

# RASC Toronto Centre – [www.rascto.ca](http://www.rascto.ca)

## The Sky This Month – June 1 to July 6, 2022 (times in EDT)

by Chris Vaughan

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### NEWS

#### Space Exploration – Public and Private

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

#### Special Launches

**Early June TBD** - A Chinese Long March 2F rocket from Jiuquan, China – payload Shenzhou 14 spacecraft with three Chinese astronauts to the Chinese space station.

**~June 6 at 5:20 am EDT** - A Rocket Lab Electron rocket from Mahia Peninsula, New Zealand - payload NASA's Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) mission to enter a unique halo-like lunar orbit to test deep space navigation and communications in the same orbit to be used by NASA's Gateway station.

**TBD** - A SpaceX Super Heavy and Starship launch vehicle from Boca Chica Beach, Texas – payload Starship first orbital test flight will attempt to travel around the world for nearly one full orbit, resulting in a re-entry and splashdown of the Starship near Hawaii.

**July TBD** - A Chinese Long March 5B rocket from Wenchang, China – payload Wentian laboratory module, the second major element of China's space station.

#### 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

June 5, 1819 - English astronomer **John Couch Adams** is born. Predicted the existence and position of Neptune, using only mathematics.

June 7, 1928 - American astronomer, **Bernard Burke**, is born. In 1955, discovers radio waves emitted by the giant Jupiter.

June 8, 1625 - **Giovanni Cassini** is born. Co-discoverer of the GRS and discoverer of Saturnian moons and the eponymous ring gap. He also determined the Earth-Mars distance using parallax and explained zodiacal light.

June 17, 1839 - American astronomer and clergyman, **Rev. George Mary Searle**, is born (and dies on same day in 1918). Discovered the asteroid 55 Pandora and six galaxies.

Jun 26, 1730 - French Astronomer **Charles Messier** is born. Later he will create his famous Messier Catalogue black list of dim fuzzy objects that are not comets.

#### Astronomy and Space Exploration

June 3, 1969 - NBC cancels the original **Star Trek** series after a 3 season run

June 4, 781 BCE - **First Solar Eclipse** recorded by the Chinese.

June 16, 1963 - **Valentina Tereshkova** becomes the first woman in space.

June 18, 1983 - **Sally Ride** becomes the first American female astronaut.

June 19, 240 BCE - **Eratosthenes** calculates the circumference of Earth using two sticks.

Jun 22, 1633 - **Galileo Galilei** is forced by the Holy Office of Rome to recant the Solar-centric view of the Universe.

Jun 25, 1638 - The first astronomical event, a **lunar eclipse**, recorded in North America.

Jun 30, 1908 - The great **Tunguska** impact in Siberia.

Jul 1, 1917 - The 100-inch Hooker Telescope mirror arrives at **Mt. Wilson**. The only telescope larger than DDO's 74-inch telescope when it opened in 1935.

Jul 1, 1962 – **Kennedy Space Center** is opened.

Jul 4, 1054 - Chinese astronomers record a bright supernova later to become the **Crab Nebula** (M1).

Jul 6, 1687 - Isaac Newton publishes **Principia** outlining his three Laws of Motion.

## OBSERVING

### Globe at Night 2022

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 **Hercules** from June 19-28.

### Sunrise/Sunset

June 1, sunrise at 5:38 am, sunset at 8:52 pm (15h14m of daylight)

July 6, sunrise at 5:42 am, sunset at 9:01 pm (15h19m of daylight)

**June Solstice** - Tue, June 21 at 5:14 am EDT

Earth at Aphelion (1.521 million km) - Mon, July 4 at 3 am EDT

### 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>

June 1, astronomical twilight ends at 11:08 pm and starts at 3:22 am (4h14m of imaging time)

July 6, astronomical twilight ends at 11:19 pm and starts at 3:25 am (4h06m of imaging time)

### Moon - Orbit

Apogee – Wed, June 1 at 9 pm EDT (406,192 km)

Perigee – Tue, June 14 at 7 pm EDT (357,432 km)

Apogee – Wed, June 29 at 2 am EDT (406,580 km)

### Moon - Phases

Tue, June 7 at 10:48 am – First Quarter Moon (sets around midnight)

Tue, June 14 at 7:52 am – Full “Strawberry/Mead/Rose/Hot” Moon (13 hours before perigee; supermoon)

Mon, June 20 at 11:11 pm – Third Quarter Moon (rises around midnight)

Tue, June 28 at 10:52 pm – New Moon (3 hours before apogee)

Best Moonless observing period(s): June 20 to July 2

### Moon – When and What to Observe

The Moon is in the evening sky for Most of this month (Jun 1 to 16). You can view the moon in morning daylight, too from June 17 to 23. (Rotate a polarized filter to darken the sky).

Evenings centred on Thursday, Jun 2 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, June 7.

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, June 9.

The nights around full moon (June 13-15) 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 Copericus 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.

### **Lunar X and V in Daytime (peaks Monday, June 6 around 21:30 GMT)**

Several times a year, for a few hours just before first quarter, small features on the moon called the Lunar X and the Lunar V become visible in strong binoculars and backyard telescopes. The bright X-shaped pattern appears when the rims of the craters Purbach, la Caille, and Blanchinus are illuminated from a particular angle of sunlight. Look for it along the terminator, about one third of the way from the southern pole of the Moon, at lunar coordinates 2° East, 24° South. The phenomenon called is pareidolia - the tendency of the human mind to see familiar objects when looking at random patterns. The Lunar V will form along the northern span of the terminator near the crater Ukert. The features will **begin to develop around 5 p.m. EDT (21:00 GMT) on Monday, June 6**, while the moon is shining in a daylight sky in the Americas. They will **peak in intensity about 90 minutes later at 6:30 pm EDT** and then disappear by about 8 p.m. EDT (00:00 GMT). Viewing the moon through polarized glasses in daytime will increase the image contrast. Observers in Europe and western Africa can see the features while the moon shines in a dark sky.

**Dial-A-Moon!** Request a view of the moon at any hour for any day of 2021 at <https://svs.gsfc.nasa.gov/4955>, then click on it to get a HUGE, annotated map (upright or inverted) (Great for Lunar X predictions)

### **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 S limb most exposed on Jun 6 (–6.8°) – approaching first quarter, only half illuminated

Moon’s W limb most exposed on Jun 9 (–7.5°) – waxing gibbous, not illuminated

Moon’s N limb most exposed on Jun 18 (+6.7°) – waning gibbous, only partly illuminated

Moon’s E limb most exposed on Jun 21 (+7.7°) – after third quarter, not illuminated

Moon’s S limb most exposed on July 3 (–6.7°) – waxing crescent, not illuminated

## Moon – Conjunctions, Eclipses, etc.

### Lunar Appulses and Conjunctions

On **June 1**, young crescent moon a thumb's width to the left (or 1.4 degrees to the celestial ESE of (1) Ceres.

On **June 3**, the waxing crescent moon will shine a slim palm's width to the right (or 5 degrees to the celestial northwest) of the Beehive cluster.

On **June 18** the waning gibbous moon will pass less than 6 degrees below (or celestial south) of Saturn.

On **June 19** the waning gibbous moon will pass 1.5 degrees below (south of) magnitude 6.7 asteroid Vesta.

On **June 22-23**, the waning crescent moon will hop from right to left (or west to east) of Mars, allowing observers in the Southern Ocean region to see the moon occult Mars around 18:00 GMT on **June 22**.

The waning crescent moon will shine to Jupiter's lower right (celestial southwest) on **June 21**, making a nice photo opportunity.

The waning crescent moon will hop past Uranus on **June 24-25**, allowing observers in western and northern Australia and eastern Indonesia to see the moon occult Uranus before dawn on June 25 – the fifth of 15 consecutive monthly lunar occultations of the seventh planet.

On **June 26**, the pretty crescent moon will shine between Venus and the Pleiades.

On **June 27**, the old moon's crescent will shine several degrees to the upper left (or 3.5 degrees to the celestial north) of Mercury.

### Planets and Dwarf Planets

After June 10, planet **Mercury** will reach far enough west of the sun for it to become visible just above the east-northeastern horizon from mid-northern latitudes. Its arrival will allow the five bright planets Mercury, Venus, Mars, Jupiter, and Saturn to be seen with unaided eyes, arranged in the order of their distance from the sun. They'll be observable until almost sunrise for the rest of June. Mercury's month-long morning apparition will be a rather poor one for observers at mid-northern latitudes, but a good one for anyone in the tropics or farther south. The planet will brighten dramatically during June, ending the month at magnitude -0.7 from an initial brightness of 2.8. Mercury will become easier to see each morning, with peak visibility occurring **on June 16, when Mercury will swing to its maximum angle of 23° west of the sun**. Look for the magnitude 0.45 planet shining very low in the east-northeastern sky between 4:30 and 5 a.m. in your local time zone. Much brighter Venus will approach Mercury from the upper right (or celestial west) until they reach a minimum separation of 9.6 degrees on June 20-21. After that, Mercury will outrace Venus to the sun. Viewed through a telescope during June, Mercury's disk will appear to decrease in diameter from 10 to 6 arc-seconds, and wax in illuminated phase from 22% to 71%. On June 27 the old moon's crescent will shine several degrees to the upper left (or 3.5 degrees to the celestial north) of Mercury.

**Venus** will continue to gleam brilliantly in the east-northeastern sky during June as it slides sunward through Aries and then Taurus – but it will not climb very high by dawn for mid-northern latitude observers, who will see it most easily between 4 and 5 a.m. local time. The planet will sit at the lower left (eastern) end of a lengthy string of the bright planets Mars, Jupiter, and Saturn. After Mercury appears to Venus' lower left around June 10, all five planets will be visible in order of their distance from the sun. During June, Venus will shine at magnitude -3.9. In a telescope, its apparent disk size will decrease from 13.7 to 11.9 arc-seconds and its illuminated phase will wax slightly from 78 to 86%. **In a challenging observation, on June 11, Venus will pass telescope-close below (or 1.7 degrees to the celestial south of) 8000 times fainter Uranus.** Venus will approach to within 10 degrees west of Mercury on June 20-21, and then their separation will increase. On June 22-23, the planet will pass binoculars-close to the lower right (or celestial south) of the Pleiades star cluster. On June 26, the pretty crescent moon will shine between Venus and the Pleiades, with Mercury rising to their lower left around 4:30 a.m. local time.

During June, the small, reddish dot of **Mars** will shine in the southeastern sky for several hours before sunrise. Following its telescope-close conjunction with Jupiter at the end of May, Mars will spend June widening its

separation on the left side of that much brighter planet as it travels rapidly prograde eastward through Pisces - except for a shortcut through northern Cetus from June 3 to 8. Mars will brighten slightly over the month, from magnitude 0.67 to 0.46. Telescope views will show a small, 87%-illuminated ruddy disk with mere hints of the dark markings that will be showcased come December. The planet's apparent disk size will grow from 6.4 to 7.2 arc-seconds. The waning crescent moon will hop from right to left (or west to east) of Mars on June 22-23, allowing observers in the Southern Ocean region to see the moon occult Mars around 18:00 GMT on June 22.

Bright, white **Jupiter** will dominate the southeastern sky in the hours before dawn during June. The magnitude -2.3 planet will begin the month shining a thumb's width to the upper right (or 2 degrees to the celestial west) of much fainter Mars. That planet will outrun Jupiter on their eastward trek through the stars of Pisces and northern Cetus, widening their separation daily. Jupiter will shine midway along a lengthy string of bright planets arranged in their order from the sun, namely: Mercury (after June 10), Venus, Mars, Jupiter, and Saturn. Jupiter will be a good telescope target during June. Its four Galilean moons will dance to the east and west of its banded disk, which will grow in apparent size from 37.4 to 40.8 arc-seconds, the Great Red Spot will appear every second or third morning, and **the small, round, black shadow of one of the Galilean moons will transit the planet on June 17 and 22**. The waning crescent moon will shine to Jupiter's lower right (celestial southwest) on June 21, making a nice photo opportunity.

Yellow-tinted **Saturn**, which has been shining in the eastern pre-dawn sky all spring, will begin to rise before midnight local time from mid-June onward. The bright planets Mercury (after June 10), Venus, Mars, and Jupiter will be strung along the ecliptic to its lower left (or celestial east). On June 5, the eastward prograde motion of the ringed planet through the background stars of eastern Capricornus will slow to a stop as it commences a westward retrograde loop that will last until late October. That event will kick off the prime observing period for the planet. Viewed in a telescope during June, Saturn's 17.5 arc-seconds-wide globe, adorned with its 41.5 arc-seconds-wide ring system, will be surrounded by a number of its brightest moons. The angle of Saturn's rings will diminish until March, 2025, so a greater amount of Saturn's southern hemisphere will extend below its ring plane this year. The waning gibbous moon will pass less than 6 degrees below (or celestial south) of Saturn on June 18.

**Uranus'** steady march away from the pre-dawn sun will allow the planet to become increasingly observable in the lower part of the eastern sky during June – but the magnitude 5.8 planet won't climb high enough in a dark sky for clear telescopic views from mid-northern latitudes until beyond the end of the month. Uranus will shift slowly eastward through southern Aries all month long, forming a triangle less than 2 degrees south of the stars Rho and Pi Arietis, which bear similar magnitudes. The waning crescent moon will hop past Uranus on June 24-25, allowing observers in western and northern Australia and eastern Indonesia to see the moon occult Uranus before dawn on June 25 – the fifth of 15 consecutive monthly lunar occultations of the seventh planet.

**Neptune** will spend June in the southeastern sky near the western border of Pisces, flanked by the bright planets Jupiter and Saturn to its east and west, respectively. The blue, magnitude 7.8 planet will rise during the wee hours, allowing it to be observed through good binoculars and backyard telescopes in the dark sky preceding dawn. In a telescope Neptune will show a 2.3 arc-seconds wide-disk. On June 28, its eastward prograde motion through the background stars will slow to a stop in preparation for a westward retrograde loop that will last until early December.

**Pluto** is a faint mag. 14.3 object moving retrograde in northeastern Sagittarius in the post-midnight sky. It is a challenge to see due to its dim nature and the low summer ecliptic.



The minor planet **(4) Vesta**, at magnitude 6.5, is within easy reach of binoculars and small telescopes. It is observable in the eastern pre-dawn sky moving prograde through central Aquarius about a fist's diameter east of Saturn.

**(1) Ceres**, at magnitude 8.9, is low in the WNW sky after sunset moving prograde across Gemini. It will become unobservable after about the first week of June.

The magnitude 10.2 asteroid **(3) Juno** will be observable in the pre-dawn eastern sky moving prograde in Eastern Aquarius and western Pisces, in the sky north of the Jupiter and Saturn.

## Planets – Appulses / Conjunctions

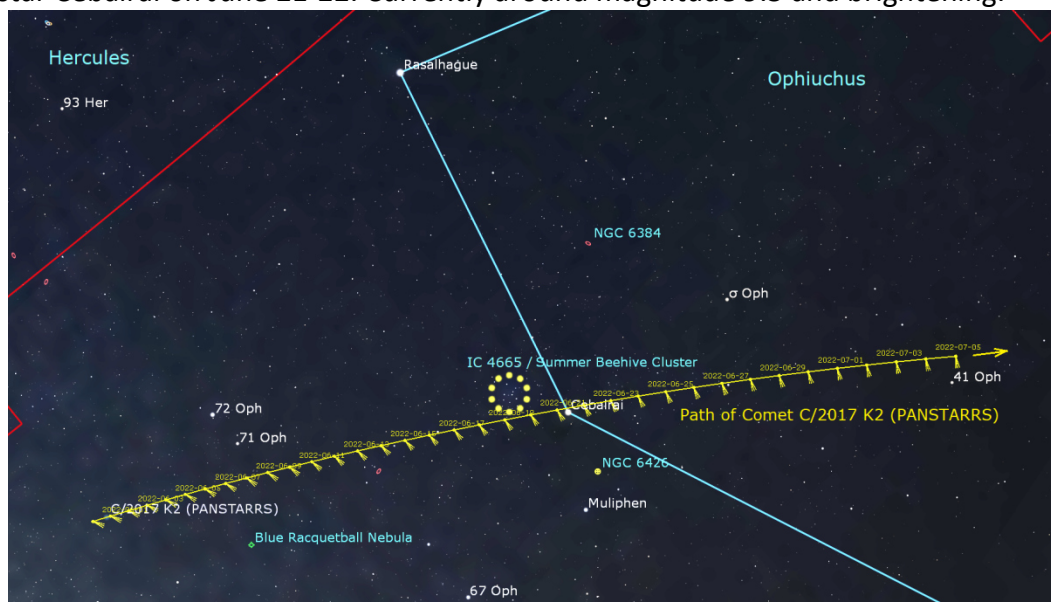
On Saturday morning, June 11, the faster motion of the extremely bright planet Venus will carry it past distant Uranus in the eastern pre-dawn sky. The two planets will be close enough to share the view in the widefield eyepiece of a backyard telescope, but bright, white Venus will outshine blue-green Uranus by a factor of 8000 times, making the fainter planet difficult to see against the glare. On June 11, **Venus will be positioned a thumb's width below (or 1.7 degrees to the celestial south of) Uranus**. They'll be nearly as close on the following day, with Venus shifting left (east) by one degree. Observers at southerly latitudes, where the planets will appear higher in a darker sky, will get the best view of the conjunction.

On the mornings surrounding Thursday, June 23, the extremely bright planet **Venus will pass binoculars-close to the pretty Pleiades** star cluster in Taurus. Look for the cluster, which is also designated Messier 45, sitting a slim palm's width to the upper left (or 5.5 degrees to the celestial north) of the planet. They will be positioned low in the east-northeastern sky. The optimum viewing time at mid-northern latitudes will be centered around 4 a.m. local time. Observers at southerly latitudes will see the meet-up higher and in a darker sky about an hour later.

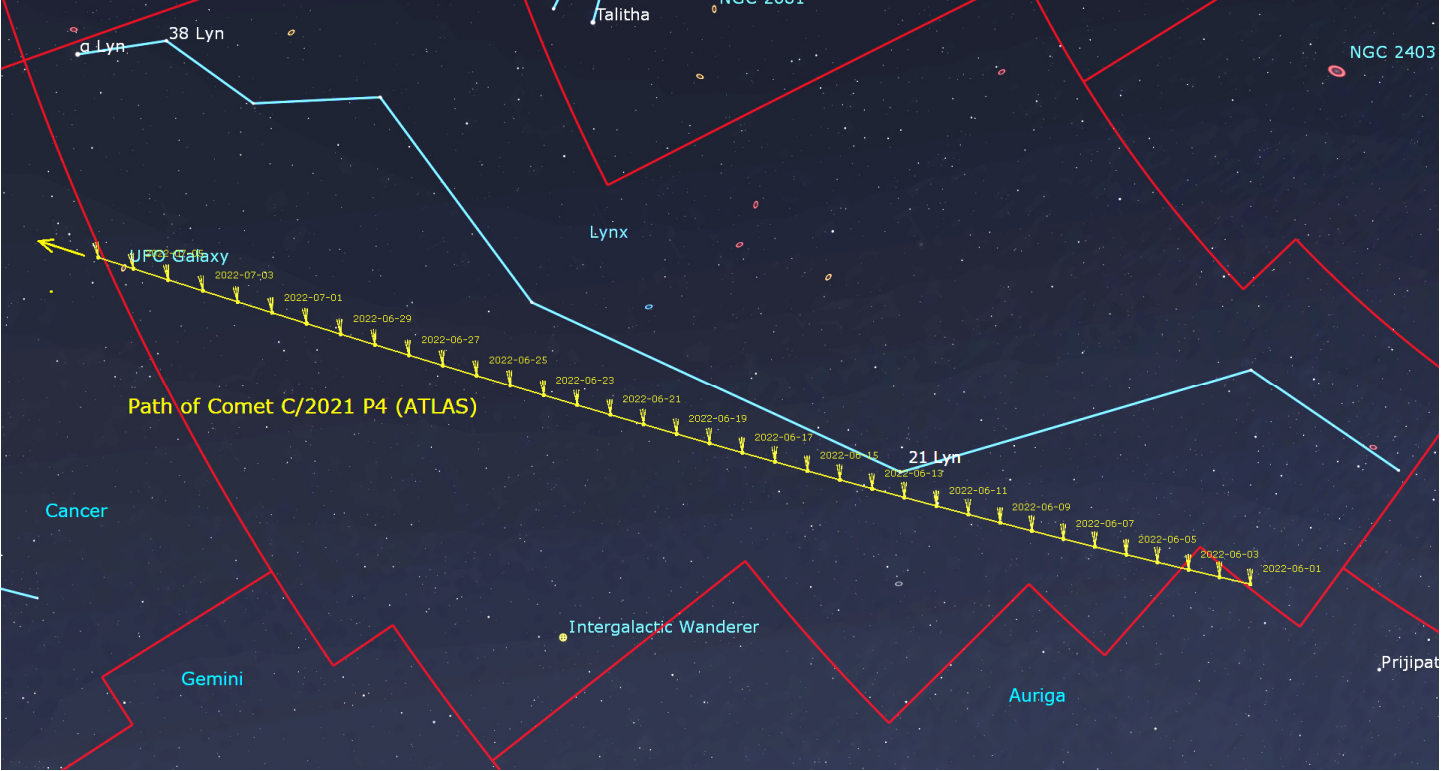
## Comets

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/>

Comet **C/2017 K2 (PanSTARRS)** travelling southwest through northeastern Ophiuchus. Visible all night long. Will pass southern edge of open cluster IC 4665 aka the Summer Beehive Cluster on June 19-20 and the bright star Cebalrai on June 21-22. Currently around magnitude 9.5 and brightening.



Comet **C/2021 P4 (ATLAS)** is travelling southeast along Lynx low in the northwestern early evening sky. Currently magnitude 11 and brightening. Passes just south of magnitude 4.6 star 21 Lyn on June 12 and just above NGC 2683 UFO Galaxy on July 5.



Meteor Shower(s)

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

none

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

According to the Minor Planet Centre...  
Near-Earth Objects Discovered This Year: 1232 (~246/month)  
Minor Planets Discovered This Year: 5,010 (~1002/month)  
Comets Discovered This Year:18 (~3.6/month)  
Observations This Year: 13.1 million

Satellites

For the GTA the current International Space Station evening pass series ends on June 2 (Most are visible around 10 pm). Pre-dawn passes resume June 26. Some higher/brighter ones include\*:

Date	Mag.	Time	Direction	Alt.
27-Jun	-3.7	5:02 am to 5:09 am	from SW to ENE	74°
30-Jun	-3.7	4:14 am to 4:19 am	from WSW to NE	75°

\* predicted times may shift slightly in the far future

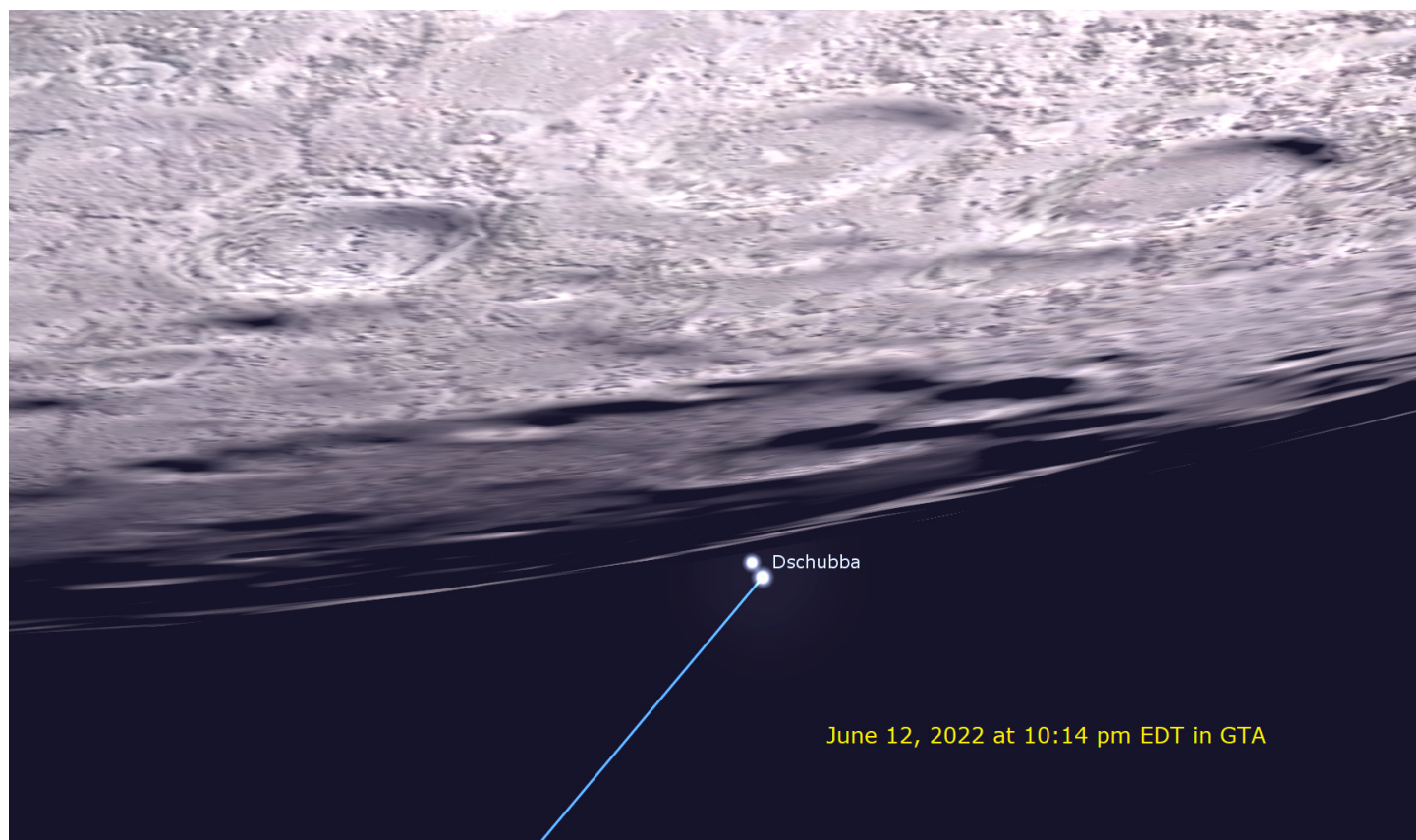
resume pre-dawn passes on June 10. Some peak at magnitude 1.1

Local occurrences info at [www.heavens-above.com](http://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](http://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)

On **June 12**, observers in the GTA can see the nearly full moon occult the bright, magnitude 2.35 double star Dschubba or Delta Scorpii. "Dark" limb ingress at 10:14:40 pm EDT. Bright limb egress at 10:55:26 pm EDT. Stars will disappear/re-appear about 8 seconds apart.



## No Asteroidal Occultations

## Variable Stars

**Sheliak**, also designated Beta Lyrae, is a naked-eye 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. Two dips in brightness because the orbit is not fully edge-on to Earth.

**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. Both diameter and spectral colour of the star vary through its cycle.

See also Boötes below.



## Double Stars

See Boötes targets below

### Constellations near the Meridian (Annually in early June)

11 pm: N. Lupus\*, N. Centaurus\*, Libra, E. Virgo, Serpens Caput, Boötes, Corona Borealis, W. Ursa Major

1 am: Scorpius, Ophiuchus, Hercules, Corona Borealis

3 am: Corona Australis\*, Sagittarius, Scutum, Serpens Cauda, Aquila, Sagitta, Vulpecula, Lyra, W. Cygnus

\*On the southern horizon

### Constellations near the Meridian (Annually in early July)

11 pm: N. Lupus\*, Scorpius, Ophiuchus, E. Libra, Serpens Caput, Hercules, Corona Borealis

1 am: Corona Australis\*, Sagittarius, Scutum, Serpens Cauda, W. Aquila, Lyra, E. Hercules

3 am: Microscopium, Capricornus, W Aquarius, Equuleus, Delphinus, Vulpecula, Cygnus

\*On the southern horizon

### Chris' Picks in early June (Northerly Non-Messier Spring Galaxies)

At magnitude 9.4, gorgeous spiral galaxy **NGC 4725** (FN073) is actually the brightest non-Messier galaxy in Coma! Use stars 30, 31 Com sitting 2 degrees to the north to locate it. Older versions of Stellarium report magnitude 12.4!

**Whale Galaxy NGC 4631** (FN064) in CVn, at mag 9.2 is the brightest non-Messier in CVn, 9x3 arc-minutes.

Watch for the **Hockey Stick Galaxy NGC 4656** just to the southeast. Located about midway between Cor Corali and Al Dafirah

**Cocoon Galaxy NGC 4490** (FN063) in CVn, magnitude 9.8, healthy 2x5 arc-minutes size. To find it, extend the line from Cor Corali to Chara by 0.5 degrees

Check out last year's The Sky this Month recording for June 2021, where I shared lots to see in CVn.

### Chris' Picks in early July (Boötes will be nice and high in evening)

**No Messier Objects:** But **M101** Pinwheel Galaxy in UMa, **M102** just outside its border with Draco, and **M3** globular cluster in CVn are all just next door

**RASC Finest NGC Object: Snowglobe Cluster NGC 5466** (FN086) mag 9.7 globular cluster, 8 arc-minutes, lightly compressed core

**Caldwell Object: NGC 5248** spiral galaxy (C45) magnitude 11, 4x6 arc-minutes, bright star-like core and bright spiral arms. Grows much larger and more complex in long exposure images

**Double Stars:**

**Izar** (Epsilon Boo and 36 BOO) close, but easy telescope split, (2.5 and 4.9) gold and blue

**Thiba** (Delta Boo or 49 Boo) easy, wide pair (3.6 and 7.9) yellow and white (RASC)

**Alkalurops** (Mu1,2 Boo or 51 Boo) binoculars double (4.3 and 7.1). Telescope triple because Mu2 splits under high mag

**Nu1,2 Boo** (52 and 53 Boo) wide pair (4.95 and 5.0), white and orange

**"Donkeys"** binoculars trio, plus **Asellus Secundus** (4.8 and 7.4) and **Asellus Tertius** split in telescopes (RASC)

**Struve 1850** (HR5415) matched white pair (7.1 and 7.6) split in telescopes

**Zeta Boo,**

**Pi Boo** (29 Boo and HR 5476) tight, white double (4.9 and 5.8)

**Xi Boo** (37 Boo and Xi Boo) tight yellow and orange (4.7 and 7.0)

**Variable Stars:** <https://www.aavso.org/LCGv2/>

**R Boo** Mira type variable ranges between 6.2 and 13.1 over 223 days. Currently approach peak.

**Asterism: The Kite's String**

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

Questions or comments to [chris.vaughan@astrogeo.ca](mailto:chris.vaughan@astrogeo.ca)

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