Comet Section

Comet prospects for 2024

Long-period comet 2023 A3 (Tsuchinshan–ATLAS) promises to be bright. Halley-type 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.

Jonathan Shanklin
Visual observations coordinator, Comet Section

12P/Pons–Brooks, imaged on 2023 Nov 21 at 02:04 UT (shortly before this issue went to press) using a 20-inch CDK (iTelescope T11) at the Utah Desert Remote Observatory. *(Alan C. Tough)*

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 in understanding their evolution. Please submit your magnitude estimates in ICQ format. Guidance on visual observation and how to submit estimates is given in the BAA *Comet Section Observing Guide*. 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 objects, which are often ignored. They would make useful targets for observers 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 the Comet Observation (COBS) database. 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.

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 web pages of the JPL, CBAT and Seiichi Yoshida. The BAA *Comet Section Observing Guide* 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 Messier 4 around Jan 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 it lies between two globular clusters, Messier 9 and NGC 6356, on Feb 14. It has a close encounter with another globular, NGC 6539, on Feb 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 Apr 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 0.5m Schmidt at Sutherland, South Africa on 2023 Feb 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 Jan 9.90. It was then named **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 astronomical units (au) in 2024 September. The small perihelion distance and relatively bright absolute magnitude started speculation as to how bright it would become at perihelion. It is still over 5au from the Sun, hence the error bars on the likely perihelion magnitude are huge. It was poorly placed in late 2023 and more reliable predictions should be possible from early 2024.

It 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, the comet will pass through the C3 field as a bright object between about Oct 6 & 12. It then quickly emerges into the evening sky, where it could be an easily visible object with a tail. It could remain a binocular object into December and a telescopic object into 2025. Further details will be given in a future edition of these notes.

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 is best seen in the early evening sky. It steadily brightens and will probably come within binocular range in late February. It could be a naked-eye object by late March; it is then sinking lower in the sky, though it should be possible to follow it into the second week of April. UK observers will not 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 Mar 23, it passes a few degrees from the galaxy Messier 33. It crosses the ecliptic on Apr 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 Aug 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 is a telescopic object in the evening sky during the first part of the year, becoming poorly placed. Circumstances improve during June, and it 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 lose it in mid-September. It passes some 6° from the Pleiades in April, though it may only be 10th magnitude at the time. Although there is a pass close to Messier 36 in May, the solar elongation is poor. The fading comet passes by the galaxy Messier 64 and the globular cluster Messier 53 over the period Aug 24 to Sep 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 suggesting that these outbursts are in fact periodic and arise from at least four independent active areas on the slowly rotating nucleus. The activity of these 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. It 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 the 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 Jan 28. It heads directly to within 10 arcminutes of 11th-magnitude galaxy NGC 4596 around Feb 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 remains 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 0.54au from 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 CBAT or other web pages. Several D/ (destroyed or disappeared) comets have predictions for a return, though searches at favourable returns in the intervening period have failed to reveal them 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 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 a supplement available on the BAA web pages at **britastro.org/node/12134**, but here 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	5.0	15.0	7.5	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	2.5	11
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
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 & sources

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