Observers' Forum

Comet Section

Comet prospects for 2022

There is a chance of a moderately bright comet at the beginning of the year for southern-hemisphere observers. Northern-hemisphere observers may get a binocular comet in May and another in the summer. Four periodic comets may be bright enough for easy visual observation, but they will still require large binoculars or a telescope.

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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 us to 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 *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 comets, 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* 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 Comet Section web pages, ephemerides for new and currently observable comets are on the web pages of JPL, CBAT and Seiichi Yoshida. The BAA *Comet Section Observing Guide* is available on the Section web page.

9P/Tempel reaches 11th magnitude, but it is at a southern declination. For southern-hemisphere observers it will be a morning object when brightest, in March.

19P/Borrelly was discovered by Alphonse Borrelly in 1904 from Marseille, France, during a routine comet search with a 160mm refractor. It was put into its discovery orbit by an encounter with Jupiter in 1889, which only made minor changes, and subsequent returns slowly became more favourable. Despite having had several further, moderately close approaches to Jupiter, the orbit has only changed a little. The comet approached the planet again in 2019 and this has slightly reduced the perihelion distance. 2022 will be its 16th observed return, with two poor ones having been missed. At its best return in 1987 it reached magnitude 7.5. For UK observers, the comet enters the evening sky at the end of the old year as a 9th-magnitude object, and it could remain this bright for a couple of months. It fades, but remains conveniently placed for evening viewing until it sinks into the summer twilight at the end of May.

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. It begins the year well placed in the evening sky and is in solar conjunction in June. It emerges into the morning sky in August, on its way to opposition in late December.

67P/Churyumov–Gerasimenko returned in 2021, but should still be visible at the start of 2022 as a 9th-magnitude object. It is fading, but well placed for convenient viewing in the evening sky. It will probably have faded below 11th magnitude by the end of February.

81P/Wild is an early-morning object of 11th magnitude in the last few months of the year and reaches its brightest at 10th magnitude early in 2023.

104P/Kowal was discovered by Charles Kowal on plates exposed with the 1.22m Palomar Schmidt camera in late January of 1979. In 1991, Masao Ishikawa (Fukaya, Saitama, Japan) photographically discovered a 14th-magnitude comet moving slowly south in Hydra on Dec 12.70, with a 0.16m astrograph. This was subsequently identified as comet 104P/Kowal, returning to perihelion 54 days early. The comet had been missed at its 1985 return, which was a poor one. Frequent encounters with Jupiter regularly change the orbit, the most recent drastic change occurring in 1924. Another encounter in 2007 reduced the perihelion distance to 1.2au, and a further one in 2019 has reduced it again to 1.1au. The comet is another evening object, of around 9th magnitude at the start of the year, but may appear large and diffuse as it will be relatively close to the Earth. It remains conveniently placed in the evening sky as it fades, but may be fainter than 11th magnitude by the end of March. It is possible that the reduction in perihelion distance will increase the activity of the comet and it is worth monitoring by electronic observers.

255P/Levy is at a poor elongation when brightest and although it reaches 9th magnitude, it will be a challenging target for electronic observers. More equatorially located observers may get a chance to see it in the early morning skies of July and August.

263P/Gibbs comes to perihelion in 2023 when not far from opposition, which makes this a very good return. It could reach 11th magnitude by November and be 8th magnitude at the end of the year, visible in the late evening sky. It is however likely to be large and diffuse as it is relatively close to the Earth.

C/2017 K2 (PanSTARRS) was discovered as a 21st-magnitude object in images taken with the Pan-STARRS 1 1.8m Ritchey–Chrétien on 2017 May 21.49. The comet was over 16au from the Sun at discovery. JPL classifies it as a hyperbolic comet, though this does not imply that it is an interstellar object. During March and April it passes a few degrees from the much brighter open cluster NGC 6709 in Aquila. Over Jun 20/21 it passes the fringes of open cluster IC 4665. By then the comet could be 7th magnitude and will remain near that brightness for around a year. On Jul 15/16 it passes close to globular cluster M10. It is heading south and UK observers will lose it by late August. There is an opportunity for well-placed imagers to capture two comets in the same field around Sep 22, when 73P/Schwassmann–Wachmann is nearby. At its brightest in early 2023 it will be at high southern declination.

C/2021 A1 (Leonard) reaches perihelion in early January, but was brightest three weeks earlier when it passed 0.23au from the Earth. If it continues brightening at the present rate, it might then reach 4th magnitude. It is however a morning object, so may not be widely observed. Having passed through conjunction, it emerges into the evening sky for southern observers in the second half of 2021 December, but by then will be fading due to its increasing distance from Earth. It could however remain a binocular object until late January.

C/2021 O3 (PanSTARRS) reaches perihelion at 0.3au in late April, then emerges into the evening sky in early May. It quickly becomes circumpolar, but fading rapidly. How bright it will be is uncertain. At discovery it was given an absolute magnitude of 10, so it might not survive perihelion. Equally, visual observers often find comets to be brighter than estimated by the search programmes. VEM magnitudes made by imagers from discovery to early 2022 will help refine the magnitude parameters, but it is not expected to be seen visually prior to perihelion. If the predictions are correct, it will be about 6th magnitude and sporting a short tail in early May.

45P/Honda–Mrkos–Pajdušáková will be in solar conjunction when brightest and therefore only visible in satellite coronographs.

The other periodic and parabolic comets that are at perihelion during 2022 are unlikely to become brighter than 11th magnitude or are poorly placed. Ephemerides for these can be found on the Central Bureau for Astronomical Telegrams (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 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, 2023 may offer 10 comets brighter than 9th magnitude, with orbits for some comets due to return in the future yet to be published by the Minor Planet Center. 2024 will see the return of 12P/Pons–Brooks, which could reach 4th magnitude.

With more and more discoveries or 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 on the Comet Section 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 2022

Comet	*T*	*q*	*P*	*N*	H_1	K_1	*Peak mag.*	*Elong. at peak*
At perihelion in 2021								
4P/Faye	Sep 9.4	1.62	7.48	22	9.7	8.5	12	164
52P/Harrington–Abell	Oct 5.2	1.78	7.60	10	6.6	20.3	14	92
67P/Churyumov–Gerasimenko	Nov 2.1	1.21	6.42	9	9.2	7.1	9	150
132P/Helin–Roman–Alu	Nov 13.1	1.69	7.66	4	10.1	10.0	13	103
At perihelion in 2022								
9P/Tempel	Mar 4.8	1.54	5.58	13	6.6	17.8	11	67
19P/Borrelly	Feb 1.8	1.31	6.84	16	7.1	11.7	9	73
22P/Kopff	Mar 18.1	1.55	6.38	18	7.0	15.0	11	49
41P/Tuttle–Giacobini–Kresák	Sep 13.3	1.05	5.43	11	10.8	15.9	13	18
44P/Reinmuth	Apr 23.3	2.11	7.10	11	8.9	10.0	14	136
45P/Honda–Mrkos–Pajdušáková	Apr 26.6	0.56	5.34	12	11.3	13.6	9	8
51P/Harrington	Oct 3.9	1.69	7.14	8	10.0	10.0	12	160
61P/Shajn–Schaldach	Oct 23.8	2.13	7.09	8	9.4	10.0	13	173
73P/Schwassmann–Wachmann	Aug 25.7	0.97	5.44	8	11.5	10.0	11	59
80P/Peters–Hartley	Dec 8.9	1.62	8.07	5	8.5	15.0	14	11
81P/Wild	Dec 15.6	1.60	6.42	7	6.6	12.3	11	60
97P/Metcalf–Brewington	Feb 14.3	2.57	10.45	4	5.5	15.0	13	96
100P/Hartley	Aug 10.9	2.02	6.36	5	9.0	10.0	13	126
104P/Kowal	Jan 11.2	1.07	5.74	6	9.6	9.9	9	81
107P/Wilson–Harrington	Aug 24.8	0.97	4.25	10	15.0	5.0	13	82
116P/Wild	Jul 16.9	2.20	6.52	5	5.6	13.4	11	146
117P/Helin–Roman–Alu	Jul 7.7	3.04	8.25	5	0.3	22.7	13	171
118P/Shoemaker–Levy	Nov 24.3	1.83	6.12	5	7.1	14.1	11	147
119P/Parker–Hartley	Aug 12.0	2.33	7.42	4	9.0	8.0	13	156
181P/Shoemaker–Levy	Jan 8.8	1.16	7.62	3	10.5	10.0	12	47
205P/Giacobini	Jan 13.4	1.53	6.67	3	10.0	10.0	14	29
255P/Levy	Sep 1.9	0.82	5.02	2	9.0	10.0	9	26
PanSTARRS (2017 K2)	Dec 19.7	1.80			4.3	6.8	8	42
ATLAS (2019 L3)	Jan 9.6	3.55			–2.4	18.2	10	171
ATLAS (2019 T4)	Jun 9.1	4.24			0.8	13.5	12	156
ATLAS (2020 R7)	Sep 16.3	2.96			7.0	8.0	13	138
ATLAS (2020 Y2)	Jun 17.7	3.13			6.5	10.0	14	96
Leonard (2021 A1)	Jan 3.3	0.62			8.6	10.5	6	38
ZTF (2021 E3)	Jun 11.9	1.78			8.5	10.0	11	106
PanSTARRS (2021 O3)	Apr 20.5	0.29			10.3	10.3	5	17
ATLAS (2021 P4)	Jul 31.7	1.09			9.5	10.0	11	20
Fuls (2021 T2)	Jun 7.6	1.24			12.0	10.0	13	73
At perihelion in 2023								
71P/Clark	Jan 21.7	1.59	5.55	9	10.5	6.0	14	15
96P/Machholz	Jan 31.1	0.12	5.28	7	11.3	9.9	12	24
237P/LINEAR	May 14.7	1.99	6.58	2	–7.6	53.5	13	43
263P/Gibbs	Feb 1.5	1.25	5.34	2	9.0	10.0	8	133
PanSTARRS (2020 K1)	May 9.3	3.07			5.5	10.0	14	5
ZTF (2020 V2)	May 8.4	2.23			7.0	8.0	12	116

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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