BCAS OBSERVING HIGHLIGHTS for December 11 to 27, 2025, a "dark Moon period"
Black Canyon Astronomical Society (BCAS), southwest-central Colorado, USA

DATES & TIMES (MST) FOR REGIONAL EVENTS AND EYE-CATCHING HAPPENINGS IN THE SKY:
December 11-20, 6:45 PM to midnight: Enjoy our fall and winter stars under a dark sky
December 12-27, 6:10 AM to 6:40 AM: Spot Mercury very low in the southeast
December 13-14, all night long, Geminid Meteor Shower Peaks (up to 150 meteors/hour)!
December 14, 3:00 AM to 6:30 AM: Crescent Moon, near 1st -magnitude star, Spica
December 17, 6:20 AM to 6:30 AM: Crescent Moon rises 10° to right of Mercury
December 18, 6:50 AM: Thin crescent Moon, 1° below 1st -magnitude star, Antares (use binoculars)
December 19, 2:00 AM to 5:45 AM: Interstellar Comet 3I/ATLAS closest to Earth (use telescopes)
December 19, 10:00 AM: Western Slope Skies on KVNF radio
December 19-27, midnight to 5:45 AM: Enjoy winter and early spring stars under a dark sky
December 21, 8:03 AM: Solstice – our astronomical winter begins, shortest day/longest night
December 24, 6:00 PM: Western Slope Skies on KVNF radio
December 26, 6:00 PM to 11:00 PM: "Fat" crescent Moon 4° above Saturn

SUMMARY. On these dark December evenings enjoy the constellations of fall and the rising stars of winter. Early risers can preview the stars of our spring sky and catch a glimpse of the Planet Mercury, before the Innermost Planet disappears into bright predawn twilight by late December. Local weather forecasts look fairly good for the night of December 13-14, the peak of the Geminid Meteor Shower, typically the strongest and most reliable of the annual meteor ("shooting star") showers. Consider braving the cold temperatures to observe the Geminids, at least for a short time. Under ideal conditions you may see up to 150 meteors per hour! You don't need any special gear to see meteors, just a dark location, a comfortable reclining chair, and a warm sleeping bag.

The solstice occurs on December 21 at 8:03 AM MST, when the Sun shines directly on the Tropic of Capricorn at 23.5 degrees south latitude, marking the start of winter in the northern hemisphere and the start of summer "down under." In Colorado, December 20-21 is the longest night of year 2025.

The Moon reaches last quarter on December 11, and from December 12 to 18, the crescent Moon wanes. The Moon is new on December 19. Between December 21 and 26, watch the crescent Moon wax in the evening sky. The Moon reaches first quarter on December 27.

Saturn is well placed for viewing from after sunset until around 11 PM MST. Bright Jupiter now rises before 7:15 PM MST. This is a great time to observe Jupiter, because the Giant Planet is above our horizon for more than 12 nighttime hours and gets very high in our sky between midnight and 4:30 AM MST. You can use telescopes or binoculars to spot Jupiter's large Galilean moons. With a telescope, you can also watch the shadows of these large moons cross the Giant Planet. With binoculars or telescopes, you can spot Neptune about 3.5 degrees northeast of Saturn and Uranus about 4 degrees south of the Pleaides Star Cluster in Constellation Taurus. Early risers can see Mercury as a morning star, just above the southeastern horizon during predawn twilight.

Several extreme solar flares occurred in recent weeks, and some of these were associated with coronal mass ejections that caused geomagnetic storms and auroras on Earth. There are active regions on the Earth-facing side of the Sun, so it's possible that auroras could be visible again from the Western Slope during this period.

Find times for local passes of bright satellites, including the International Space Station and Tiangong, the Chinese Space Station, at these links...
https://www.heavens-above.com/
https://www.n2yo.com/passes/?s=25544

Note: The apparent brightness of sky objects is measured in "magnitude" units. Many bright stars are magnitude +1, while the faintest stars easily visible to unaided eyes under dark skies are magnitude +6. Some of the brightest stars are 0 magnitude (e.g., Vega, Arcturus), while the brightest sky objects have negative magnitudes (e.g., Sirius at -1.5, Jupiter at -2 to -3, Venus at -4 to -5, the full Moon at -12 to -13, and the Sun at -26.7 magnitude). Angular distances on the sky are usually cited in degrees of arc (often abbreviated as "°"). Helpful ways to estimate 1, 5, 10, 15, and 25 degrees of arc can be found here: https://www.timeanddate.com/astronomy/measuring-the-sky-by-hand.html

GEMINID METEORS PEAK – DECEMBER 13-14! Weather forecasts look fairly good for the night of December 13-14, the peak of Geminid Meteor Shower, which is typically the strongest and most reliable of the annual meteor showers. **Under ideal conditions, we may see up to 150 Geminid meteors per hour.** If it's cloudy on December 13-14, we may see lesser rates of Geminids for a few nights both before and after the peak. Meteors (aka "shooting stars") are visible when dust- to gravel-size debris from comets and asteroids enters our atmosphere at many miles per second. These speedy particles compress, heat, and ionize the air through which they pass, producing light. You don't need any special equipment to see meteors, just a dark location, a comfortable reclining chair, and a warm sleeping bag. Meteor showers are named after the location of their radiants (the apparent origin points of meteors on the sky), but shower meteors generally appear all over the sky, even quite far from their radiants. The name of a shower typically refers to the constellation in which its radiant is located. There is no real link between the constellation and the shower; it's just our perspective on the location of the radiant.

To see many meteors, it's best to look high in the sky in a direction away from any ambient lighting or moonlight. You can view Geminids all night long, because the Geminid radiant rises in the east northeast by the end of evening twilight, culminates more than 70 degrees above the southern horizon around 1 PM MST, and remains well above the western horizon into morning twilight. This timing is great for our Mountain Time Zone in 2025, because the predicted maximum is 1 PM MST (= 8 hours UTC) on December 14. This is before moonrise, when the Geminid radiant is very high in our sky. The sky is dark until about 2:27 AM MST, when a 26%-illuminated, crescent Moon rises. After 2:27 AM MST, moonlight may hinder seeing fainter Geminids. But it may be worth continuing a Geminid vigil beyond moonrise, because meteor rates typically increase until just before morning twilight. The Geminids often include many fireballs (very bright meteors); this fact adds incentive to observe through the predawn hours. Geminid Meteors are debris from the Asteroid 3200 Phaeton, which some scientists consider to be a "rock comet" or "dead comet."

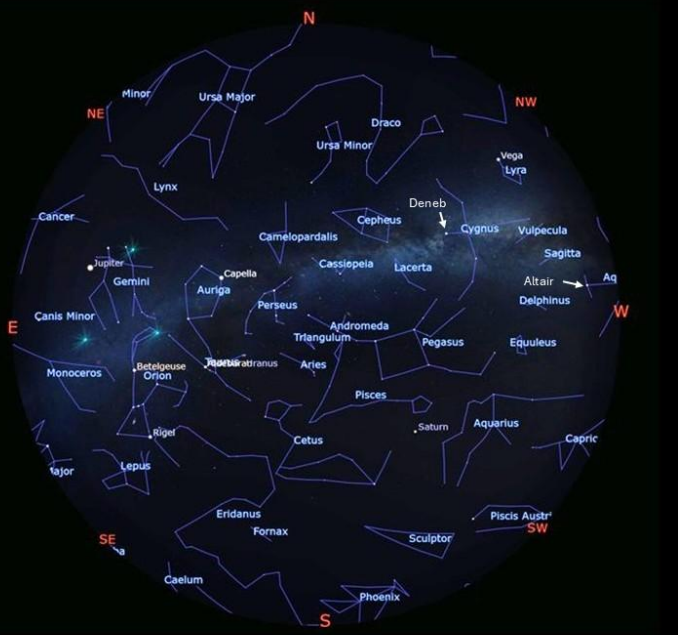
OUR WINTER SOLSTICE: DECEMBER 21. In Colorado, our shortest day, only 9 hours 22 minutes long (plus or minus a few minutes based on your latitude) is December 21, and our longest night is the night of December 20-21. These correspond to the December solstice, when the Sun shines directly on the Tropic of Capricorn at latitude 23.5 south, marking the beginning of astronomical winter in the northern hemisphere and the beginning of summer in the southern hemisphere (the solstice occurs at exactly 8:03 AM MST on December 21). Our earliest sunset occurred on December 6, 7, or 8 at about 4:46 PM MST (plus or minus a few minutes, based on your exact location in western Colorado). Our latest sunrise will be on January 4 or 5 at about 7:34 AM MST (again, plus or minus a few minutes, depending on your location). Earliest sunset and latest sunrise occur about two weeks before and after the December solstice, respectively, due to factors related to Earth's orbital eccentricity and axis tilt.

ENJOY A DARK DECEMBER SKY! After darkness falls, enjoy some lingering "summer" stars in the northwest, our fall constellations at their highest, and the stars of our winter sky, as they rise in the east. Use a planetarium app on your smartphone or the annotated chart below to navigate our dark, December evening sky.

All-Sky View
from Colorado's Western Slope
for December 13, 2025, 8:30 PM MST

The Milky Way spans the sky from Constellation Cygnus low in the west northwest, through Cassiopeia and Perseus north of the zenith, to Auriga and to Gemini in the east. The "Summer Triangle" asterism, consisting of the bright stars, Vega, Altair, and Deneb lingers low in the west northwest. Fall Constellations, Pegasus, Andromeda, and Pisces, are high in the south. 1st-magnitude Saturn is just west of south, and bright Jupiter (magnitude -2.6), moving through Gemini, is rising higher in the east northeast. Constellation Orion is rising higher in the east, and Sirius, the night sky's brightest star, has just risen above the east-southeastern horizon. The radiant of the Geminid Meteor Shower is well above the east-northeastern horizon, allowing us to see Geminid meteors all through the night of December 13-14.

Simulated using Stellarium

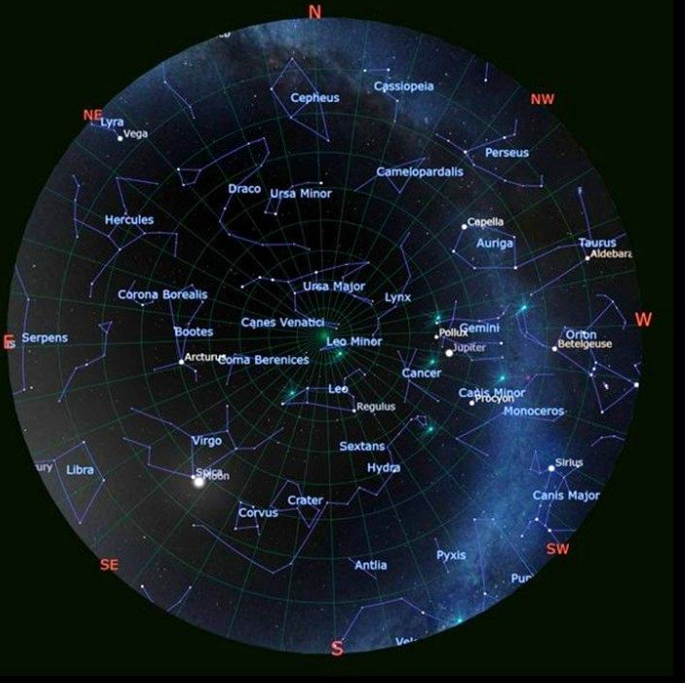


And before dawn at around 5:30 AM MST, our spring stars and constellations are rising high in the east, as our winter stars are descending toward the western horizon. Use a planetarium app for your smartphone or the annotated chart below to navigate our December predawn sky.

All-Sky View
from Colorado's Western Slope
for December 14, 2025, 5:30 AM MST

The "winter" Milky Way spans the sky from Constellations Pyxis, Puppis, and Canis Major low in the southwest through Monoceros and Gemini in the west, Auriga and Perseus in the northwest, into Cassiopeia in the north northwest. Orion is about to set in the west, but Sirius, the night sky's brightest star, is still above the west-southwestern horizon. The Big Dipper is high in the northern sky. Bright Jupiter (magnitude -2.6), moving through Gemini, is starting to descend in the west. Our spring Constellations, Virgo, Boötes, Corona Borealis, and Corvus are rising higher in the east. The radiant of the Geminid Meteor Shower is still high in the west, allowing us to enjoy Geminid meteors until the onset of bright, predawn twilight on December 14.

Simulated using Stellarium



THE MOON. The Moon reaches **last quarter on December 11** (exactly at 1:52 PM MST), and from December 12 to 18, the crescent Moon wanes. The **Moon is new on December 19** (exactly new at 6:43

PM MST). Between December 21 and 26, watch the crescent Moon wax in the evening sky. **The Moon reaches first quarter on December 27** (exactly at 12:10 PM MST). In the predawn of December 14, look for a crescent Moon about 2 degrees to the right of the first-magnitude star, Spica, in Constellation Virgo. On December 17 from 6:20 AM to 6:30 AM MST, look for a thin (6%-illuminated) lunar crescent about 10 degrees above and to the right of -0.5 magnitude Mercury, which is about 4 to 5 degrees above the southeastern horizon. Challenge yourself on the morning of December 18 at about 6:50 AM MST (in bright twilight with the Sun only 7 degrees below the horizon) to spot a very thin (only 2% illuminated) lunar crescent just 2 degrees above a flat horizon and 1 degree below +1.0-magntiude Antares and about 7 degrees below brighter (-0.5 magnitude) Mercury (binoculars will help). On the evening of December 26, look for a fat (42%- illuminated) crescent Moon about 4 degrees above first-magnitude Saturn.

Enjoy seeing earthshine delicately illuminate the nightside of the crescent Moon, especially on mornings from December 14 to 17 and on evenings from December 21 to 25 (binoculars can provide eye-catching views!). NASA has published a stunning visualization of lunar phases for year 2025. Another fun site is NASA's daily Moon guide. **Please do your crescent Moon spotting before sunrise and after sunset. NEVER chance looking at the Sun directly; serious eye damage can result.**

INTERSTELLAR COMET 3I/ATLAS: NOW CLOSEST TO EARTH. Using a telescope, challenge yourself to spot and/or image a visitor from another planetary system, Comet 3I/ATLAS (formerly designated as C/2025 N1)! This Comet is closest to Earth during this period, but it's now moving away from the Sun and fading. 3I/ATLAS was discovered by the Asteroid Terrestrial-impact Last Alert System (ATLAS) that is operated by the University of Hawaii. It's only the third interstellar object to be discovered traversing our Solar System, hence the designation, "3I." At a predicted magnitude range of +12 to +13.5 during this period, it may still be possible to view or image 3I/ATLAS with "backyard" telescopes. Comet 3I/ATLAS is currently moving against the stars of Leo, with a backdrop of the Virgo Galaxy Supercluster. There are many galaxies in this region of magnitude +12 to +13.5, so distinguishing a "fuzzy"-looking comet from "fuzzy"-looking galaxies could be challenging. 3I/ATLAS may or may not show a visible tail. To identify 3I/ATLAS with certainty, check for motion against background stars over a period of 10 minutes or more. Due to its faintness, it helps to look for "3I" when the Moon is below the horizon. The Comet passed perihelion (its closest point to the Sun, 126 million miles) on October 29, and it is closest to Earth on December 19 at 167 million miles. Comet 3I/ATLAS is following an unbound, hyperbolic trajectory past the Sun, and it will not be returning to our Solar System. Updates, photos, finder charts, and ephemerides for 3I/ATLAS are here…
https://theskylive.com/c2025n1-info
https://astro.vanbuitenen.nl/comet/3I
http://aerith.net/comet/catalog/0003I/2025N1.html
https://en.wikipedia.org/wiki/3I/ATLAS

SATURN – WELL PLACED FOR EVENING VIEWING! As the sky darkens, the Ringed Planet is more than 40 degrees above the east-southeastern horizon, culminating about 45 degrees above the southern horizon between 6 PM and 7 PM MST. Saturn sets in the west at about 12:26 AM MST on December 11 and 11:23 PM MST on December 27. During this period, Saturn fades slightly from magnitude +0.95 to +1.00, as its distance from Earth increases from 871 million to 897 million miles. Through telescopes, Saturn's disk appears 17 arc seconds wide, and its rings span 41 arc seconds. During 2025, Saturn's thin rings (150,000 miles wide but only about 1000 ft thick!) appear nearly "edge-on" from our perspective on Earth. Saturn's rings are not as striking as they have been in the past few years (and will be a few years from now). When seen nearly edge-on, the rings are dimmer, making it easier to spot some of Saturn's mid-sized moons, like Tethys, Dione, Rhea, and Enceladus. Titan, Saturn's largest moon, is

bright enough to see with just binoculars. You can follow the changing positions of Saturn's moons by using various planetarium apps.

NEPTUNE – NEAR SATURN. Neptune, shining at magnitude +7.8, is about 3.5 degrees northeast of Saturn. Like Saturn, we can see Neptune best as it culminates more than 45 degrees above the southern horizon between 6 PM and 7 PM MST. You'll need binoculars or a telescope to spot Neptune, moving slowly against the stars of southwestern Pisces during this period. A telescope may reveal Neptune's 2.3 arc second-wide, blue disk. Neptune is 2.78 billion miles distant during this period. You can use this link to find Neptune:
https://theskylive.com/neptune-info

URANUS. Uranus is well placed for viewing through much of the night. Uranus is moving slowly against the stars of Constellation Taurus, about 4 degrees south of the Pleiades Star Cluster. You can use this link to find Uranus: https://theskylive.com/uranus-info
At magnitude +5.65, you can see the 7th Planet easily with binoculars, and perhaps even with eyes unaided when the Moon is below the horizon. But you'll need a telescope to resolve Uranus' 3.8 arc second-wide disk and to detect color easily. Most people perceive Uranus as either blue or green. How does it appear to you? The best times to view the 7th Planet may be between 7:30 PM and 12:30 AM MST, when Uranus is more than 50 degrees above the horizon. Uranus is 1.73 billion miles from Earth during this period.

JUPITER AND ITS MOONS RISE IN THE EVENINGS. These long December nights are great times to observe Jupiter for two reasons: 1) The Giant Planet is above our horizon for more than 12 nighttime hours and 2) Jupiter gets very high in our sky (about 55 to 72 degrees) between midnight and 4:30 AM MST. Jupiter is retrograding (moving westward) against the stars of eastern Gemini, rising in the east northeast at about 7:12 PM MST on December 11 and 6:01 PM MST on December 27. "The King of Planets" then remains visible into morning twilight. Between December 11 and 27, the Giant Planet brightens from magnitude -2.60 and -2.66, as its distance from Earth decreases from 405 to 396 million miles, and its apparent diameter increases from 45.3 to 46.3 arc seconds.

Use a telescope or binoculars to spot Jupiter's four bright "Galilean" moons. You can identify them by their changing positions and referring to various planetarium apps. Use a telescope to view shadows of the Galilean moons crossing the Giant Planet. These are total solar eclipses on Jupiter! Ganymede, the largest moon in the Solar System, casts the largest shadow of Jupiter's moons, and its shadow is usually the easiest to spot. Due to their smaller diameters, the shadows of Callisto, Io, and Europa are smaller than Ganymede's shadow. But shadows of all 4 Galilean moons can be observed transiting Jupiter with telescopes having apertures as small as 3 inches. Shadow transits of Io and Europa occur frequently, because Io orbits Jupiter every 1.8 Earth days, and Europa every 3.6 days. Ganymede and Callisto have longer orbital periods (around Jupiter), 7.2 and 16.7 Earth days, respectively, so their shadows cross Jupiter less frequently. No transits of Callisto's shadow are visible from the Western Slope during this period.

December 12, 2025, 12:12 AM to 2:30 AM MST, Io's shadow crosses Jupiter with Jupiter very high in our local sky.

December 13, 2025, 6:42 PM to 8:58 PM MST, Io's shadow crosses Jupiter (Locally, this transit begins before Jupiter rises at around 7:03 PM MST and ends with Jupiter 20 degrees above the eastern horizon).

December 14, 2025, 12:32 AM to 3:20 AM MST, Europa's shadow crosses Jupiter with Jupiter very high in our local sky.

December 16, 2025, 7:02 AM to 10:20 AM MST, Ganymede's shadow crosses Jupiter (Locally, this event begins with Jupiter 27 degrees above the western horizon in bright morning twilight and the Sun only 5 degrees below the horizon. The event ends after Jupiter sets).

December 19, 2025, 2:06 AM to 4:22 AM MST, Io's shadow crosses Jupiter with Jupiter high in our local sky.

December 20, 2025, 8:36 PM to 10:52 PM MST, Io's shadow crosses Jupiter (Locally, this event begins with Jupiter 22 degrees above the eastern horizon and ends with Jupiter 49 degrees high in the east).

December 21, 2025, 3:08 AM to 5:58 AM MST, Europa's shadow crosses Jupiter (Locally, this event begins with Jupiter 66 degrees high in the west northwest and ends with Jupiter 34 degrees above the western horizon).

December 24, 6:20 AM to 9:36 AM MST, Callisto's shadow crosses Jupiter (Locally, this event begins with Jupiter 27 degrees high in the west and the Sun 13 degrees below the horizon. The transit ends in daylight after Jupiter has set).

December 24, 4:26 PM to 7:16 PM MST, Europa's shadow crosses Jupiter (Locally, this event begins in daylight before Jupiter rises and ends with Jupiter 11 degrees high in the east northeast).

December 26, 2025, 4:00 AM to 6:16 AM MST, Io's shadow cross Jupiter (Locally, this event begins with Jupiter 53 degrees high in the west and ends with Jupiter 27 degrees above the western horizon).

December 27-28, 2025, 10:30 PM to 12:46 AM MST, Io's shadow crosses Jupiter with Jupiter more than 50 degrees high in our local sky.

MERCURY: A "MORNING STAR." On December 12 between 6:10 and 6:40 AM MST, you may spot Mercury, shining at magnitude -0.5, rising from 5 to 10 degrees above an unobstructed southeastern horizon (with the Sun 13 to 8 degrees below the horizon). After December 12, Mercury, although still brightening, descends into brighter morning twilight. After December 27, it will be very challenging to spot the Innermost Planet in glaring morning twilight, as its angular separation from the Sun decreases, prior to its solar conjunction on January 21. Between December 12 and 27, Mercury brightens from magnitude -0.50 to -0.55, as its gibbous disk (as seen through telescopes) waxes from 74% to 92% illuminated. Mercury's distance from Earth increases from 102 million to 124 million miles during this period, as its apparent diameter decreases from 6.1 to 5.0 arc seconds. **Please do your Mercury spotting before sunrise. NEVER chance looking at the Sun without taking proper precautions. Serious eye damage can result.**

WILL A BRIGHT NOVA ("NEW" STAR) APPEAR SOON? Will there be a bright "new" star in Constellation Corona Borealis sometime soon, at least briefly? Corona Borealis rises above the east-northeastern horizon by 3:00 AM MST and is more than 30 degrees above the eastern horizon by 6:00 AM MST. T Coronae Borealis (T CrB) is a recurrent nova that (based on past behavior) may rapidly increase in brightness 1500-fold (to second magnitude) to become the brightest star (or 2nd brightest star) in Corona Borealis between now and sometime in 2026. Then this "new star" may fade rapidly below

naked-eye visibility in about a week. As of 5 AM (MST) on December 11, T CrB had not yet erupted. Astronomer Jean Schneider of Paris Observatory stated that an eruption is most likely on November 10, 2025 or June 25, 2026. There was no eruption on November 10, 2025, but keep watch - an eruption could happen at any time! You can find additional info at these sites…
https://blogs.nasa.gov/Watch_the_Skies/2024/02/27/view-nova-explosion-new-star-in-northern-crown/
https://www.aanda.org/articles/aa/full_html/2023/12/aa48372-23/aa48372-23.html

THE SUN. The Sun has been very dynamic lately, as solar active regions containing sunspots have unleashed numerous flares and coronal mass ejections (CMEs) of charged particles. There have been many M-class (moderate) solar flares during recent weeks. And there were X-class (extreme) flares on November 4 (two!), 9, 10, and 14 and on December 1 and 8! Also, CMEs have triggered geomagnetic storms that caused auroras. As of December 11, an expansive, active region containing very large sunspots is about to rotate away from the Earth-facing side of the Sun. But other active regions are still facing us, and additional active regions may soon rotate into view. We may experience more M- and possibly X-class (extreme) flares and powerful CMEs. The best way to monitor sunspots, solar flares, CMEs, and other solar activity safely (and in "real time") is by using the internet. Check out the following sites (as of December 11, solar images on the sdo.gsfc… site have not been updated since September due to a "hardware failure with its data storage" – for "real-time" solar images, visit soho.www…).
https://sohowww.nascom.nasa.gov/data/realtime-images.html
https://sdo.gsfc.nasa.gov/data/
https://stereo.gsfc.nasa.gov/beacon/
http://halpha.nso.edu/
https://www.swpc.noaa.gov/
http://www.sidc.be/silso/ssngraphics
Do not look at the Sun directly without safe, specialized solar filters. Looking at the Sun can be very dangerous unless you take adequate precautions. Severe eye damage and even blindness can result.

AURORAS (aka "polar lights" or "northern lights"). With continuing high solar activity and associated coronal mass ejections, there may be geomagnetic storms that trigger auroras that could become visible from the Western Slope. Get predictions and updates for auroras, their intensity, and geographic extent from NOAA's Space Weather Prediction Center:
https://www.swpc.noaa.gov/products/aurora-viewline-tonight-and-tomorrow-night-experimental
Auroras are most frequently seen from high latitudes, e.g., from Canada, Alaska, Iceland, northernmost Europe, southern New Zealand, and Antarctica. But many people have seen and photographed auroras from Colorado several times both this year and last year, including a spectacular aurora on November 11, 2025. Also, we can watch auroras in real-time from Yellowknife, Northwest Territories on an all-sky camera at the Canadian Space Agency's AuroraMax website. Like Colorado, Yellowknife is in the Mountain Time Zone. An aurora webcam at the University of Alaska-Fairbanks is two hours behind the Mountain Time Zone…
https://www.youtube.com/watch?v=O52zDyxg5QI
Airglow and SAR arcs also result from high solar activity, and these phenomena have been photographed and/or observed from Colorado.

EARTH SATELLITES. Numerous Earth satellites are visible every clear night. Satellites are visible only when they reflect sunlight during twilight or nighttime hours. We see satellites most often during late evening twilight and for an hour or so afterwards, and before and during early morning twilight. The

brightest satellites are the International Space Station (ISS) and Tiangong, the Chinese Space Station. Both space stations can appear brighter than any star in the sky, and at times even brighter than the Planet Jupiter. Predictions for space station passes can change quickly, and it's best to get predictions for passes within 24 hours of when you want to see the satellites. In low Earth orbit, both the ISS and Tiangong are subject to atmospheric drag, and they undergo frequent re-boosting. Re-boosting slightly slows orbital speed, resulting in later passes. Also, both space stations frequently alter their orbits to avoid collisions with other satellites and space debris. Some popular sites for predicting local passes of the space stations are the following (be sure to set applications to your location and time zone):
https://www.heavens-above.com/
https://www.n2yo.com/passes/?s=25544
For ISS passes, you can use NASA's "Spot the Station" app for mobile devices …
https://www.nasa.gov/spot-the-station/
Starlink satellite "trains" can be striking sights for a few days after their launch. For predictions of SpaceX's Starlink satellites, try using this site:
https://findstarlink.com/#5431710;3

HAPPY OBSERVING!