope. It is by far the most difficult to use, requiring manual focusing, and manual collimation (which is extremely difficult). I have never been able to produce really satisfactory images with mine. And it is quite expensive (though less than the Origin or the Vespera Pro, even without filters).

The best value for money is the Dwarf 3. It can produce excellent wide-field deep-sky images at a quite modest price. It can also do solar, and fine day-time nature photography, and video. It is extremely easy to transport and set-up (just a little more effort for equatorial alignment).

The most capable scope overall, for deep-sky, is undoubtedly the Celestron Origin, but of course it is the most expensive. It can capture excellent images of many deep-sky objects, with much shorter exposure times than any of the other scopes discussed, so it really does give you the most power, if you can live with the cost. I have produced more worthwhile images with the Origin than with any of my other scopes.

A good economical combination would be the Dwarf 3 and the S50. You could certainly buy both of these scopes for less than the price of any of the other three discussed, and that would give you a wide range of abilities, so long as you can live with the small size of the basic S50 images, and longer exposures aren't too much of a problem for you (which they rather are for me, as I have to observe remotely in often uncomfortable conditions).

It's a bit difficult to know how to place the Vespera Pro. It is a very capable scope, quite easy to use, and it can produce excellent wide-field images in fine detail. It has the same F/5 focal ratio as the S50, but seems to work a bit faster. It has the best sensor of any of the scopes discussed (well, perhaps tied with the Dwarf 3), and its optics are excellent, with a 4-element lens. It also has good battery life, and the most internal storage (but it needs that, given its large frame size). Good though it is, it's quite pricey, so I'd only recommend it after the Dwarf 3 and the Origin.

(Continued on [page 18](#))

5 Smart Scopes Reviewed and Compared (continued)

Finally the Equinox 2. I really cannot see any reason to recommend this scope. It is quite expensive, and it is by far the most difficult to use, requiring manual focusing and collimation; and the collimation process, which is definitely required, is extremely difficult. And I have never been really satisfied with any image I have produced with this scope. I show the best I've been able to do in the video version of this review. As previously noted, sample images serving as a useful addition to this review can be seen (reduced to show in the video) in the video version of this review:

<https://youtu.be/Akq1iPWwXZc>

I hope you have found some of this interesting or informative. As I noted at the start, I could say much more about the features and quirks of the various scopes. I have focused here on the factors I thought most significant. If you have any questions about my experiences with any of these scopes, please feel free to email me at kloedham@idirect.ca and I will do my best to respond.

Until the next time, clear skies!

– *Ken Leedham*

HAA Outreach Presentations with Vulnerable Sectors

The HAA executive has created a policy for any HAA member who wishes to do outreach presentations to vulnerable sectors, which includes children under 18 years of age and vulnerable adults. This does not include our general club outreach activities.

Presentations include in-person or virtual sessions where parents/guardians may not be present. **As it is not always possible to anticipate caregiver attendance at outreach activities for children under the age of 18, or vulnerable adults, it is therefore a requirement for HAA member-volunteers who work with these vulnerable populations to complete a Police Vulnerable Sector Check.**

These can be obtained only in your region of residency. Costs vary from one area to another. They will be kept on file by the HAA Education Director. No details regarding the findings of the check will be made in any way public or viewed beyond the HAA Education Director.

The HAA will reimburse any member who wishes to do outreach presentations to vulnerable individuals, provided a receipt is submitted.

Please contact Jo Ann Salci if you have any questions about this policy and/or if you wish to put your name forward to help with outreach activities to young people! This policy is effective immediately.

2025 Dark Sky Star Party Review by Sue MacLachlan

This year, the HAA Dark Sky Star Party took place between Friday September 19 and Sunday September 21. 26 people attended the party as well as two very well behaved and friendly dogs; Pepper and Goosebumps. There were some people for whom this was their first time at the star party among the attendees. First timer or not, many were awe struck by the beauty of the great sky. The first timers very quickly became part of our HAA dark sky star party community where the old-hands extended a welcome to one and all!

The weather definitely co-operated with beautiful warm sunny days and clear nights. While the seeing and transparency weren't always perfect throughout our time, that didn't deter anyone's enthusiasm! Plus there were some moments where the sky was perfect - 4am on Saturday was particularly breathtaking.

Trailer Row was mostly filled with astrophotographers eager to catch a distant object. There were many many conversations among the campers, both during the day and at night around equipment, techniques, object choice and processing as well as the usual socializing.

The visual astronomers, who were typically in the Ground Camping Lane, had a glorious time hunting down objects, sharing and comparing views through each other's equipment and relishing in the many payoffs of actually finding your target(s) well into the wee hours of the mornings.

One of the highlights for almost everyone was the transit of Titan's shadow across the north polar region of Saturn. In preparation for the transit, a few people napped beforehand. The transit began about 1:30 am on September 20 but the nappers were up by 2:00 am, watching the shadow of Titan move across the face of Saturn in real time, a rare thing for celestial events. Most of us observed the transit in at least 4 different telescopes, one of which was the 28" Dob that belongs to the Bluewater Astronomical Society. Our thanks go out to Matthew Mannering for reminding everyone about the timing of the transit and to Brett Tatton and the BAS for the set-up and use of the 28" Webster.

The BAS also provided a tour of E.S.Fox Observatory which is their roll off roof observatory located about a 30 minute drive from the star party site. The people who toured the observatory were very impressed with both the facility and the views of the sun they saw that afternoon.

Four members of the Skelton family joined us for the group dinner on Saturday evening. This year's dinner included roast or fried chicken, vegetarian pizza, some fabulous salads, potato wedges and lots of pie. Thank yous were given to the Skelton family and the co-organizers Sue MacLachlan, Doug Turner, Matthew and Janice Mannering. Interestingly, during the dinner, we discovered that apparently all of the problems of the world can be solved over pie.

I would be remiss if I didn't mention the gathering at the coffee tent each morning. Stories were shared, astronomy and astrophotography advice was given and lots of friendly laughter was heard. One person mentioned to me that he hadn't had that many great conversations with so many different people in one place and that he was really enjoying the weekend.

On behalf of everyone at the HAA and the Dark Sky Star Party attendees, once again, I want to extend a thank you to Dave Skelton and his family for allowing us to use his property. It is a very special, beautiful place where the dark sky is the star of the show and we are very privileged to be able to use the site.

Oh, by the way, there weren't any nearby coyotes this year but we did have a nighttime visit from 2 porcupines!! Ask around for details if you are curious....

The 2026 event will be the 5th anniversary of the HAA Dark Sky Star Party which will be held from Friday September 11 to Sunday September 13, 2026. See you next year.



The Moon, Venus and Regulus on Sept 19, 2025 at 5:34am from Burlington, ON, by Bob Christmas



The Moon and Venus on Sept 19, 2025, from Ancaster, ON, by Jo Ann Salci



The North America (NGC 7000) & Pelican (IC 5070) Nebulas, in Cygnus, by Chris Szaban
Taken through a NIKKOR ED lens with a ZWO ASI294MC Pro camera, from Milton, ON.
Exposures: 49 x 180s = 162 minutes total.



Emission Nebula Sh2-112, in Cygnus, by Alex Kepic
Taken through a Celestron C8 with a ZWO ASI294MC Pro camera on a Celestron AVX mount.
Frames: 306 x 2 mins, 215 x 2 mins (17 hours 22 minutes total integration time).



The Cocoon Nebula (IC 5146) in Cygnus, by Bob Christmas
Taken with a ZWO Seestar S50 imager from Burlington, ON. 270 x 10s = 45 minutes total.



The Andromeda Galaxy (M31), with companions M32 and M110, by Chris White
Telescopic image taken with a Canon T7i @ISO 1600. 168 x 60s = 2 hours, 48 minutes total.



The Cigar Galaxy (M82) in Ursa Major, by Alex Kepic
Taken through a Celestron C8 with a ZWO ASI294MC Pro camera on an AM5 Mount.



Silver Sliver Galaxy (NGC 891) in Andromeda, by Alex Kepic
Taken through a Celestron C8 with a ZWO ASI294MC Pro camera on a Celestron AVX mount.
Frames: 413 x 2 mins (13 hours 46 minutes total integration time).



The Soul Nebula (IC 1848), in Cassiopeia, by Chris Szaban
Taken through NIKKOR ED lens with ASI294MC Pro camera, from Milton, ON. 54 x 180s; 162 minutes total.



William J. McCallion
Planetarium

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 - **Oct 22: Any ETs Phoning Home? The Search for Alien Life**
 - **Oct 29: A Creepy Cosmos**
 - **Nov 5: Introductory Astronomy for Kids — Constellations**
- **For show times and further details, visit**
www.physics.mcmaster.ca/planetarium

UPCOMING EVENTS

October 17, 2025 - 7:30 pm – H.A.A. Meeting at St. Matthew’s Anglican Church. This is our *Annual and Special Meeting*. Our guest speaker will be *Matteo Statti*, who will talk about the Rev. D.B. Marsh Telescope. **There is the option of attending online via [Zoom](#)**. Past meetings can be viewed on our [YouTube](#) channel.

November 14, 2025 - 7:30 pm – H.A.A. Meeting at St. Matthew’s Anglican Church. This is our

2024-2025 Council

Check out the H.A.A. Website
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All active HAA members have the privilege of access to an exclusive HAA members only dark sky location.

Be on the lookout for e-mails with dark sky observing details. Space is limited.

The Harvey Garden HAA Portable Library



Contact Information

E-mail: library@amateurastronomy.org