

Comets of 2023



Visual comets for small instruments

Comets that are expected to reach magnitude 9 or brighter

C/2017 K2 (PANSTARRS)

This comet is exceptional in that it was discovered at a large distance of over 16 AU, while already active. Unfortunately, it remained fainter than expected throughout 2022. K2 reached perihelion on December 19 of 2022 and is currently observable from the southern hemisphere. It will still brighten marginally in the first weeks of 2023 as our planet is getting closer to the comet. However, it is no longer expected to become brighter than magnitude 8. In March, the comet will begin to fade more rapidly. By the end of May, it will become unobservable due to low solar elongation. By the time it reappears in the summer as a morning comet in Monoceros, K2 will have already faded beyond magnitude 10.5.

C/2022 A2 (PANSTARRS)

In November of 2022, C/2022 A2 (PANSTARRS) gave us a pleasant surprise when it reappeared from behind the sun roughly 3 magnitudes brighter than expected. At the end of 2022, it has already been reported brighter than magnitude 9.5, so it may become just a little brighter than magnitude 9 by the end of January, between closest approach to earth (January 17) and perihelion (February 2023). Its strongly inclined, retrograde orbit favours northern hemisphere observers.

C/2022 E3 (ZTF)

C/2022 E3 (ZTF) is currently the most promising comet of 2023. At the end of 2022, it is already observable in the morning hours in small instruments and binoculars. Perihelion occurs on January 12, but the comet is expected to keep brightening after that until it approaches earth to 0.28 AU on February 1st. By the end of January, it may become brighter than magnitude 5 while conveniently located for northern hemisphere observers in Draco, Ursa Minor and then Camelopardalis. The comet's retrograde orbit and relatively close approach will result in rapid apparent motion.

On January 23, earth will move through the comet's orbital plane. This event may enhance the visibility of the dust tail and perhaps an anti-tail. On February 12 the comet will cross the ecliptic, after which it will gradually become better observable from the Southern hemisphere. By March the comet is expected to have faded to magnitude 9.

C/2021 T4 (Lemmon)

C/2021 T4 (Lemmon) moves on a retrograde, near-parabolic orbit that will take it to just outside the orbit of Mars at perihelion on July 31. It will be visible from May until September for southern hemisphere observers. Closest approach to earth will occur 11 days before perihelion on July 20. By this time the comet may reach magnitude 8, just within range of binoculars under a dark sky.

103P/Hartley

103P/Hartley is a Jupiter-family comet with an orbital period of 6.5 years. Its 2023 apparition will be a favourable one in which the comet will approach us to <0.39 AU by the end of September, shortly before perihelion on October 12. Though this is not as good as the 2010 apparition (in which the comet approached us to <0.12 AU) we may still expect it to brighten to magnitude 7.5 or so. This is the last time this century that 103P/Hartley will come as close to earth as this. The comet will be observable from July to December from both hemispheres, although it will be higher above the horizon for northern hemisphere observers when it is at its brightest in September and October.

2P/Encke

2P/Encke was first discovered by Pierre Méchain. It was named after Johann Franz Encke following the computation of its orbit in 1819, and the successful prediction of its return in 1822. It has a very short orbital period of just 3.3 years. The 2023 apparition is not a particularly good one, but the comet should be observable low in the east from the northern hemisphere, a few weeks before perihelion on October 22. After perihelion, it will remain too close to the sun.

62P/Tsuchinshan

The 2023/2024 apparition of the Jupiter-family comet 62P/Tsuchinshan is a very favourable one. The comet will be observable in the morning hours from both hemispheres, from October to well into 2024. After perihelion on 24 December 2023, it will approach us to 0.5 AU at good elongation. In addition, the comet recently made two close approaches to Jupiter. Its perihelion distance had already been reduced from 1.49 AU to 1.38 AU due to such an event in 2009. In April 2020, the comet approached Jupiter again, this time as close as 0.27 AU. This approach has further reduced its perihelion distance to 1.26 AU, which may result in increased activity. Fun fact: 62P/Tsuchinshan will approach Mars to <2 million kilometres in April 2049.

144P/Kushida

144P/Kushida is a Jupiter-family comet with an orbital period of 7.5 years. The upcoming apparition of this comet is a favourable one, and though perihelion will occur in January of 2024, it may already have brightened to the 9th magnitude by the end of December 2023. It will be observable from the end of October until well into 2024, from both hemispheres,

C/2021 S3 (PANSTARRS)

C/2021 S3 (PANSTARRS) was discovered on 24 September 2021 and has been brightening at a normal rate since then. It is moving from south to north on an orbit inclined 58.5 degrees to the ecliptic. So consequently, this comet will favour southern hemisphere observers before perihelion in February of 2024. It will be observable in the morning hours starting in August. By the end of 2023, it may have already brightened to magnitude 8.5.



Visual comets for larger instruments

Comets that are expected to reach magnitude 13 or brighter

C/2019 L3 (ATLAS)

C/2019 L3 (ATLAS) already reached perihelion in January of 2022, but as 2023 commences it is still observable from the southern hemisphere at magnitude 11.5. It performed better than initially expected and appears to be fading at a slower rate since perihelion. It will probably remain brighter than magnitude 13 throughout the first four or five months of 2023.

C/2022 P1 (NEOWISE)

C/2022 P1 (NEOWISE) is a Halley-type comet on a 79-year, retrograde orbit. It was discovered on August 8, 2022, at magnitude 18 or so and has brightened very rapidly since then. The comet became brighter than magnitude 10 in October, between its closest approach to earth and perihelion. At the beginning of 2023 the comet is too close to the sun to be observed, but by mid-February it could re-appear in the morning sky for southern hemisphere observers. That is, if it fades slower than the fast rate at which it brightened it might still be a bit brighter than magnitude 13 by mid-February.

81P/Wild

In 1974, four years before its discovery, 81P/Wild made a very close approach (less than 1 million km) to Jupiter, which pulled the comet into the inner solar system and reduced its orbital period from well over four decades to just 6.4 years. For the current apparition the comet already reached perihelion on December 15 and has begun to fade at the beginning of 2023. But our planet is still closing in on the comet, so it is expected to remain brighter than magnitude 13 until May. While it is observable from both hemispheres, southern hemisphere observers have it at a more convenient altitude.

C/2022 U2 (PANSTARRS)

C/2022 U2 (PANSTARRS) is another comet that, like C/2022 P1, brightened very rapidly over the last few months of 2022. It will reach perihelion on January 13, 2023. At the end of 2022 the comet is brighter than magnitude 12 and it may brighten a little bit more until its closest approach to earth on January 28. Its orbit is inclined to the ecliptic by 48°, favouring northern hemisphere observers. If it fades slowly enough, it may remain observable until somewhere in March, possibly allowing southern hemisphere observers to see it as well.

96P/Machholz

96P/Machholz is a comet with a 5.3-year orbit, that brings it as close as 0.12 AU from the sun at perihelion. Although the peak brightness (mag ~1?) may seem interesting at a first glance, comets like this have a very steep light curve and are only getting this bright when already too close to the sun. Perihelion will occur on January 31. Before perihelion the comet will probably be too low on the horizon for it to be observed at all. After perihelion, northern hemisphere observers might briefly have a chance around mid-February, when the comet could still be of the 10th magnitude while appearing just above the eastern horizon shortly before dawn.

C/2019 U5 (PANSTARRS)

C/2019 U5 (PANSTARRS) is a distant comet that will never get within 3.6 AU from the sun. Nevertheless, it has been brightening nicely at a predictable rate since its discovery in October 2019 and will be in opposition around perihelion on March 29, 2023. By mid-January it should already become brighter than magnitude 13 and it is expected to reach magnitude 12 or so by the end of March. The comet moves on highly inclined orbit from north to south, crossing the ecliptic a week before perihelion, giving observers from both hemispheres an opportunity to see it.

C/2020 V2 (ZTF)

At the beginning of 2023, C/2020 V2 (ZTF) is already brighter than magnitude 10. It has been visually observed from the northern hemisphere since February 2022 and has consistently been about a magnitude brighter than initially estimated. Unfortunately, it will pass through perihelion while out of sight, so northern hemisphere observers have until the end of March to observe it disappears into the sun's glare. In June, it will re-appear favouring southern hemisphere observers, although northern hemisphere observers should still be able to see it during the summer months as it passes through the constellation of Cetus and Eridanus. C/2020 V2 will likely remain brighter than magnitude 13 well into 2024.

C/2020 K1 (PANSTARRS)

At an inclination of 89.7° , the orbital plane of C/2020 K1 (PANSTARRS) stands almost exactly perpendicular to the ecliptic. As 2023 commences, the comet has just crossed the ecliptic moving south, at the opposite side of the sun. By the end of February, when it re-appears from the sun's glare, it will only be visible from southern latitudes. The comet will pass through perihelion on May 9 and could reach magnitude 11 or better.

364P/PANSTARRS

On April 7, Jupiter-family comet 364P/PANSTARRS will approach earth to 0.12 AU, even closer than in July 2018 when the comet approached us to 0.23 AU. During that 2018 approach the comet reached magnitude 11, but it was a little bit closer to perihelion and may also have benefited a bit more from forward scattering. So, despite the closer distance in 2023, the expectation is that it will end up at roughly the same brightness in the first half of April. The comet will be observable from both hemispheres, but northern hemisphere observers will have it at a more convenient altitude in the first half of April, when it is closest to earth.

237P/LINEAR

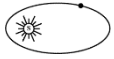
During its previous apparition in 2016, Jupiter-family comet 237P/LINEAR brightened to the 10th magnitude. In 2009 it remained fainter than magnitude 18, but since then it has approached Jupiter to 0.4 AU, reducing its perihelion distances from over 2.4 AU to less than 2 AU, possibly explaining the increased activity. It is obviously uncertain how this comet will perform in 2023, but its position will be favourable so it might become observable in larger instruments once again. Perihelion will occur on May 14. It will be observable from both hemispheres, though southern hemisphere observers will have it at a higher altitude.

185P/Petrew

The 2023 apparition of Jupiter-family comet 185P/Petrew is not a very good one. The comet will remain farther than 1.5 AU from earth. Nevertheless, it should be observable in the morning from mid-June to the beginning of August from mid- and southern latitudes, which have the longer nights during this period. Perihelion occurs on July 12.

12P/Pons-Brooks

12P/Pons-Brooks is a Halley-type comet with an orbital period of 71 years. The comet's upcoming apparition is its fourth since it was discovered by Jean-Louis Pons in 1812. Although perihelion will not occur until April 2024, the comet was already recovered in June of 2020, and it is expected that it will become brighter than magnitude 13 in the last one or two months of 2023. The comet has a highly inclined (74°) orbit and moves from north to south, so initially it will favour northern hemisphere observers, who can find it after sunset in the constellation of Lyra. In April of 2024 the comet may become brighter than magnitude 5, although its elongation will not be optimal.



Returning periodic comets

Periodic comets with perihelion in 2022

Comet(s)		Perihelion				Nearest approach			
designation	period	date	mag	radius ¹	elong ²	date	mag	delta ³	elong
2P/Encke	3.31 yrs	22 Oct 2023	7.1	0.34 AU	11.5°	24 Sep 2023	10.7	0.90 AU	46.3°
26P/Grigg-Skjellerup	5.24 yrs	25 Dec 2023	14.7	1.08 AU	31.3°	24 Dec 2023	14.7	1.80 AU	31.3°
39P/Oterma	19.68 yrs	11 Jul 2023	22.3	5.71 AU	61.0°	10 Nov 2023	21.7	4.73 AU	177.6°
62P/Tsuchinshan	6.18 yrs	24 Dec 2023	7.2	1.26 AU	108.9°	30 Jan 2024	7.8	0.50 AU	124.5°
71P/Clark	5.56 yrs	22 Jan 2023	13.6	1.59 AU	21.3°	14 Sep 2023	17.1	1.62 AU	151.9°
72P/Denning-Fujikawa	8.94 yrs	15 Jun 2023	15.7	0.78 AU	30.0°	19 May 2023	17.1	1.35 AU	42.5°
77P/Longmore	6.90 yrs	3 Apr 2023	15.2	2.35 AU	148.7°	25 Apr 2023	15.1	1.37 AU	163.0°
79P/du Toit-Hartley	5.05 yrs	30 Sep 2023	18.1	1.12 AU	8.4°	22 Dec 2022	22.3	2.04 AU	155.9°
94P/Russell	6.57 yrs	21 May 2023	17.9	2.23 AU	77.4°	2 Feb 2023	17.1	1.38 AU	166.3°
96P/Machholz	5.28 yrs	31 Jan 2023	0.7	0.12 AU	3.9°	31 Jan 2023	0.7	0.89 AU	3.9°
103P/Hartley	6.48 yrs	12 Oct 2023	7.1	1.06 AU	88.0°	26 Sep 2023	7.1	0.38 AU	92.4°
121P/Shoemaker-Holt	9.81 yrs	28 Jun 2023	21.3	3.73 AU	7.6°	12 Dec 2022	20.4	2.83 AU	171.5°
126P/IRAS	13.37 yrs	5 Jul 2023	12.5	1.71 AU	72.7°	18 Sep 2023	12.3	1.28 AU	111.4°
147P/Kushida-Muramatsu	8.09 yrs	7 Dec 2023	20.7	3.16 AU	171.3°	13 Dec 2023	20.7	2.17 AU	179.1°
170P/Christensen	8.63 yrs	20 Apr 2023	19.3	2.92 AU	16.7°	9 Nov 2023	18.4	2.17 AU	162.9°
180P/NEAT	7.60 yrs	12 Jul 2023	17.4	2.50 AU	52.2°	11 Feb 2023	16.5	1.74 AU	157.0°
185P/Petrew	5.45 yrs	12 Jul 2023	11.7	0.93 AU	35.1°	21 Jun 2023	12.2	1.50 AU	40.5°
199P/Shoemaker	14.27 yrs	7 Aug 2023	16.3	2.91 AU	133.6°	28 Jun 2023	16.1	1.91 AU	176.7°
213P/Van Ness	6.12 yrs	11 Nov 2023	15.8	1.98 AU	62.0°	27 Jun 2023	15.1	1.27 AU	156.9°
225P/LINEAR	6.97 yrs	8 Aug 2023	19.7	1.32 AU	70.6°	20 Nov 2023	20.8	1.13 AU	114.2°
226P/Pigott-LINEAR-Kowalski	7.31 yrs	27 Dec 2023	15.8	1.77 AU	90.6°	5 Nov 2023	15.6	1.21 AU	112.7°
237P/LINEAR	6.58 yrs	14 May 2023	11.6	1.99 AU	115.6°	8 Jul 2023	11.4	1.06 AU	156.0°
256P/LINEAR	9.99 yrs	12 Mar 2023	17.8	2.70 AU	118.0°	4 May 2023	17.4	1.79 AU	152.0°
263P/Gibbs	5.30 yrs	30 Jan 2023	16.1	1.24 AU	131.4°	1 Feb 2023	16.1	0.34 AU	131.5°
279P/La Sagra	6.75 yrs	19 Apr 2023	19.7	2.15 AU	25.3°	10 Nov 2023	19.2	1.64 AU	161.1°
280P/Larsen	9.64 yrs	4 Aug 2023	18.8	2.64 AU	82.0°	25 Apr 2023	18.1	1.76 AU	160.0°
281P/MOSS	10.77 yrs	1 Feb 2023	19.5	4.03 AU	155.8°	12 Jan 2023	19.5	3.05 AU	177.4°
285P/LINEAR	9.58 yrs	12 Jan 2023	16.5	1.72 AU	47.6°	12 Aug 2022	16.9	1.53 AU	126.3°
287P/Christensen	8.50 yrs	5 Jul 2023	18.4	3.03 AU	118.4°	30 Aug 2023	18.1	2.05 AU	170.7°
291P/NEAT	9.68 yrs	4 May 2023	19.7	2.57 AU	5.8°	26 Sep 2022	19.1	2.00 AU	164.5°
300P/Catalina	4.43 yrs	11 Apr 2023	16.5	0.83 AU	27.9°	19 Mar 2023	16.7	1.50 AU	35.9°
310P/Hill	8.55 yrs	23 Oct 2023	18.1	2.42 AU	159.8°	4 Nov 2023	18.1	1.44 AU	166.8°
321P/SOHO	3.77 yrs	26 Oct 2023	6.1	0.05 AU	2.2°	28 Oct 2023	9.7	0.92 AU	5.0°
322P/SOHO	3.97 yrs	21 Aug 2023	6.0	0.05 AU	2.8°	25 Jun 2023	20.0	0.76 AU	109.2°
326P/Hill	8.19 yrs	30 Dec 2023	20.1	2.77 AU	79.8°	20 Sep 2023	19.3	1.83 AU	174.6°
339P/Gibbs	7.12 yrs	30 Aug 2023	20.0	1.35 AU	24.8°	14 Jan 2023	22.6	1.80 AU	148.6°
347P/PANSTARRS	6.84 yrs	20 Jul 2023	19.9	2.21 AU	89.2°	19 Oct 2023	19.3	1.34 AU	161.3°
354P/LINEAR	3.47 yrs	13 Oct 2023	20.0	2.00 AU	77.8°	31 Jan 2024	18.8	1.07 AU	175.9°

Returning periodic comets (continued)

Comet(s)		Perihelion				Nearest approach			
designation	period	date	mag	radius ¹	elong ²	date	mag	delta ³	elong
358P/PANSTARRS	5.58 yrs	10 Nov 2023	22.7	2.39 AU	140.7°	11 Oct 2023	22.6	1.43 AU	162.4°
364P/PANSTARRS	4.89 yrs	14 May 2023	12.7	0.80 AU	50.3°	7 Apr 2023	11.1	0.12 AU	79.6°
365P/PANSTARRS	5.61 yrs	9 Oct 2023	19.9	1.32 AU	24.4°	27 May 2024	22.3	1.66 AU	152.0°
404P/Bressi	10.38 yrs	4 Nov 2023	18.8	4.13 AU	143.1°	5 Dec 2023	18.7	3.15 AU	178.3°
426P/PANSTARRS	5.69 yrs	12 Sep 2023	19.5	2.67 AU	106.3°	19 Nov 2023	19.0	1.74 AU	160.5°
427P/ATLAS	5.64 yrs	19 Mar 2023	19.9	2.17 AU	8.9°	22 Nov 2023	19.4	1.68 AU	165.8°
452P/Sheppard-Jewitt	19.70 yrs	25 Apr 2023	18.0	4.18 AU	112.7°	23 Feb 2023	17.8	3.21 AU	175.3°
P/2004 V3 (Siding Spring)	19.03 yrs	23 Nov 2023	20.5	3.95 AU	75.8°	17 Aug 2023	20.1	3.25 AU	130.8°
P/2005 E1 (Tubbiolo)	18.73 yrs	28 Sep 2023	20.1	4.40 AU	12.3°	30 Mar 2024	19.3	3.50 AU	175.7°
P/2007 T2 (Kowalski)	5.31 yrs	17 Nov 2023	16.1	0.65 AU	41.2°	27 Dec 2023	16.0	0.33 AU	77.6°
P/2008 L2 (Hill)	14.80 yrs	11 May 2023	18.6	2.33 AU	35.1°	31 Oct 2023	18.2	1.83 AU	155.9°
P/2012 WA34 (Lemmon-PANSTARRS)	10.13 yrs	8 Jul 2023	21.4	3.07 AU	11.8°	26 Jan 2024	20.5	2.30 AU	170.9°
P/2013 YG46 (Spacewatch)	5.92 yrs	6 Jan 2023	21.5	1.79 AU	5.9°	21 Apr 2022	21.4	1.74 AU	156.5°
P/2014 A3 (PANSTARRS)	9.89 yrs	22 Apr 2023	20.5	3.47 AU	41.1°	23 Nov 2022	19.5	2.55 AU	176.2°
P/2014 W1 (PANSTARRS)	9.44 yrs	19 Dec 2023	21.6	2.73 AU	112.3°	19 Oct 2023	21.1	1.77 AU	170.0°
P/2015 T3 (PANSTARRS)	9.00 yrs	17 Dec 2023	19.6	2.12 AU	23.9°	27 May 2023	19.6	1.77 AU	150.4°
P/2017 S9 (PANSTARRS)	5.60 yrs	25 Feb 2023	22.4	2.19 AU	33.4°	25 Aug 2022	21.4	1.47 AU	168.5°
P/2018 P3 (PANSTARRS)	5.21 yrs	26 Dec 2023	18.6	1.75 AU	61.6°	4 Aug 2023	18.2	1.14 AU	154.3°
P/2019 A4 (PANSTARRS)	4.22 yrs	3 Mar 2023	20.4	2.39 AU	96.2°	14 Dec 2022	19.6	1.43 AU	165.9°
P/2021 V2 (Fuls)	27.25 yrs	21 Jan 2023	17.5	3.50 AU	157.0°	3 Feb 2023	17.5	2.55 AU	162.6°
P/2022 O2 (PANSTARRS)	15.87 yrs	7 Jan 2023	19.9	1.76 AU	62.7°	30 Aug 2022	20.1	1.32 AU	147.6°
P/2022 R1 (PANSTARRS)	19.28 yrs	9 Oct 2023	19.2	3.57 AU	148.1°	4 Nov 2023	19.1	2.59 AU	172.2°
P/2022 V1 (WISE-Lemmon)	12.75 yrs	3 Mar 2023	19.0	2.28 AU	99.9°	20 Dec 2022	18.6	1.47 AU	148.0°

¹ Radius: The distance between the comet and the sun

² Elongation: The angle between the direction of the comet and the direction of the sun.

³ Delta: The distance between earth and the comet



Other notes

Planetary approaches and other noteworthy subjects

87P/Bus

In February of 2023, comet 87P/Bus will approach Jupiter to just 0.18 AU. The comet will be dragged into a wider orbit and remain within 2 AU of the planet until 2028. Consequently, the perihelion distance will be increased from 2.10 to 3.69 AU, and the orbital period from 6.38 to 9.56 years.

235P/LINEAR

In June, 235P/LINEAR will approach Jupiter to 0.24 AU. As the comet will remain ahead of the planet during the approach, it will be slowed down into a smaller orbit of 6.4, instead of 8 years. The perihelion distance will be reduced from 2.7 to 2.0 AU.

263P/Gibbs

The 2023 apparition of 263P/Gibbs is a favourable one, as it approaches our planet to 0.34 AU on February 1. It has already been recovered and is expected to reach magnitude 16 at closest approach.

264P/Larsen

264P/Larsen will approach Jupiter to 0.48 AU on November 6. Its perihelion distance will be increased from 2.4 to 2.7 AU, and its orbital period from 7.7 to 8.1 years.

395P/Catalina-NEAT

In August, 395P/Catalina-NEAT will approach Jupiter to 0.66 AU, slightly increasing its perihelion distance from 4.0 to 4.2 AU and its orbital period from 16.3 to 19.3 years. Before 1971 – when the comet approached Jupiter to 0.11 AU – it had an orbital period of 42 years. In 1949 it also approached Uranus to 0.13 AU, with little effect on its orbit.

P/2007 T2 (Kowalski)

P/2007 T2 (Kowalski) has only been observed during its 2007 apparition, shortly after it was dragged further into the inner solar system by a very close approach (<0.02 AU) to Jupiter in 2004. It has not been observed in 2018, when its orbit should have brought it within 0.48 AU of our planet. In 2023 however, it may (or may not) be recovered when it approaches earth to 0.35 AU in December.

Obviously, more comets will be discovered in 2023 and some of those will already be observable in the same year. Hopefully, some will be bright. For up-to-date information on observable comets, regularly check <http://astro.vanbuitenen.nl/comets>.

I wish you a happy 2023.

May the comets be bright and the skies clear.

Gideon van Buitenen