

## Appearance of Saturn's Rings, 2025-2039 and beyond.

*Includes, for telescopic observers, details of the appearance of Saturn's rings, currently, and in coming years.*

[Written in November 2025] Over the last several weeks, since Saturn became well placed for viewing in the early evening, I have been setting up a telescope for folks to get an unusual view of Saturn. After reading an excellent article, *Why the Rings of Saturn Seem as if They're About to Disappear*, by Tom Metcalfe in the November 21 edition of the New York Times, I felt motivated to redouble my efforts to get folks to get a telescopic look at Saturn – especially now that I'm immersed in the mostly warm and clear, skywatcher-friendly climate of Palm Springs, California! I was also moved to produce this observer's guide to the changing appearance of Saturn's rings for coming years.

Data below have been obtained from *Saturn Ephemeris Generator 3.0*:

[https://pds-rings.seti.org/tools/ephem3\\_sat.shtml](https://pds-rings.seti.org/tools/ephem3_sat.shtml)

Here is an example of the output available, after entering dates in this format,

*yyyy-mm-dd hh:mm:ss*

(some or all of the time elements hh:mm:ss can be omitted), and making a selection of what data pertaining to Saturn and its rings to display:

Date&time, UT -----Saturn's rings-----

year mo dy hr	opening from Earth	from Sun
2025 3 23 17	0.00°	0.65°

Explanation: On March 23, 2025, Saturn's rings were presented edge-on to observers on Earth, on the only such occasion between 2009 and 2038, while the Sun still illuminated the north face of the rings from an angle of 0.65° above their plane. The rings are very thin, so Saturn would have appeared through a telescope as a disk, without rings. But Saturn was then in the part of its orbit nearly on the opposite side of the Sun from Earth. Saturn appeared only 10° from the Sun in our sky and rose in bright twilight only shortly before sunrise, and would not have been visible.

Date&time, UT -----Saturn's rings-----

year mo dy hr	opening from Earth	from Sun
2025 05 06 13	-2.21°	0.00°

Explanation: Twice in Saturn's 29.5-year trip around the Sun, the rings are presented edge-on toward the Sun. (Note 0.00° in the last column in the above line of data.) The rings lie in the

planet's equatorial plane, so their edgewise presentations toward the Sun coincide with one of the planet's equinoxes, when the lighting on the rings switches from the north side to the south side (Saturn's northern hemisphere autumn), and back again half a Saturnian year later (spring).

The most recent occurrence was on May 6, 2025, when the rings were presented edge-on to Sun during the planet's autumnal equinox, and sunlight began to illuminate the south face of the rings, then tipped  $2.21^\circ$  toward Earth. Saturn was then visible low in the eastern morning sky.

Date&time, UT -----Saturn's rings-----

year mo dy hr	opening from Earth	from Sun
2025 07 07 20	-3.61° maximum	-0.93°

Explanation: Observers on Earth will continue to observe the illuminated south face of the rings until late in 2038, as indicated by the minus signs in both columns of the data for the rings. As time passes after the May 6, 2025 northern hemisphere autumnal equinox of Saturn and the edgewise presentation of its rings toward Sun, the angle of solar illumination on the rings changes in a sinusoidal way with a 29.5-year period, reaching maximum of nearly  $27^\circ$  at Saturn's northern winter solstice in 2032, and  $0^\circ$  at the spring equinox in early 2039. The Earth, in its annual orbit around the Sun at a distance of just more than a tenth of Saturn's distance from the Sun, sees Saturn from a different, changing direction, as much as  $6^\circ$  away from the Sun's direction, so Saturn's rings appear to "wobble", appearing tipped sometime more, and sometime less, than the solar view. Note the alternating minimum and maximum values under the column heading, Saturn's rings – opening from Earth, in the table below.

Date&time, UT -----Saturn's rings-----

year mo dy hr	opening from Earth	from Sun
2025 11 24 11	-0.37° minimum	-3.02°
2026 07 21 00	-9.16 maximum	-6.58
2026 12 06 00	-6.09 minimum	-8.63
2027 08 03 08	-14.44 maximum	-12.10
2027 12 18 13	-11.69 minimum	-14.02
2028 08 15 17	-19.16 maximum	-17.20

2028 12 29 13	-16.90 minimum	-18.86
2029 08 28 11	-22.96 maximum	-21.53
2030 01 09 22	-21.36 minimum	-22.82
2030 09 06 14	-25.50 maximum	-24.71
2031 01 18 12	-24.69 minimum	-25.52
2031 07 29 23	-26.57 maximum	-26.33
2031 10 27 07	-26.43 minimum	-26.56

Saturn's northern hemisphere winter solstice --

Rings' maximum inclination as seen from **Sun**:

2032 04 11 17	-26.87	<b>-26.731</b>
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Rings' maximum inclination as seen from **Earth**:

2032 05 12 04	<b>-26.94</b> maximum	-26.726
2032 10 19 18	-25.70 minimum	-26.51
2033 03 18 03	-26.80 maximum	-26.03
2033 10 31 10	-23.30 minimum	-24.79
2034 03 21 19	-25.21 maximum	-23.75
2034 11 13 12	-19.52 minimum	-21.55
2035 03 31 19	-22.06 maximum	-20.04
2035 11 26 19	-14.70 minimum	-17.10
2036 04 12 10	-17.69 maximum	-15.26
2036 12 09 00	-9.22 minimum	-11.84
2037 04 25 11	-12.48 maximum	-9.80

2037 12 21 21	-3.43 minimum	-6.14
2038 05 08 14	-6.78 maximum	-4.01

Rings presented edge-on to **Earth**

(Earth's first of three ring-plane crossings):

2038 10 15 15	<b>0.00</b>	-1.53
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Rings' dark north face increasingly tipped toward Earth, until:

2039 1 3 11	2.36 maximum	-0.30
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Rings presented edge-on to **Sun**

(at Saturn's northern hemisphere spring equinox):

2039 1 22 18	2.21	<b>0.00</b>
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Next, rings' north face becomes increasingly illuminated.

Rings presented edge-on to **Earth**

(Earth's second of three Saturn ring-plane crossings):

2039 4 1 20	<b>0.00</b>	1	1.06
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Next, rings' dark south face increasingly tipped toward Earth, until:

2039 5 21 14	-0.93 maximum	1.82
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Rings presented edge-on to **Earth**

(Earth's third of three Saturn ring-plane crossings):

2039 7 9 15	<b>0.00</b>	2.56
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Thereafter, the rings' illuminated north face will be tipped toward Earth.

Saturn's northern hemisphere summer solstice and the rings' next maximum as seen from Earth will occur only two weeks apart in 2046, at inclinations of  $26.734^\circ$  on Nov. 1 and  $26.908^\circ$  on Nov. 15, respectively.

After 2038-39, Saturn's rings will again be presented edge-on toward Earth three times in 2054-55, within a few months before and after Saturn's northern hemisphere autumnal equinox and rings' edge-on presentation toward Sun in October 2054. After these four events, the rings' south face will be tipped toward Earth and illuminated until 2068.

As Saturn traces out its 29.5-year orbit around the Sun, its ring plane takes about 12 months to sweep across Earth's orbit, centered on the date the ring plane sweeps across the Sun, defining Saturn's autumn or spring equinox. Depending on where planet Earth is located in its orbit during the ring plane's solar encounter, the Earth could have from one to three encounters with Saturn's ring plane (ring-plane crossings) during its sweep across our orbit, giving us an edge-on view of the ring system one to three times. (Twice would be a very rare, limiting case, where two of the three ring plane encounters coincide.)

During 1975-2075, the 100 years centered on the current year 2025, our planet Earth has triple ring plane crossings (each providing an edge-on view of the rings), in each of the apparitions 1980, 1995-96, 2038-39, and 2054-55.

Earth experiences single ring plane crossings in 2009, 2025, and 2068. Opportunities to view Saturn with rings exactly edge-on in these years are usually affected by unfavorable viewing conditions, with the planet not far from conjunction with the Sun.