

RASC Toronto Centre – www.rascto.ca

The Sky This Month – Sept 8 to Oct 6, 2021 (times in EDT)

by Chris Vaughan

NEWS

Space Exploration – Public and Private

Ref. <http://spaceflightnow.com/launch-schedule/>

Launches

September TBD, three launches - A Rocket Lab Electron rocket from Launch Complex 1A, Mahia Peninsula, New Zealand – payload, “Love At First Insight”, two BlackSky Earth observation spacecraft

September TBD - A SpaceX Falcon 9 rocket from SLC-4E, Vandenberg Space Force Base, California, - payload, Starlink comsats

Sept. 14 TBD - A Russian Soyuz rocket from Baikonur Cosmodrome, Kazakhstan – payload, 34 OneWeb comsats

Sept. 15 TBD - A SpaceX Falcon 9 rocket from Kennedy Space Center, Florida – payload, civilian **Inspiration4 Mission for St. Jude’s Children’s Research Hospital on Crew Dragon spacecraft** with billionaire Jared Isaacman, scientist and educator Sian Proctor, medical officer Hayley Arceneaux, and mission specialist Christopher Sembroski.

Sept. 23 at 2:11 p.m. EDT - A United Launch Alliance Atlas 5 rocket from Vandenberg Space Force Base, California – payload, Landsat 9 Earth observation satellite for NASA and the U.S. Geological Survey

September TBD - A Chinese Long March 7 rocket from Wenchang, China – payload, automated Tianzhou 3 resupply ship to dock with the Chinese space station

Late September TBD - An Ariane 5 ECA rocket from Kourou, French Guiana – payload, SES 17 and Syracuse 4A communications satellites

Sept. 30 at 8:48 pm EDT - A Japanese Epsilon rocket from Uchinoura Space Center, Japan – payload, JAXA Rapid Innovative Payload Demonstration Satellite, or RAISE 2

Oct. 5 at TBD – Soyuz rocket from Baikonur Cosmodrome, Kazakhstan – payload, **crewed Soyuz MS-19 spacecraft to the ISS** with cosmonaut Anton Shkaplerov, film director Klim Shipenko, and actress Yulia Peresild

October TBD - A Chinese Long March 2F rocket from Jiuquan, China – payload, Shenzhou 13 spacecraft with **three Chinese astronauts** to rendezvous and dock with the Chinese space station in low Earth orbit

This Month in History (a sampling)

Ref. <http://www2.jpl.nasa.gov/calendar/>, <http://space.about.com/library/weekly/bldatechoice.htm>,
<http://www.planetary.org/multimedia/space-images/charts/whats-up-in-the-solar-system-frohn.html>,
<http://www.lunar-occultations.com/rlo/calendar.pdf>

Astro-Birthdays and Milestones

September 7, 1914 – **James van Allen** – American physicist and magnetospheric researcher is born

September 17, 1764 – English astronomer **John Goodricke** is born, pioneer of periodic variable stars, discovering Algol’s eclipsing binary mechanism and researching Cepheid variables

September 21, 1874 - **Gustav Holst** – composer of *The Planets* (in 1916, before Pluto was discovered in 1930)

September 24, 1898 – American astronomer **Charlotte Moore Sitterly**, solar spectroscopy expert is born

September 27, 1918 – **Sir Martin Ryle** – pioneer of astronomical radio interferometry is born

September 28, 1953 – American astronomer **Edwin Hubble** dies at age 63

October 5, 1958 – American astrophysicist **Neil deGrasse Tyson** is born

Astronomy and Space Exploration

September 6, 1997 - Gladman, Nicholson, Burns, and Kavelaars using the 200-inch Hale telescope discover Caliban and Sycorax, moons of Uranus

September 8, 1966 – First episode of Star Trek airs

September 9, 1892 - Edward Barnard of the Lick Observatory discovers Jupiter's innermost satellite, Amalthea. The first since Galileo's four Galilean moons

September 15, 1965 – *Lost in Space* premieres only weeks after *Star Trek*

September 18, 1977 – Voyager I images the Earth and Moon together

September 21, 2003 – Galileo spacecraft's end of mission impact into Jupiter

September 23, 1846 – Johann Galle discovers Neptune within 1 degree of Urbain Le Verrier's predicted position, observing it the same night he received the position and confirmed it over subsequent nights, never accepting credit for the discovery.

September 27, 1905 – Einstein's $E=mc^2$ paper is published

September 27, 1858 – William Usherwood takes 1st photo of a comet, Donati (7-sec exposure with f/2.4 portrait lens, since lost). Sept 28, G.B. Bond of Harvard took the 1st comet images through a telescope.

October 1, 1958 – NASA is created by the US Congress

October 4, 1957 – Sputnik 1 becomes the first manmade object to orbit the Earth.

October 5, 1923 – Edwin Hubble identifies the first extra-galactic Cepheid variable star, named V1, in M31

October 6, 1995 – The first exo-planet is detected around the star 51 Pegasi

OBSERVING

Zodiacal Light Pre-Dawn

During autumn at mid-northern latitudes every year, the **ecliptic** extends nearly vertically upward from the eastern horizon before dawn. That geometry favors the appearance of the faint **zodiacal light** in the eastern sky for about half an hour before dawn on moonless mornings. Zodiacal light is sunlight scattered by interplanetary particles that are concentrated in the plane of the solar system - the same type of material that produces **meteor showers**. It is more readily seen in areas free of urban light pollution. For observers at low latitudes, the ecliptic is nearly vertical all year round, making the light a frequent phenomenon. Sadly, observers above 60°N latitude miss out.

If your location favors it, **between September 8 and the full moon on September 20**, look for a broad wedge of faint light extending upwards from the eastern horizon and centered on the ecliptic. It will be strongest in the lower third of the sky, below the twin stars **Castor** and **Pollux**. Try taking a long exposure photograph to capture it. Don't confuse the zodiacal light with the **Milky Way**, which is positioned nearby in the southeastern sky. The window opens again on **October 5**, when the wedge will be below Regulus.

The Sun

Solar Cycle 25 is just underway and already the sun is producing sunspots on a fairly regular basis. Observe them in safely filtered telescopes, and through pinhole projectors and eclipse glasses. Check the current Daily Sun image at <https://spaceweather.com/>.

Globe at Night 2021

A citizen science program to map light pollution around the world. During the observing window, you are encouraged to make a visual measurement to determine the limiting magnitude of stars you can observe at your location. The website provides charts for assisting observations, instructions for submitting results, and an interactive map showing current and historical results. Details are at <http://www.globeatnight.org/>

The summer campaign's focus is on **Pegasus** from September 27 to October 6.

Sunrise/Sunset

Sep 8, sunrise at 6:50 am, sunset at 7:39 pm (12h50m of daylight)

Oct 6, sunrise at 7:21 am, sunset at 6:49 pm (11h28m of daylight)

Saturday, September 22 at 3:21 pm – Northern Autumnal Equinox (enhanced aurorae opportunities)

Astronomical Twilight

The skies are not truly dark until the Sun drops well below the horizon. Below are the times of true darkness, when the sun is more than 18° below the horizon - also known as Astronomical Twilight. Astrophotography is best done in full darkness. Details are at <https://www.timeanddate.com/sun/canada/toronto?month=6>
<http://www.timeanddate.com/astronomy/canada/toronto>

Sep 8, astronomical twilight ends at 9:19 pm EDT and starts at 5:10 am EDT (7h51m of imaging time)

Oct 6, astronomical twilight ends at 8:24 pm EDT and starts at 5:47 am EDT (9h23m of imaging time)

Moon - Orbit

Perigee – Saturday, September 11 at 6 am EDT (368,461 km)

Apogee – Sunday, September 26 at 6 pm EDT (404,640 km)

Moon - Phases

Calendar maker at https://www.moonconnection.com/moon_phases_calendar.phtml

Monday, September 6 at 8:51 pm - **New Moon**

Monday, Sept 13 at 4:39 pm - First Quarter Moon (sets around midnight)

Monday, September 20 at 7:54 pm - **Full Harvest Moon** (closest to the equinox)

Tuesday, September 28 at 9:57 pm - Last Quarter Moon (rises around midnight)

Wednesday, October 6 at 7:05 am - **New Moon**

Due to the shallow angle between the evening ecliptic (and moon's orbit) and the horizon, the **Harvest Moon** rises at nearly the same time over several nights (~20 minutes later).

Sep 18 – moonrise at 6:56 pm

Sep 19 – moonrise at 7:21 pm

Sep 20 – moonrise at 7:43 pm (Full Harvest Moon)

Sep 21 – moonrise at 8:03 pm

Sep 22 – moonrise at 8:24 pm

(The Winter Solstice full moon rises ~62 minutes later each night.)

The New Moon on September 6 triggers Rosh Hashanah, the Jewish New Year, at sunset.

Best Moonless observing period(s): Sep 8-10 and Sep 30 to Oct 9

Moon – When and What to Observe

The Moon is in the evening sky for Most of this month (Sep 8-27). You can view the moon in morning daylight, too from Sept 11-15. (Rotate a polarized filter to darken the sky).

Evenings centred on Friday, Sept 10 after sunset, watch for **Earthshine**, reflected sunlight off Earth.

The **Lunar Straight Wall** aka “Rupes Recta” is visible in binoculars and telescopes during evening 1-2 days after first quarter, and just before third quarter. It’s a N-S aligned fault scarp that extends for 110 km across SE Mare Nubium, the dark region north of Tycho. At the same phase, the spectacular **Alps Mountains** and **Apennine Mountains** bordering Mare Imbrium look best. These will be highly visible on Tuesday, Sept 14.

The **Golden Handle / Jeweled Scimitar** is observable with eyeballs, binoculars and telescopes all night long 3-4 days before full moon. It’s composed of the Jura Mountains around Sinus Iridum, west of Mare Imbrium – plus the Heraclides and Laplace promontories. Use magnification to see wrinkle ridges or “dorsae” in the Bay of Rainbows. The feature will be highly visible on Thursday and Friday, Sept 16-17.

The nights around full moon (Sept 19-21) accentuate lunar geology instead of topography. Look for **ray systems** around Tycho, Copernicus, Proclus, and comet-like rays at Messier in Mare Fecunditatis. Look for **terraces in Copernicus** and many nearby **craters with dark haloes** (ejected mare basalt overlying white Copernicus ejecta). Observe the Reiner Gamma Lunar Swirl west of Kepler. Look for dark stains left by now-dormant volcanoes, three in Crater Alphonsus, and two in Crater Atlas.

Dial-A-Moon! Request a view of the moon at any hour for any day of 2021 at <https://svs.gsfc.nasa.gov/4874>, then click on it to get a HUGE, annotated map (upright or inverted) (Great for Lunar X predictions)

Lunar X in Early Evening

Several times a year, for a few hours near its first quarter phase, features on the moon called the Lunar X and Lunar V become visible in strong binoculars and backyard telescopes. The Lunar X is located on the terminator south of the crater La Caille, about one third of the way up from the southern pole of the Moon (at 2° East, 24° South). The “V” is located near the crater Ukert (at 1° East, 14° North).

On Monday, September 13 those letters are predicted to start developing by 5 pm EDT (or 21:00 GMT), peak in intensity around 7 pm EDT (or 23:00 GMT), and then gradually fade out. That peak will be during waning daylight for observers in the eastern Americas - but you can observe the moon in a telescope during daytime, as long as you take care to avoid the sun. **The Lunar X and V will be observable anywhere on Earth where the moon is visible, especially in a dark sky, between about 21:00 GMT on September 13 and 01:00 GMT on September 14.**

Moon - Libration

Due to the moon’s 5° orbital inclination and its elliptical orbit, the centre of the moon’s Earth-facing hemisphere rises and falls and drifts left-and-right through the lunar month – a process known as libration. The minor rotations allow features near the lunar limb to rotate more fully into view (or disappear from view) – permitting up to 59% of the moon’s surface to be observable from Earth over the course of time. Below are the times of greatest libration. Note that, viewed from the Northern Hemisphere, the moon’s northern limb is on top, and the moon’s eastern limb is toward the viewer’s right-hand side, and vice versa.

Moon’s N limb most exposed on Sep 19 (+6.6°) – almost full moon, well illuminated

Moon’s E limb most exposed on Sep 20 (+5.2°) – full moon, well illuminated

Moon’s W limb most exposed on Oct 3 (–6.2°) – waning crescent, illuminated

Moon’s S limb most exposed on Oct 4 (–6.6°) – almost new moon, poorly illuminated

Use this NE libration window to view **Mare Marginis, Mare Smythii, Crater Hubble, Crater Avery, Crater Beals**

Moon – Conjunctions, Eclipses, etc.

Lunar Appulses and Conjunctions

On **September 8**, the very young crescent moon will be positioned a slim palm's width to the upper right (or 5 degrees to the celestial north) of Mercury.

On **September 9**, the young crescent moon will shine several finger widths to the upper right (or 4 degrees to the celestial northwest) of Venus, with Vesta nearby.

On **September 12**, the waxing, nearly half-illuminated moon will shine several finger widths to the upper right (or 3 degrees to the celestial north) of Antares.

On **September 16**, the bright, waxing gibbous moon will shine several finger widths below (or 4.5 degrees to the celestial south) of Saturn.

The nearly full moon will pass less than a palm's width below (or 5 degrees to the celestial south of) Jupiter on **September 17-18**.

The very bright, nearly full moon will hop past Neptune on **September 19-20**.

The bright, waning gibbous moon will hop past Uranus on **September 23-24**.

On **September 25**, the waning gibbous moon will shine several finger widths below (or 5 degrees to the celestial south of) the Pleiades, with the Hyades below the moon.

Planets and Dwarf Planets

During September, **Mercury** will put on its best showing of the year for observers in the Southern Hemisphere, where the near-vertical ecliptic at southerly latitudes will allow the speedy planet to shine in a darkened sky after sunset all month long. For those at mid-northern latitudes, the canted-over ecliptic will force Mercury to set very soon after the sun every evening. The best views in either hemisphere arrive with Mercury's greatest elongation, 27 degrees east of the sun, on September 13-14. Visually, the planet will decrease in brightness over the month from magnitude 0.03 to -1.50. In a telescope, Mercury will exhibit an illuminated phase that wanes from 65% to a mere 17.4%, and its apparent disk size will swell from 5.93 to 9.54 arc-seconds. But Canadians will cease to see the planet beyond about September 21. On September 8, the very young crescent moon will be positioned a slim palm's width to the upper right (or 5 degrees to the celestial north) of Mercury. On September 20-21, Mercury will pass only a thumb's width below (or 1.4 degrees to the celestial south of) Spica.

Extremely bright **Venus'** position close to a steeply tilted evening ecliptic will prevent the planet from climbing very high - or from shining in a dark sky - for observers in the Northern Hemisphere between now and early October. But the near-vertical ecliptic available in the Southern Hemisphere will allow the planet to shine in total darkness and sit relatively high in the sky there. For mid-northern latitude observers, Venus will set at about 9 p.m. local time on September 8 and 30 minutes earlier on the October 6. After a close pass, only a thumb's width above (or 1.5 degrees to the celestial north of) Spica on September 5, Venus' eastward Prograde motion will see it depart Virgo for Libra on September 18. The main belt asteroid designated (4) Vesta will be traveling on a parallel track about 5 degrees north of Venus. On September 8 they'll share almost the same Right Ascension coordinate, but Venus' faster motion will soon outpace the more distant asteroid. Viewed through a telescope from now until early October, our sister planet will show a gradually waning, barely gibbous phase and an apparent disk diameter that grows from 15.2 to 19.8 arc-seconds. On September 9, the young crescent moon will shine several finger widths to the upper right (or 4 degrees to the celestial northwest) of Venus.

Mars will be too close to the sun to be observed from mid-northern latitudes during September. Mars passes solar conjunction on October 7-8.

Recently past opposition, bright, white, magnitude -2.8 **Jupiter** will be well-placed for observing nearly all night long this month while the planet travels retrograde across the stars of eastern Capricornus. Fainter,

yellowish Saturn will be shining 16° to Jupiter's right (or celestial east). Jupiter will catch your eye in the southeastern sky before the end of evening twilight. Unfortunately, the low summertime ecliptic will prevent it from climbing very high in the southern sky. Views of Jupiter in amateur telescopes will show its equatorial bands. The Great Red Spot will appear every 2nd or 3rd night. Occasionally, the round, black shadows of Jupiter's four large Galilean satellites will make several-hour traverses of the planet. The nearly full moon will pass less than a palm's width below (or 5 degrees to the celestial south of) Jupiter on September 17-18.

Best Jupiter Shadow Transit Events

Io's shadow on Sept 11 from 10:05 pm to 12:15 am EDT

Europa's shadow on Sep 12 from 9:40 pm to 12:20 am EDT

Callisto's shadow with GRS on Sept 17 from dusk to 11 pm EDT

Io's shadow on Sept 20 from dusk to 8:40 pm EDT

Io's shadow on Sept 27 from 8:25 to 10:40 pm EDT

Io's shadow on Oct 4 from 10:20 pm to 12:30 am EDT

Immediately after dusk, yellowish **Saturn** will be shining in the lower part of the southeastern sky - ready for observing past late evening. But Saturn's early August opposition means it will now be descending the western half of the sky after late evening. During the month, Saturn will be travelling retrograde westward across the stars of Capricornus - with much brighter Jupiter positioned 16 degrees to its left (east). Unfortunately, the low ecliptic will prevent Saturn from climbing very high in the southern sky. Initially at magnitude 0.3, Saturn will decrease slightly in brightness during the month. In a telescope Saturn will show a mean apparent disk diameter of 18 arc-seconds, and its rings will subtend 42 arc-seconds. Saturn's rings will be tilting more edge-on to Earth every year until the spring of 2025. This year they are already closed enough for Saturn's southern polar region to peek out beyond them. September will also be a good time to view Saturn's moons with a backyard telescope in a dark sky. On September 16, the bright, waxing gibbous moon will shine several finger widths below (or 4.5 degrees to the celestial south) of Saturn.

This month, **Uranus** will rise in mid-evening and will be best observed during the wee hours of the night, when it will be highest. In early October Uranus will be rising at about 8 p.m. local time and will culminate over the southern horizon, two-thirds of the way up the sky, at around 3 a.m.. The magnitude 5.7 planet will be traveling retrograde westward in a part of southern Aries that lacks bright stars, but you can locate the planet about midway between Hamal (Alpha Arietis) and Omicron Tauri. In a telescope, Uranus will exhibit a blue-green, 3.7 arc-seconds wide disk. It will be surrounded by the 5th magnitude stars Sigma, Omicron, and Pi Arietis - creating a distinctive "flux capacitor" asterism for anyone viewing Uranus in binoculars. The bright, waning gibbous moon will hop past Uranus on September 23-24.

During September, the distant, blue planet **Neptune** will be an all-night target that is already climbing the southeastern sky after dusk. It will be traveling retrograde westward among the stars of northeastern Aquarius, a few finger widths to the left (or 4 degrees to the celestial east) of the medium-bright star Phi Aquarii (ϕ Aqr). When Neptune reaches opposition on September 14, it will be closest to Earth for this year - a distance of 2.69 billion miles, 4.33 billion km, 4 light-hours, or 28.9 Astronomical Units. The blue planet will then shine at a slightly brighter magnitude of 7.8 and Neptune's apparent disk size will grow to 2.4 arc-seconds. Since it's directly opposite the sun in the sky, Neptune will be visible all night long in good binoculars if your sky is very dark, and in backyard telescopes from almost any site. Your best views will come after 9 p.m. local time, when the blue planet has climbed higher. Neptune's large moon Triton can be seen more easily around opposition, too. The very bright, nearly full moon will hop past Neptune on September 19-20, and Neptune will pass only 1.5 arc-minutes south of the magnitude 6.25 star designated HIP115953 on September 23.

Pluto is a faint mag. 14.3 object moving prograde in northeastern Sagittarius. Pluto is an evening target, but a challenge to see due to its dim nature and the low summer ecliptic.

The minor planet **(4) Vesta** will travel prograde east through Virgo until October 2. On September 8, it is 6° to the north of Venus – but Venus' faster motion increases their separation each night. At magnitude 7.7, Vesta is within reach of binoculars and small telescopes – but it has to compete with the western twilight after sunset. The young moon will sit midway between Venus and Vesta on Thursday, September 9.

Dwarf Planet **(1) Ceres**, at magnitude 8.7, is in the SE sky after midnight, moving Prograde east a finger's width below (1° southeast of) Aldebaran.

On Saturday, September 11, the main belt asteroid designated **(2) Pallas** will reach opposition and its minimum distance from Earth for 2021. On the nights near opposition, Pallas will rise at sunset and set at sunrise, and shine with a peak visual magnitude of 8.55. That's within reach of backyard telescopes, but wait until the asteroid has risen higher for the best view of it – about 9 pm local time or later. Pallas will be situated in western Pisces, above Neptune, and several finger widths to the right (or 4 degrees to the celestial southwest) of the medium-bright star Gamma Piscium. Nearby Neptune will reach its own opposition several days from tonight.

Planets – Appulses / Conjunctions

On Thursday, **September 23**, the retrograde motion of magnitude 7.8 Neptune will carry it a thumb's width below (or 1.5° south of) the magnitude 6.25 star HIP 115953. Try spotting them in binoculars!

Comets

Ref <http://www.aerith.net/comet/weekly/current.html>, <http://cometchasing.skyhound.com/>, <https://in-the-sky.org/data/comets.php>, <https://www.ast.cam.ac.uk/~jds/>, <http://www.cobs.si/>

Meteor Shower(s)

Ref. <http://www.amsmeteors.org/meteor-showers/meteor-shower-calendar/>

Southern Taurids (September 22 to December 2)

The minor Southern Taurids shower, derived from Comet 2P/Encke, is underway and will peak in early November. Frequent fireballs.

Orionids (October 3 to November 12)

The annual Orionids meteor shower, composed of debris from repeated passages of Comet Halley, runs from October 3 to November 12. It peaks between midnight and dawn on **Thursday, October 21** under a moonlit sky. At that time the sky overhead is moving directly into the densest region of the particle field, producing 10-20 fast meteors per hour. The meteors can appear anywhere in the sky, but will be travelling away from the radiant point between the constellations of Orion and Gemini (R.A. 6:19:30, Dec. +15° 58'45").

Asteroids

Ref. <http://neo.jpl.nasa.gov/ca/>, <http://www.minorplanetcenter.net/>
<https://www.youtube.com/watch?v=ONUSP23cmAE#action=share>

No notable close asteroids

Satellites

For the GTA, the current International Space Station morning pass series ends on Sep 13 (Most are visible around 5 am). Evening passes resume on Sep 14 (between 8 and 10 pm EDT). Some higher/brighter ones include*:

Date	Mag.	Time	Direction	Alt.
19-Sep	-3.7	8:15 pm to 8:21 pm	from WSW to ENE	81°
04-Oct	-3.7	7:46 pm to 7:52 pm	from WNW to SE	82°

* predicted times may shift slightly in the far future

Watch for opportunities to see the Soyuz and Dragon missions chasing / leading ISS!

The Chinese space station **Tiangong** will resume pre-dawn passes on Sept 24. Some peak at magnitude 1.4

Local occurrences info at www.heavens-above.com and enter your location, from phone/tablet apps, Chris Vaughan's Skylights (subscribe to email [here](#) or visit www.astrogeo.ca/skylights)

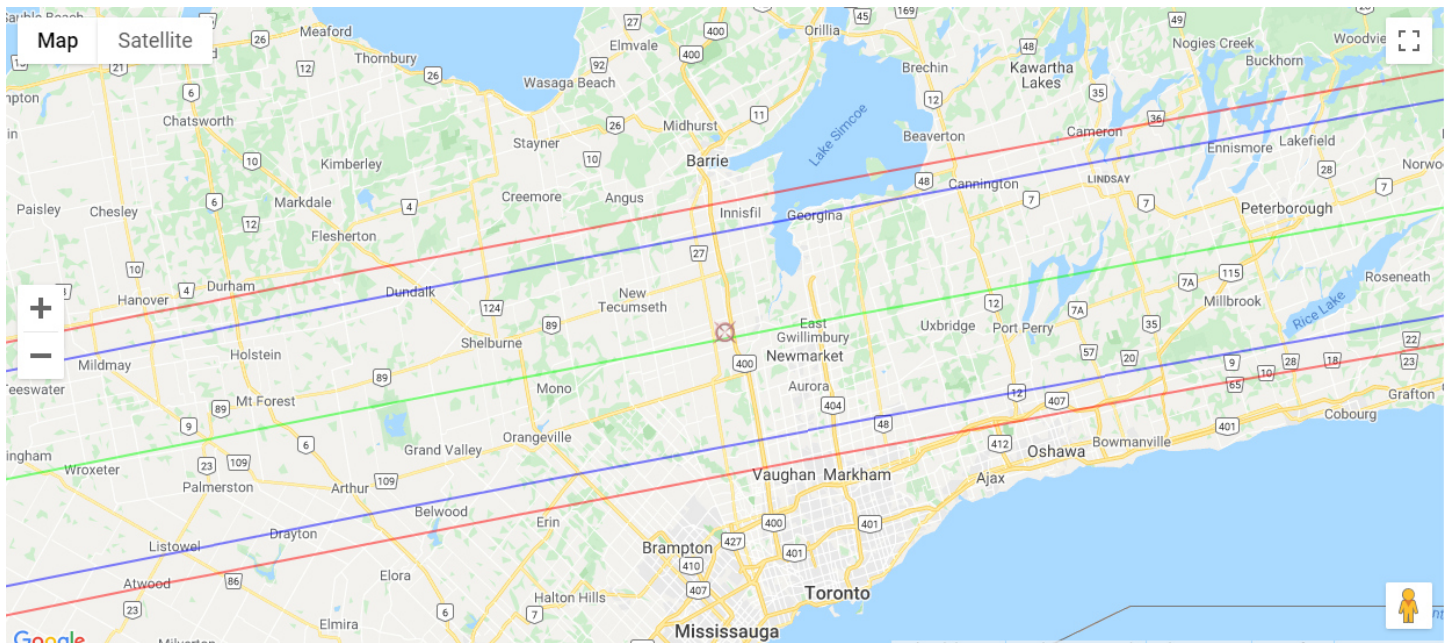
Occultations – Lunar and Asteroidal

Ref: <http://asa.usno.navy.mil/SecA/olist18.html>, <http://www.asteroidoccultation.com/> and <http://www.poyntsource.com/New/Global.htm> (additional links on the following URLs open track maps)

No Lunar Occultations

Rank 100 - 22 Sep 2021 at 08:24 UT, asteroid (1039) Sonneberga (mag 16.9) occults star TYC 1336-00739-1 (mag 10.1), dips 6.8 mags for 1.8s, alt 67°, near nu Gem aka 18 Gem

https://www.asteroidoccultation.com/2021_09/0922_1039_72788.htm



Variable Stars

Sheliak, also designated Beta Lyrae, is an eclipsing binary system that varies in brightness between 3.3 and 4.4 over a period of 12.94 days. At peak, it shines as bright as Sulafat. At minimum, as dim as Delta Lyrae.

Almizan II, or Eta Aquilae, is a Cepheid variable star that ranges from 3.5 to 4.4 over 7.18 days. At maximum, it shines almost as brightly as Lambda Aquilae, the tail of the eagle. At minimum, as faint as Iota Aql.

Algol, also designated Beta Persei, is among the most accessible variable stars for skywatchers. During a ten-hour period that repeats every 2 days, 20 hours, and 49 minutes, Algol's visual brightness dims and re-brightens noticeably. This happens because a companion star orbiting nearly edge-on to Earth crosses in front of the much brighter main star, reducing the total light output we receive. Algol normally shines at magnitude 2.1, similar to the nearby star Almach (aka Gamma Andromedae). But while at minimum, Algol's brightness of magnitude 3.4 is almost identical to Rho Persei (or Gorgonea Tertia or ρ Per), the star sitting just 2.25 degrees south of Algol. On Wednesday, September 15 at 9:40 p.m. EDT (or 01:40 UT on September 16), Algol will be at its minimum brightness, and low in the northeastern sky. Five hours later Algol will shine at full brightness nearly overhead in the eastern sky. Other minima of Algol are listed on p 115 of the OH.

Delta Cephei (or δ Cep) more than doubles in brightness every 5 days and 9 hours. At its peak of magnitude 3.5, it's as bright as Zeta. At its minimum of 4.4, it's as faint as Epsilon. So you can tell at a glance which part of its cycle it's in! Delta is also a nice double star when viewed in telescopes – splitting into a brighter yellow star and a dimmer blue star.

Constellations near the Meridian (Annually in early-Autumn)

Try to view objects when they are highest, either on the meridian or **within 45° of the zenith**, where the air blanket thickness is between 1.0 and 1.5. (High targets are your best defense against bad seeing.)

9 pm: Corona Australis, Sagittarius, Scutum, W. Capricornus, Aquila, **Delphinus, Sagitta, Vulpecula, Cygnus, Lyra, E. Draco,** and **Cepheus**

11 pm: Microscopium, Piscis Austrinus, Capricornus, W. Aquarius, **Equuleus, W. Pegasus, Lacerta, E. Cygnus, Cepheus,** and **E. Draco**

1 am: Sculptor, E. Aquarius, W. Cetus, **W. Pisces, Pegasus, W. Andromeda, Lacerta, Cassiopeia,** and **Cepheus**

Double Stars

A nice Cygnus Double Stars tour at <http://www.dibonsmith.com/cyg.htm>

Omicron1,2 Cygni aka 31 Cyg – bright, wide orange pair (no binoculars needed) Can you see 30 Cygni tucked in close to α 1 Cygni?

Omega1,2 Cygni includes Ruchba – bright, still easily split, makes a little triangle with α 3 Cyg

U Cygni – a finger's width ENE of Omicron, mag 7.6 telescopic carbon red and blue pair, part of RASC DS program

Albireo aka Beta1,2 Cygni – bright, blue and yellow pair that splits in any telescope and good binoculars

Bessel's Star aka **61 Cygni**, Struve 2758 – medium-bright mag 4.8, pale yellow pair, easily split, part of RASC DS program

Delta Cygni aka Al Fawaris – medium-bright pair splits at high power into greenish-blue and yellow-white stars. Will one day mark north celestial pole!

Many more!!!

Suggestions for September – Cygnus! (It's nice and high)!

Many double stars (a few mentioned above)

Cygnus X-1 Star! Black Hole orbiting blue supergiant star **V1357 Cyg**, near Sh 2-101

Messier Objects: Cooling Tower Cluster **M29**, unnamed open cluster **M39**

Finest NGC List: The **Foxhead Cluster** NGC 6819; **Blinking Planetary** NGC 6826; The **Crescent Nebula** NGC 6888;

The **Cygnus Loop** aka **East Veil Nebula / West Veil / Pickering's Triangle** supernova remnant NGC 6992, 6960, and 6979; The **North America Nebula** NGC 7000 plus **Pelican Nebula** IC 5070; **Pink Pillow Nebula** NGC 7027;

Fireworks Galaxy NGC 6946 is a big (11'x10'), magnitude 9.6 face-on spiral on the border with Cepheus

Asterisms:

Chaple's Arc aka **the Fairy Ring** asterism, more than four 8th to 9th magnitude double stars in a ring about 20 arc-minutes across. Ref. <http://www.theskyscrapers.org/chaples-arc>

Red Necked Emu or **Star26** asterism, about 30' across, a dozen stars in three connected curves that resemble neck and legs, anchored by magnitude 4.9 star 29 Cyg aka b3 Cyg and HIP99770

Little Orion asterism, in the dark Gulf of Mexico part of the North America Nebula

Lesser-known targets for big scopes and imagers include:

IC 5076 reflection nebula 7' across sits north of the North Am Nebula,

Northern Coalsack huge, dark N-S patch between Deneb and Sadr

Post-COVID, see you at DDO, Long Sault C A, Bayview Village Park, or the CAO!

Questions or comments to chris.vaughan@astrogeo.ca

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