Comet Prospects for 2028

There are several periodic comets that may come within visual range in 2028. 19P/Borrelly and 22P/Kopff could be easy binocular objects, with 96P/Machholz also putting on a good show*.*

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 or visual equivalent 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, ideally through the COBS portal. 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 total magnitude estimates there is considerable benefit in making photometric measurements using a standard aperture of 9 arc-seconds. Such observations often show small transient events in the near-nucleus environment much more clearly than do total magnitude estimates.

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.

19P/Borrelly is best placed for southern hemisphere observers prior to perihelion, but moves into northern skies by mid November when it could be a binocular object. Perihelion and opposition almost coincide and it passes 0.42 au from the Earth in early December. Although this puts it at the fringes of naked eye visibility, the coma will be large, so it is more likely to be a diffuse binocular object. It is conveniently placed for observation in the early evening sky. Unusually the comet brightens slightly differently compared to how it fades and this may benefit those in the northern hemisphere, though the differences are small.

22P/Kopff starts off as a morning object, but by perihelion it is visible in the late evening sky of mid-summer. It passes 0.35 au from the Earth just after perihelion, but doesn't reach opposition until August. The relatively close approach should put it into easy binocular range, but again it is likely to be a large diffuse object. It fades fairly slowly and becomes observable at a more convenient time in the evening. On April 12 it passes some 3° from M9 in Ophiuchus, but is likely to be a little fainter than the globular. Between around May 24 and June 23 it joins M16, M17 and NGC 6605, then around July 8 is close to M25. A more distant approach to M22 follows around July 24. The comet was well observed at the last return in 2022, although it only reached 11th magnitude and seems to have behaved in a similar fashion at all previous returns.

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 spends the first half of the year making a loop through Hydra, though touches Virgo and Libra, then

spends most of the rest of the year in Libra. It is in opposition in early May and conjunction in mid November. With its southern declination it is poorly placed for observation from the UK.

96P/Machholz can be a bright object when it passes through the field of the SOHO coronographs, but is less frequently observed visually. This year the comet should become visible to UK based observers after perihelion. After rounding the Sun on May 12 it heads almost due north and reaches a declination of 87° a month later. In late May it is likely to be a binocular object, initially in the morning sky, but quickly becoming visible all the short summer night. It passes 0.32 au from the Earth in mid June, when it may still be visible in binoculars. Having passed the pole it heads equally quickly south, fading more rapidly and will be gone from UK skies by mid July.

104P/Kowal is slowly fading after reaching 10th magnitude last year. The comet reaches its minimum distance from the Earth (1.04 au) in mid February and the continuing approach has partly compensated for the increasing distance from the Sun.

118P/Shoemaker-Levy doesn't reach perihelion until 2029, but is well placed in the December evening sky when it is likely to be 11th magnitude.

The other periodic and parabolic comets that are at perihelion during 2028 are unlikely to become brighter than 11th magnitude or are poorly placed. Ephemerides for these can be found on the CBAT 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.

Looking ahead to 2029, there are potentially two easy binocular comets:. 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, but here only those comets expected to be brighter than 14th magnitude during the year are listed.

Comets brighter than magnitude 14 in 2028

Comet	T	q	P	N	H1	K1	Elong at peak	Peak mag
At perihelion in 2027								
104P/Kowal	Oct 13.1	1.07	5.75	7	9.6	9.9	92	11.6
315P/LONEOS	Nov 16.5	2.36	10.96	2	8.8	10.0	141	13.8
At perihelion in 2028								
15P/Finlay	Feb 9.8	1.00	6.58	16	12.0	10.0	22	13.3
19P/Borrelly	Dec 12.3	1.31	6.86	16	7.1	11.7	136	6.5
22P/Kopff	Jun 28.3	1.32	5.87	18	7.0	15.0	143	6.6
41P/Tuttle-Giacobini-Kresak	Feb 16.0	1.05	5.43	14	10.0	40.0	65	10.8
58P/Jackson-Neujmin	Sep 4.9	1.39	8.29	9	11.0	15.0	129	11.7
64P/Swift-Gehrels	Mar 31.5	1.39	9.40	7	9.0	20.0	17	13.7
67P/Churyumov-Gerasimenko	Apr 9.2	1.21	6.43	9	11.0	10.0	22	13.4
73P/Schwassmann-Wachmann	Jan 22.6	0.94	5.39	9	9.0	10.0	17	10.0
96P/Machholz	May 12.1	0.12	5.28	8	11.3	9.9	5	2.2
98P/Takamizawa	May 11.0	1.63	7.34	6	9.0	20.0	117	13.3
102P/Shoemaker	Jul 10.8	2.08	7.47	6	6.5	20.0	119	13.9
106P/Schuster	Dec 12.4	1.54	7.32	6	10.0	15.0	120	12.5
108P/Ciffreo	Dec 9.2	1.67	7.25	6	11.7	10.0	147	13.5
205P/Giacobini	Sep 13.5	1.53	6.67	4	13.0	10.0	143	13.8
Siding Spring (P/2006 HR30)	Oct 8.9	1.22	21.81	1	11.0	10.0	69	12.2

At perihelion in 2029								
4P/Faye	Mar 8.9	1.62	7.50	23	8.0	15.0	54	13.3
118P/Shoemaker-Levy	Jan 11.4	1.83	6.13	6	7.1	14.1	160	10.5

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)

Belyaev, N. A., Kresak, L., Pittich, E. M. and Pushkarev, A. N., *Catalogue of short Period Comets*, Bratislava (1986).

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Jenniskens, P. *Meteor Showers and their Parent Comets.* Cambridge University Press (2006).

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Marsden, B. G. and Williams, G. V. *Catalogue of Cometary Orbits*, 17th edition, IAU MPC/CBAT, (2008).

Minor Planet Electronic Circulars

Nakano Notes at http://www.oaa.gr.jp/~oaacs/nk.htm (Accessed 2023 December)

Jonathan Shanklin

List of all comets predicted to reach perihelion in 2028.

This table will not be created until the end of 2027.

Comet name	T	Q	P	No	H_1	K_1	Elong	Peak mag

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 and the brightest magnitude (which must be regarded as uncertain) and the elongation at which it occurs are given for each comet. The magnitudes, orbits, and in particular the time of perihelion of the D/ comets are uncertain. The SOHO comets are only likely to be observed by satellite and some of the linkages are uncertain so that for a few alternative linkages give a different perihelion date.

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