

RASC Toronto Centre – www.rascto.ca
The Sky This Month – Spring Galaxy Edition II
April 29 to May 27, 2020 (times in EDT, UT-4)
by Chris Vaughan

NEWS

Space Exploration – Public and Private

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

Launches

Most launches by multiple countries are TBD

May 27 tbd - SpaceX Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, **SpaceX Crew Dragon Capsule** test flight to/from ISS with “Bob and Doug” (Douglas Hurley and Robert Behnken).
NASA says no in-person public viewing

May 5 tbd - Long March 5b rocket from Wenchang, China, new **Chinese Crew Capsule** test flight and high-speed re-entry without crew of 20 metric ton version designed for deep space (beyond LEO). Capsule can launch 6 persons or 3 persons with 500 kg of cargo

This Month in History (a sampling)

Ref. <http://www2.jpl.nasa.gov/calendar/>, <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

May 1, 1825 – Swiss mathematician **Johann Jakob Balmer**, formulated formula for spectral emission lines of Hydrogen.

May 10, 1900 – Pioneering female British-American astronomer **Cecilia Payne-Gaposchkin**, earned the first PhD from Harvard’s Radcliffe College, on stellar composition. She surveyed all stars brighter than 10th mag. and millions of variable stars, setting the foundations of stellar evolution studies. Also supervised Helen Sawyer-Hogg and others.

May 15, 1857 - Scottish astronomer, **Williamina Fleming**. In nine years, she catalogued more than 10,000 stars. During her work, she discovered 59 gaseous nebulae (including the Horsehead Nebula), over 310 variable stars, and 10 novae. In 1907, she published a list of 222 variable stars she had discovered.

May 16, 1925 – American astronomer **Nancy Roman**, early NASA executive, “Mother” of the Hubble Space Telescope, and radio astronomer at Naval Research Lab.

May 17, 1836 - British solar astronomer, **Sir Joseph Norman Lockyer**, is born. Sir Lockyer named the Sun's outer layer the "chromosphere", co-discovered Helium, and founded the journal Nature.

May 18, 1048 - Persian poet, mathematician, astronomer, and stellar cartographer, **Omar Khayyam**, is born. He calculated the length of the year to 6 decimal places with a one day error every 5000 years. (The Gregorian calendar has a one day error every 3330 years.)

Astronomy and Space Exploration

May 1, 1930 – **PL**uto is officially named using eleven-year-old Venetia Burney's suggestion

May 1, 1543 - Copernicus circulates Commentariolus 'The Little Commentary,' showing the heliocentricity of the Solar System.

May 2, 1780 - William Herschel discovered the first binary star, Xi Ursae Majoris.

May 3, 1715 - Edmund Halley's total solar eclipse (the last one visible in London for almost 900 years). Halley observes total eclipse phenomenon "Baily's Beads."

May 5, 840 - Emperor Louis of Bavaria, son of Charlemagne, dies of fright during the 5 minutes of eclipse totality he witnessed

May 12, 1930 – First planetarium opens in the USA, the Adler in Chicago

May 14, 1973 - The first US space station, Sky Lab, is launched on the last Saturn V rocket.

May 15, 2005 – Pluto's moons Nix and Hydra discovered by Hal Weaver et al

May 16, 1969 - Venera 5, USSR Venus Atmosphere Probe, descended on parachutes into Venus' atmosphere - data was returned indicating an atmosphere composed of 93-97% carbon dioxide, 2-5% nitrogen, and less than 4% oxygen. The probe returned data down to within 26 kilometers of surface and was then lost - crushed by the pressure on Venus.

May 17, 1969 - Venera 6 probe returned data down to within 11 kilometers of surface and was then lost - crushed by the pressure on Venus.

Star Parties, etc.

Ref: <http://www.amsky.com/calendar/events/#may>, <https://www.skynews.ca/star-party-calendar/>

OBSERVING

Globe at Night 2020

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 May campaign will focus on **Leo** and **Boötes** from May 14 to 23.

Sunrise/Sunset

Apr 29, sunrise at 6:12 am, sunset at 8:18 pm (14h06m of daylight)

May 27, sunrise at 6:20 am, sunset at 8:22 pm (14h02m of daylight)

Astronomical Twilight

The skies are not truly dark until the Sun drops well below the horizon. Below are the times of true darkness, also known as Astronomical Twilight. Astrophotography is best done in full darkness. Details are at

<https://www.timeanddate.com/sun/canada/toronto?month=5&year=2020>

<https://www.timeanddate.com/sun/canada/toronto>

Apr 29, astronomical twilight ends at 10:10 pm EDT and starts at 4:18 am EDT (6h08m of imaging time)

May 27, astronomical twilight ends at 11:01 pm EDT and starts at 3:28 am EDT (4h27m of imaging time)

Moon - Orbit

Perigee – Tue, May 5 at 11 pm EDT

Apogee – Mon, May 18 at 4 am EDT

Moon - Phases

Thursday, April 30 at 4:38 pm - 2nd First Quarter Moon of April

Thursday, May 7 at 6:45 am - Full Milk Moon (supermoon)

Thursday, May 14 at 10:03 am - Last Quarter Moon

Friday, May 22 at 1:39 pm - New Moon

Friday, May 29 at 11:30 pm - First Quarter Moon

Libration

S limb most exposed on May 4 (-6.6°)

E limb most exposed on May 12 ($+6.9^\circ$)

N limb most exposed on May 18 ($+6.7^\circ$)

W limb most exposed May 27 (-5.9°)

Moon – Conjunctions, Eclipses, etc.

Lunar X – April 29/30

Several times a year, for a few hours near its first quarter phase, a feature on the moon called the Lunar X becomes visible in strong binoculars and backyard telescopes. When the rims of the craters Purbach, la Caille, and Blanchinus are illuminated from a particular angle of sunlight, they form a small, but very obvious X-shape. The phenomenon called is pareidolia - the tendency of the human mind to see familiar objects when looking at random patterns. The Lunar X is located near the terminator, about one third of the way up from the southern pole of the Moon (at 2° East, 24° South). The prominent round crater Werner sits to its lower right.

On Wednesday, April 29, the Lunar X is predicted to peak in intensity at 9:44 p.m. EDT (or 01:44 UT on Thursday, April 30) - but the phenomenon will be visible for approximately two hours on either side of that time. This event should be visible wherever the moon is shining in a dark sky during that time window. Simply adjust for your difference from the Eastern Time zone. For the Americas, the Moon will be positioned in the western evening sky. At the same time, you can look for the Lunar V and the Lunar L. The “V” is produced by the small crater Ukert combined with some ridges to the east and west of it. It is located a short distance above the moon’s equator at lunar coordinates 1.5° East, 8° North. For a further challenge, see if you can find the letter “L” down near the moon’s southern pole. Its position is to the southwest of three craters named Licetus, Cuvier, and Heraclitus, which combine to form a Mickey Mouse’s head shape.

Lunar Appulses and Conjunctions

The waning gibbous moon will pass 3.25 degrees to the south of Jupiter on **May 12**, making a lovely binoculars sight and photo opportunity with nearby Saturn. The waning crescent moon will pass 4 degrees to the south of Mars on **May 15**. The young crescent moon will join the two inner planets on **May 23-24**, setting up a nice binoculars sight and photo opportunity.

Planets and Dwarf Planets

On May 4 **Mercury** will pass the sun at superior conjunction, and then enter the west-northwestern early evening sky. The planet’s evening apparition will continue throughout May, but Mercury won’t become easily observable until after mid-month when the optimal viewing time will be about 9 p.m. in your local time zone. Later in the month, Mercury will become naked-eye visible in a darker sky between 9:15 and 10:15 p.m. local time. During its observable period, the planet will continuously decrease in brightness. Meanwhile, when viewed through a telescope, Mercury’s illuminated phase will diminish from nearly fully illuminated to half-illuminated, and its apparent disk diameter will swell from 6 to 7.4 arc-seconds. Mercury will pass within one degree of much brighter Venus on May 21-22, and the young crescent moon will join the two inner planets on May 23-24, setting up a nice sight in binoculars and a photo opportunity.

During May, **Venus** will complete the final stage of its long and spectacular evening apparition in the west-northwestern evening sky. On May 1, Venus will be shining at a peak brilliance of -4.73 in a fully dark sky, and

set shortly before midnight in your local time zone. On May 13, the planet will reach its most easterly point among the stars of northern Taurus. For the rest of May, Venus will steadily swing sunward, descending the sky ever more rapidly and then sinking into the western twilight for the last week of the month, just days before inferior solar conjunction. Viewed in a telescope during May, Venus will dramatically increase in apparent disk size from 39.5 to 57.7 arc-seconds, and it will wane in illuminated phase to a slim crescent as it moves between Earth and the sun. Exercise extreme caution with telescopic observations of Venus in late May. Do not point a telescope anywhere near Venus unless the sun has completely disappeared below the horizon. Mercury will pass within one degree of much brighter Venus on May 21-22. The young crescent moon will join the two inner planets on May 23-24, setting up a nice binoculars sight and photo opportunity.

Mars will begin May shining at magnitude 0.41 and moving prograde through the stars of eastern Capricornus in the southeastern pre-dawn sky. On May 9, the Red Planet will cross into Aquarius where it will remain all month. As the distance between Earth and Mars reduces, Mars will continuously increase in brightness, finally exceeding magnitude 0.0 at month-end. Viewed in a telescope during May, Mars will exhibit an 86% illuminated disk that will expand from 7.64 to 9.24 arc-seconds. The waning crescent moon will pass 4 degrees to the south of Mars on May 15.

During May, **Jupiter** will shine very brightly in the pre-dawn sky among the stars of eastern Sagittarius. Jupiter's slowly increasing visual magnitude during May, from -2.35 to -2.56, will allow it to remain easily visible in the southern sky until sunrise. Dimmer Saturn will be positioned approximately 5 degrees to the west of dimmer Jupiter. The shallow angle of the morning ecliptic in the Northern Hemisphere will keep the two planets low in the sky, but southerly observers will have a better view of them. On May 14 Jupiter will halt its regular eastward motion and begin a retrograde loop that will last until mid-September. (Saturn's own retrograde loop, which commenced a few days earlier, will keep both gas giants together for the rest of 2020.) Throughout May, Jupiter's disk will grow about 10% larger in telescopes as Earth slowly draws closer to it. It will reach maximum apparent size at opposition in July. For several mornings around mid-month, Jupiter will approach within 2.5 degrees of the globular cluster Messier 75. On May 31, Jupiter will begin to rise before midnight local time, promising summer evenings full of good views. Several Jovian moon shadow transit events will occur on Jupiter in May, including Callisto's shadow crossing with the Great Red Spot on May 3, and a double shadow event on May 28. The waning gibbous moon will pass 3.25 degrees to the south of Jupiter on May 12, making a lovely binoculars sight and photo opportunity with nearby Saturn.

During May, **Saturn** will be easily visible in the southeastern pre-dawn sky among the stars of western Aquarius for several hours before dawn. Saturn will be positioned approximately 5 degrees to the east of much brighter Jupiter. The shallow angle of the morning ecliptic in the Northern Hemisphere will keep both planets low in the sky, but southerly observers will have a better view of them. On May 11 Saturn will begin a retrograde loop that will last until the end of September. (Jupiter's own retrograde loop, which will begin a few days later, will keep both gas giants together for the rest of 2020.) Throughout May, Saturn's disk and rings will grow larger in telescopes. They'll reach maximum apparent size at opposition in July. At the end of May, Saturn will be rising only minutes after midnight local time, promising summer evenings full of good views. Also at the end of May, Saturn will move to within 2.75 degrees of the globular cluster Messier 75. The waning gibbous moon will pass to the south of Saturn and Jupiter on May 12, making a lovely binoculars sight and photo opportunity.

Uranus will spend May climbing away from the sun in the eastern pre-dawn sky - but it will be unobservable until it escapes the morning twilight late in the month. Even then, the shallow angle of the morning ecliptic will keep the magnitude 5.85 planet too low in the sky for good viewing.

During May, **Neptune** will be in the southeastern pre-dawn sky moving prograde eastward in front of the stars of eastern Aquarius. The shallow morning ecliptic will delay dim, magnitude 7.9 Neptune's return to visibility until the latter part of May.

Magnitude 9.2 **Ceres** will spend May observable in the eastern pre-dawn sky as it moves prograde through the stars of Aquarius. During the third week of May, Mars will overtake it, passing 7 degrees to the north of the dwarf planet.

Magnitude 8.2 **Vesta** will spend May moving prograde through Taurus, but the daily westward motion of the stars will carry the asteroid down into the western post-sunset twilight, rendering it unobservable.

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/2019 Y4 (ATLAS) has broken up and is fading below magnitude 9. It is in the early evening sky in southern Camelopardalis, and will spend May descending into Perseus while it heads towards perihelion.

Comet c/2017 T2 (PanSTARRS) will spend May as a circumpolar object moving east from Camelopardalis to Ursa Major. It has already reached its peak brightness of approximately 8.5. It is highest after evening darkness now, but moves higher all month.

Comet c/2019 Y1 (ATLAS) will spend May as a circumpolar object moving east from northern Camelopardalis to Ursa Major and through the Big Dipper's bowl. It has already passed its peak brightness of approximately 8.5. It should pass very close to Dubhe on May 20.

Comet c/2020 F8 (SWAN) has reportedly reached a naked-eye magnitude of +5.5 (!), but will be too low and too close to the sun in the eastern pre-dawn sky for GTA viewing. It will make its closest approach to Earth of 0.56 AU on May 12. It is predicted to reach a peak brightness of +3 in late May around perihelion.

Meteor Shower(s)

Ref. <http://www.amsmeteors.org/meteor-showers/meteor-shower-calendar/>, <https://www.imo.net/files/meteor-shower/cal2018.pdf>

Eta Aquarids (April 19 to May 26)

The Eta Aquarids are a strong, broad maximum meteor shower better viewed from southern latitudes as the radiant is southerly and rises soon before the Sun in the GTA. The shower peaks before dawn on May 6th. These are fast meteors with persistent trails, few fireballs at a rate of 10-30 per hour in the GTA. The source of the shower is Halley's Comet. The radiant is coincident with Eta Aquarius (RA 22h 32m, Decl. -1°). This year, the Moon will be full on the peak date.

Asteroids

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

According to the Minor Planet Centre...

Near-Earth Objects Discovered This Year:	973 (~243/month)
Minor Planets Discovered This Year:	1109 (~277/month)
Comets Discovered This Year:	17 (~4.3/month)

Observations This Year: 12.1 million

Satellites

Current GTA **International Space Station** (ISS) pre-dawn pass series ends on May 16. The rest of May offers late evening passes (mostly between 10:30 pm and 1 am).

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.astrogeoguy.tumblr.com)

Occultations – Lunar and Asteroidal

Ref: <http://www.asteroidoccultation.com/> and <http://www.poyntsource.com/New/Global.htm> (additional links on the following URLs open track maps), <http://www.lunar-occultations.com/bobgraze/index.html>

Lunar Occultations

-

Asteroidal Occultations

-

Variable Stars

See Observers Handbook monthly events for Minima of Algol

Double Stars

Blake Nancarrow's Picks for May

δ (delta) Dra - aka Altair, Nodus Secundus, BUP 186, SAO 18222, HIP 94376

θ (theta) Vir - aka Σ1724 (Struve), SAO 139189, HIP 64238

HD 111845 in Com - aka STF (Struve) 1685, SAO 100307, HIP 62783

HD 109556 in Crv - aka Σ1659, SAO 157384, HIP 61466

6 Leo - aka SHJ 107, SAO 117751, HIP 46774

Constellations near the Meridian (Annually in mid-May)

Green text indicates less than 1.5 air masses (higher than 45°) and best viewing

10 pm: E. Hydra, Corvus, Crater, **W. Virgo, E. Leo, Coma Berenices, Canes Venatici, Ursa Major, and Draco**

12 am: Libra, E. Hydra, E. Virgo, **Boötes, Corona Borealis, Coma Berenices, Draco, and Ursa Minor**

2 am: Scorpius, Libra, **Ophiuchus, Serpens Caput, Corona Borealis, Hercules, Draco, and Ursa Minor**

Spring Star party Targets (Annually in mid-May)

Fertile Gardens - The Big Dipper, Leo, and Hercules (eye / binoculars)

Spring Buds (Selected high surface brightness galaxies) – M81, M82 Bode's Nebulae and M101 Pinwheel Galaxy (UMa), M94, M106, M51 Whirlpool and M63 Sunflower (CVn), NGC 2903, M65 and M66 Leo Triplet (Leo), M104 Sombrero, M60, and M49 (Vir), M64 Black-eye (Com), M83 Southern Pinwheel (Hya) (very low in south), etc. (telescope)

Spring Bulbs – NGC 6210 Turtle Nebula (Her), NGC 6543 Cat's Eye (Dra), Ring Nebula (Lyr), Blinking Planetary (Cyg), etc. (telescope)

Spring Blooms – M10 and M12 (Oph), M13 and M92 (Her), M5 (Serp), M3 (CVn), Melotte 111 (Com), M53 (Com), etc. (binoculars, telescope)

Double Plays – Castor (Gem), Regulus and Algieba (Leo), iota Cancri (Cnc), Cor Caroli (CVn), Porrima (Vir), Izar (Boo), etc. (telescope)

Hit Singles – Vega (Lyr), Arcturus (Boo), Spica (Vir), Capella (Aur), etc. (eye, binoculars, telescope)

Don't forget the RASC Finest NGC list! They're listed in the 2020 Observers Handbook on pages 318-320 (many are as good, and as easy to see, as Messier objects). There are 50 RASC Finest NGC objects in the Spring season (FNGC # 39 through 89).

~~See you at DDO, Long Sault C A, Glen Major Forest, Bayview Village Park, or the CAO!~~

Questions or comments to chris.vaughan@astrogeo.ca

To subscribe to the weekly Astronomy Skylights emails, please use the MailChimp signup form [here](#).
("Skylights" content is archived at www.astrogeo.ca/skylights)