Comet Prospects for 2024

Final edition

Long period comet 2023 A3 (Tsuchinshan-ATLAS) promises to be a bright comet. Halley type comet 12P/Pons-Brooks makes a return and may reach 4th magnitude. Three other periodic comets may be bright enough for visual observation with a telescope.

These predictions focus on comets that are likely to be within range of visual observers, though comets often do not behave as expected and can spring surprises. Members are encouraged to make visual magnitude estimates, particularly of periodic comets, as long term monitoring over many returns helps understand their evolution. Please submit your magnitude estimates in ICQ format. Guidance on visual observation and how to submit estimates is given in the BAA Observing Guide to Comets. Drawings are also useful, as the human eye can sometimes discern features that initially elude electronic devices.

Theories on the structure of comets suggest that any comet could fragment at any time, so it is worth keeping an eye on some of the fainter comets, which are often ignored. They would make useful targets for those making electronic observations, especially those with time on instruments such as the Faulkes telescopes. Such observers are encouraged to report electronic visual equivalent magnitude estimates via COBS. When possible use a waveband approximating to Visual or V magnitudes. These estimates can be used to extend the visual light curves, and hence derive more accurate absolute magnitudes. Such observations of periodic comets are particularly valuable as observations over many returns allow investigation into the evolution of comets.

In addition to the information in the BAA Handbook and on the Section web pages, ephemerides for new and currently observable comets are on the JPL, CBAT and Seiichi Yoshida's web pages. The BAA Observing Guide to Comets is available on the Section web page.

2021 S3 (PanSTARRS) starts the year as a Southern Hemisphere object, but creeps into our morning sky towards the end of January, when it might be 8th magnitude. It passes a few degrees from M4 around January 30, though the globular cluster will be a couple of magnitudes brighter than the comet. It might brighten a further magnitude by the time of its perihelion in mid February, and lies between two globular clusters, M9 and NGC 6356 on February 14. It has a close encounter with another globular NGC 6539 on February 28. It remains a morning object until April, when it will be a binocular object in the late evening sky. It is close to open cluster NGC 6871 on April 20 as it tracks through Cygnus. It will fade slowly and could remain a telescopic object until the end of summer, remaining well-placed for northern hemisphere observers.

The ATLAS (Asteroid Terrestrial-impact Last Alert System) team discovered an 18th magnitude asteroidal object in images taken with the 0.5 m Schmidt at Sutherland, South Africa on 2023 February 22.08. Follow-up observations suggested that it was a comet and it was linked to "isolated tracklet file" observations from Purple Mountain Observatory made on 2023 January 9.90. It was then named as **2023 A3 (Tsuchinshan-ATLAS)**; the name “Tsuchinshan” has been previously used for comets discovered at the Purple Mountain Observatory. The comet is at perihelion at 0.4 au in 2024 September. The small perihelion distance and relatively bright absolute magnitude then started speculation as to how bright the comet would become at perihelion. The comet is still nearly 4 au from the Sun, hence the error bars on the likely perihelion magnitude are large, but it seems likely to be a bright object at that time.

The comet could become a visual telescopic object in 2024 February and will still be a telescopic object for UK observers when lost in the summer twilight in June. If SOHO is still operational it will pass through the C3 field as a bright object between October 7 and 11. It quickly emerges into the evening sky, when it could be an easily visible object with a tail. It could remain a binocular object into December and a telescopic object into 2025.

12P/Pons-Brooks was discovered by Jean-Louis Pons in 1812, then recovered as a new comet by William R Brooks in 1883. It was next seen in 1954 when it was well observed by the BAA comet section, with observations by George Alcock, Mike Hendrie, Albert Jones, Gerald Merton, Roy Panther, W. H. “Steave” Steavenson and Reggie Waterfield amongst others. Studies by Maik Meyer linked comets seen in 1385 and 1457 with 12P. With a well-defined orbit it was recovered at this return in mid-June 2020. During 2023 it underwent a series of rapid brightenings, by several magnitudes on some occasions, before returning to a stable magnitude. Such brightenings could continue as it approaches perihelion. It could be as bright as 11th magnitude at the beginning of the year, when it will be best seen in the early evening sky. It steadily brightens and came within binocular range in February. It could be a naked eye object by late March, but it is sinking lower in the sky, though it should be possible to follow it into the second week of April. UK observers won’t see it again, but those in the Southern Hemisphere will be able to follow it as it fades after perihelion, when tail development may be greater. Around March 23 it passes a few degrees from the galaxy M33. It crosses the ecliptic on April 13, not far from Jupiter and Uranus. The fading comet then passes a couple of degrees from the much brighter globular cluster NGC 3201 around August 1.

13P/Olbers is another long period comet returning in 2024. It was discovered by Heinrich Olbers in 1815, when it reached 5th magnitude with a one degree tail. The period was not well known, and it was accidently recovered at its next return in 1887. The last return in 1956 was broadly similar to the present one and the comet reached 6th magnitude with a one degree tail. In 2024 the comet will be a telescopic object in the evening sky during the first part of the year, becoming poorly placed. Circumstances improve during June and the comet will be nearing its brightest by the solstice, with the comet visible in the late evening. It reaches its greatest northern declination at the end of the month and slowly fades as it moves southwards. UK observers will lose it in mid September. It passes some 6° from the Pleiades in April, though the comet may only be 10th magnitude at the time. Although there is a pass close to M36 in May, the solar elongation is poor. The fading comet passes by the galaxy M64 and the globular cluster M53 over the period August 24 to September 2.

29P/Schwassmann-Wachmann is an annual comet that has outbursts, which over the last few decades seem to have become more frequent, though this could just reflect more intense coverage. Richard Miles has developed a theory that suggests that these outbursts are in fact periodic, and arise from at least four independent active areas on the slowly rotating nucleus. The activity of the active areas evolves with time. The comet is an ideal target for electronic observations and it should be observed at every opportunity, ideally using the methodology established by Richard. The comet begins the year in Cancer, approaching opposition later in January. It becomes poorly placed as it passes through solar conjunction between May and October and ends the year in Leo.

62P/Tsuchinshan reached perihelion in late 2023, but is closest to Earth in January and hence remains at around 7th magnitude, though best seen in the morning sky. With increasing distance from both Earth and Sun it fades rapidly in March as it moves towards opposition around the equinox. It passes through the Virgo cluster of galaxies in late January and February, passing between NGC 4429 and NGC 4442 on January 28. It heads directly to within 10’ of 11th magnitude galaxy NGC 4596 around February 16, but then moves away again to track back between the previously mentioned pair.

144P/Kushida reaches perihelion in January and could be around 8th magnitude at the start of the year. It will remain in the evening sky as it fades, sinking into the twilight around mid May. It avoids passing close to any nebulae.

226P/Pigott-LINEAR-Kowalski may be fading from 11th magnitude at the start of the year.

333P/LINEAR passes 0.54 au from the Earth in December when it is near perihelion and hence might reach 10th magnitude. However it is then likely to be large and diffuse so will not be an easy target.

The other periodic and parabolic comets that are at perihelion during 2024 are unlikely to become brighter than 11th magnitude or are poorly placed. Ephemerides for these can be found on the MPC or other WWW pages. Several D/ comets have predictions for a return, though searches at favourable returns in the intervening period have failed to reveal the comets and the orbits will have been perturbed by Jupiter. There is however always a chance that they will be rediscovered accidentally by one of the Sky Survey patrols. They are not listed here, nor are some of the SOHO comets that are due to return.

Looking ahead to 2025, 21P/Giacobini-Zinner is the only comet that is predicted to reach even 11th magnitude. However, some orbits for comets due to return in the future are yet to be published by the MPC.

With more and more discoveries and recoveries of periodic comets being made, the number of expected returns increases every year. A full list of returning comets is given as an appendix, but first only those comets expected to be brighter than 14th magnitude during the year are listed.

Comets brighter than magnitude 14 in 2024

Comet	T	q	P	N	H_1	K_1	Peak mag	Elong at peak
At perihelion in 2023								
2P/Encke	Oct 22.5	0.34	3.30	65	10.2	9.6	13.7	9
62P/Tsuchinshan	Dec 25.1	1.26	6.18	8	4.8	32.8	6.8	110
226P/Pigott-LINEAR-Kowalski	Dec 27.2	1.77	7.31	5	6.0	15.0	10.6	88
2020 K1 (PanSTARRS)	May 9.3	3.07			5.6	8.7	13.7	73
2020 V2 (ZTF)	May 8.4	2.23			4.4	9.4	12.4	58
At perihelion in 2024								
12P/Pons-Brooks	Apr 21.0	0.78	70.8	5	5.0	15.0	3.9	23
13P/Olbers	Jul 1.0	1.18	68.8	3	1.4	30.0	4.9	31
33P/Daniel	Nov 11.0	2.24	8.29	11	7.3	10.0	11.5	153
37P/Forbes	Oct 11.3	1.62	6.44	12	8.6	14.7	13.0	64
46P/Wirtanen	May 19.1	1.05	5.44	12	9.5	16.8	11.4	11
144P/Kushida	Jan 25.7	1.39	7.48	4	6.6	16.3	7.9	125
154P/Brewington	Jun 13.6	1.55	10.5	3	6.7	14.7	11.3	34
333P/LINEAR	Nov 29.3	1.11	8.67	2	10.7	20.0	10.4	89
2021 S3 (PanSTARRS)	Feb 14.9	1.32			6.4	8.4	8.1	68
2022 E2 (ATLAS)	Sep 13.5	3.67			5.0	10.0	13.1	132
2022 L2 (ATLAS)	Mar 10.9	2.71			6.5	10.0	12.2	146
2023 A3 (Tsuchinshan-ATLAS)	Sep 28.2	0.39			6.5	8.0	-3.1	20
2023 C2 (ATLAS)	Nov 16.8	2.37			7.0	10.0	12.7	97
	Aug 12.1	0.91			10.5	10.0	11.4	15
Camarasa-Duszanowicz)							13.9	29
At perihelion in 2025								
49P/Arend-Rigaux	Apr 10.6	1.43	6.75	11	9.6	10.0	13.3	75

The date of perihelion (T), perihelion distance (q), period (P), the number of previously observed returns (N), the magnitude parameters H_1 and K_1, the brightest magnitude (which must be regarded as uncertain) and the approximate elongation at which this occurs are given for each comet. In most cases the comet will be brightest at around the time of perihelion.

Note: $m_1 = H_1 + 5.0 * \log(d) + K_1 * \log(r)$

References and sources

BAA Observing Guide to Comets, 6th edition (2020) at https://britastro.org/wp-content/uploads/2017/05/Comet-Observing-Guide-2020-November-rev-6.pdf (Accessed 2022 October)

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Appendix

List of all comets predicted to reach perihelion in 2024

Comet	T	q	P	H	K	Peak mag	Elong
12P/Pons-Brooks	Apr 21.0	0.78	71.33	5.0	15.0	3.9	23
13P/Olbers	Jul 1.1	1.18	68.76	5.0	15.0	7.5	31
30P/Reinmuth	Aug 17.2	1.81	7.22	8.6	13.3	14.3	14
32P/Comas Sola	Apr 20.6	2.02	9.71	6.2	20.0	14.1	87
33P/Daniel	Nov 11.0	2.24	8.29	7.3	10.0	11.5	153
37P/Forbes	Oct 11.3	1.62	6.44	8.6	14.7	13.0	64
46P/Wirtanen	May 19.5	1.05	5.44	9.5	16.8	11.4	11
50P/Arend	May 12.8	1.92	8.27	9.5	15.0	16.1	12
54P/deVico-Swift-NEAT	Sep 3.6	2.17	7.38	9.0	10.0	12.8	171
89P/Russell	Mar 26.6	2.22	7.27	11.5	15.0	18.2	133
125P/Spacewatch	Mar 7.3	1.52	5.53	9.0	10.0	11.7	80
130P/McNaught-Hughes	Apr 14.5	1.82	6.22	12.5	10.0	16.7	115
133P/Elst-Pizarro	May 9.9	2.67	5.63	15.4	5.0	18.7	175
144P/Kushida	Jan 25.7	1.39	7.48	6.6	16.3	7.9	125
146P/Shoemaker-LINEAR	Aug 5.5	1.42	8.08	15.0	10.0	17.0	82
150P/LONEOS	Mar 13.0	1.75	7.64	13.5	10.0	15.6	146
154P/Brewington	Jun 13.6	1.55	10.51	2.9	36.0	11.6	33
190P/Mueller	Dec 24.1	2.02	8.69	13.0	10.0	16.7	148

192P/Shoemaker-Levy	May 24.3	1.47	16.47	15.0	10.0	18.4	35
194P/LINEAR	Feb 4.2	1.80	8.36	16.0	10.0	18.3	154
202P/Scotti	May 23.3	2.97	8.17	13.5	10.0	20.2	130
207P/NEAT	Jan 31.8	0.93	7.63	16.0	10.0	12.7	93
208P/McMillan	Aug 24.0	2.53	8.11	9.9	10.0	14.9	173
209P/LINEAR	Jul 15.2	0.97	5.09	17.0	5.0	17.3	53
212P/NEAT	Apr 25.1	1.61	7.71	17.0	5.0	19.4	102
216P/LINEAR	Jan 6.9	2.13	7.58	12.4	10.0	16.2	162
219P/LINEAR	Feb 13.9	2.35	6.96	11.0	10.0	17.0	146
222P/LINEAR	May 12.7	0.83	4.94	20.0	10.0	20.2	28
227P/Catalina-LINEAR	Mar 8.2	1.62	6.37	16.5	5.0	16.9	151
234P/LINEAR	Oct 23.6	2.82	7.40	12.0	10.0	18.6	154
242P/Spahr	Dec 23.2	3.97	13.03	8.0	10.0	16.5	144
251P/LINEAR	Feb 13.2	1.74	6.58	16.5	5.0	19.1	111
253P/PANSTARRS	Oct 21.0	2.03	6.44	14.5	10.0	17.6	173
267P/LONEOS	Apr 24.6	1.24	5.75	19.5	10.0	22.0	28
268P/Bernardi	Dec 18.5	2.41	9.84	13.5	10.0	18.4	134
276P/Vorobjov	Dec 10.8	3.90	12.37	11.5	10.0	19.7	175
299P/Catalina-PANSTARRS	Apr 30.3	3.16	9.20	11.5	10.0	18.2	172
305P/Skiff	Nov 17.1	1.42	9.98	16.0	10.0	16.6	121
309P/LINEAR	Mar 29.0	1.67	9.16	15.0	10.0	19.1	38
311P/PANSTARRS	Jan 2.0	1.94	3.24	17.0	10.0	20.4	116
316P/LONEOS-Christensen	Oct 13.3	3.72	9.31	9.5	10.0	17.4	175
328P/LONEOS-Tucker	Jul 28.0	1.87	8.57	14.5	10.0	18.0	120
333P/LINEAR	Nov 29.3	1.11	8.67	10.7	20.0	10.4	89
338P/McNaught	Aug 3.0	2.29	7.68	12.0	10.0	16.5	149
345P/LINEAR	Aug 31.2	3.14	8.09	12.0	10.0	18.6	178
349P/Lemmon	May 27.1	2.51	6.77	14.0	10.0	18.9	171
355P/LINEAR-NEAT	Apr 1.5	1.71	6.46	12.5	10.0	17.0	14
360P/WISE	Oct 3.8	1.85	7.11	19.5	15.0	23.2	164
362P/Spacewatch	Jul 20.1	2.87	7.92	13.3	5.0	17.0	165

363P/Lemmon	Nov 13.2	1.72	6.76	17.5	10.0	20.8	94
384P/Kowalski	Sep 19.1	1.11	4.93	19.5	10.0	19.1	81
457P/Lemmon-PANSTARRS	Aug 20.3	2.33	4.30	15.5	10.0	19.8	170
472P/NEAT-LINEAR	Jul 19.8	3.38	21.50	10.5	10.0	18.1	155
473P/NEAT	Feb 26.2	1.41	22.51	8.8	18.8	13.0	46
475P/Spacewatch-LINEAR	Jun 1.6	4.08	19.76	10.5	10.0	19.1	168
476P/PANSTARRS	Oct 16.6	3.12	10.45	12.5	10.0	19.3	146
						17.9	161
479P/Elenin	May 5.2	1.24	13.33	13.5	15.0	13.8	97
P/2010 T2 (PANSTARRS)	Mar 15.4	3.77	13.16	11.5	10.0	19.9	163
P/2010 WK (LINEAR)	Jul 21.4	1.78	13.83	14.5	5.0	17.4	116
P/2012 US_{27} (Siding Spring)	Oct 21.2	1.81	11.74	13.5	10.0	15.9	153
P/2013 R3 (Catalina-PANSTARRS)	Mar 20.3	2.20	5.28	14.0	10.0	19.2	152
P/2014 C1 (TOTAS)	Jul 27.1	1.67	5.28	15.5	10.0	19.4	56
P/2014 MG_4 (Spacewatch-PANSTARRS)	Sep 6.7	3.72	11.23	9.5	10.0	17.4	166
P/2015 R2 (PANSTARRS)	Dec 15.7	2.45	9.49	14.5	10.0	20.1	138
P/2019 A3 (PANSTARRS)	Mar 2.6	2.31	5.57	9.0	10.0	14.6	148
P/2019 M2 (ATLAS)	Sep 28.1	1.07	5.27	20.5	10.0	21.5	50
C/2021 G2 (ATLAS)	Sep 10.0	4.98		5.5	10.0	15.7	143
C/2021 Q6 (PANSTARRS)	Mar 21.7	8.71		6.0	10.0	19.9	169
C/2021 S3 (PANSTARRS)	Feb 14.9	1.32		5.5	10.0	7.4	68
C/2021 S4 (Tsuchinshan)	Jan 1.2	6.69		6.5	10.0	18.6	147
C/2022 E2 (ATLAS)	Sep 13.5	3.67		5.0	10.0	13.1	132
C/2022 H1 (PANSTARRS)	Jan 19.0	7.69		6.0	10.0	19.1	126
C/2022 L2 (ATLAS)	Mar 10.9	2.71		6.5	10.0	12.2	146
C/2022 S4 (Lemmon)	Jul 17.2	2.77		8.0	10.0	14.6	80
C/2022 T1 (Lemmon)	Feb 17.5	3.44		12.0	5.0	16.7	165
C/2022 U1 (Leonard)	Mar 24.9	4.20		8.5	10.0	17.8	114
C/2022 U3 (Bok)	Jul 27.7	4.83		7.5	10.0	17.5	151
C/2023 A3 (Tsuchinshan-ATLAS)	Sep 28.2	0.39		6.5	8.0	2.5	11

C/2023 C2 (ATLAS)	Nov 16.7	2.37		7.0	10.0	12.7	97
C/2023 H1 (PanSTARRS)	Nov 30.9	4.46		8.5	10.0	18.1	147
C/2023 H3 (PanSTARRS)	Feb 18.8	5.23	50	10.0	10.0	20.4	173
						15.5	124
						11.4	15
						20.5	122
							3
							3
							1
							3
							3
P/2003 T12 (SOHO)	Jul 3.7	0.59		17.0	10.0	15.4	27
							17
						13.8?	34
						18.2	171
						18.3	99
						20.4	122
Camarasa-Duszanowicz)						13.9	29
						22.1	149
						20.0	158
						16.6	82
						16.6	55
						20.9	152
						16.8	110

The date of perihelion (T), perihelion distance (q), period (P), the magnitude parameters H_1 and K_1, the brightest magnitude (which must be regarded as uncertain) and the elongation at which this occurs are given for each comet. The data for the D/ and SOHO comets is uncertain, but some may be recovered, even though they have been missed at previous returns.

Note: $m_1 = H_1 + 5.0 * \log(d) + K_1 * \log(r)$