Comet Prospects for 2022

Unless some bright long period comets are discovered it promises to be yet another disappointing year for comet enthusiasts. Four periodic comets may be bright enough for easy visual observation, but 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 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.

Alphonse Borrelly discovered comet **19P/Borrelly** in 1904 from Marseilles, 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 Jupiter 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 7.5^{m}. For UK observers the comet enters the evening sky at the end of the old year as a 9^{th} 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 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. The comet 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.

Charles Kowal discovered **104P/Kowal** on plates exposed with the 1.22-m Palomar Schmidt in late January 1979. In 1991, Masao Ishikawa (Fukaya, Saitama, Japan) photographically discovered a 14th magnitude comet moving slowly south in Hydra on December 12.70 with a 0.16-m astrograph. This was subsequently identified as comet P/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 1.2 au, and a further one in 2019 has reduced it further to 1.1 au. The comet is another evening object, of around 9th magnitude at the start of the year, but may be 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 will be worth electronic observers following it from mid 2021.

2017 K2 (PanSTARRS). A 21st magnitude comet was discovered in images taken with the PanSTARRS 1 1.8m Ritchey-Chretien on 2017 May 21.49. The comet was over 16 au from the Sun at discovery. JPL classify it as a Hyperbolic Comet, though this does not imply that it is an interstellar object. The comet could reach 11th magnitude by mid-year, but it is heading south and UK observers will loose it by mid August. At its brightest in early 2023 it will be at high southern declination.

The other periodic and parabolic comets that are at perihelion during 2020 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, 2023 could be a dreadful year with no comets brighter than 12th magnitude currently on offer, though orbits for some comets due to return in the future are yet to be published by the MPC. 2024 will see the return of P/Pons-Brooks, which could reach 4th magnitude.

Comets reaching perihelion in 2022

Comet	T	q	P	N	H_1	K_1	Peak mag
1884 O1 (D/Barnard)	Jan 6.3	1.30	5.40	1	8.9	10.0	
1952 B1 (D/Harrington-Wilson)	Sep 21.7	1.23	5.49	1	12.0	10.0	
1997 B1 (P/Kobayashi)	Mar 28.8	2.06	25.15	1	12.0	10.0	
2005 E4 (P/SOHO)	Feb 24.8	0.05	5.68	2			
2005 G2 (P/SOHO)	Jul 9.4	0.05	5.77	2			
2006 S4 (P/Christensen)	Jan 14.4	3.11	15.89	1	11.0	10.0	
2007 A2 (P/Christensen)	Nov 28.9	2.80	15.96	1	13.5	10.0	
2007 S1 (P/Zhao)	Oct 7.9	2.52	7.47	1	13.0	10.0	
2008 QP20 (P/LINEAR-Hill)	Jan 2.1	1.81	6.69	1	13.2	10.0	
2009 Q1 P/Hill	May 23.9	2.79	13.02	1	11.5	10.0	17
2010 TO2 P/LINEAR-Grauer	Nov 29.3	5.51	14.09	1	9.0	10.0	20
2011 R3 P/Novichonok-Gerke	Oct 5.3	3.47	10.33	1	11.0	10.0	18
2011 W1 P/PANSTARRS	Feb 7.7	3.32	10.07	1	11.5	10.0	19
2012 O3 P/McNaught	May 29.8	1.61	9.78	1	16.5	10.0	19
2012 WX3 P/Tenagra	Mar 31.8	2.45	9.13	1	13.0	10.0	18
2013 G4 P/PANSTARRS	Jun 19.4	2.62	9.35	1	15.0	10.0	21
2014 R5 P/Lemmon-PANSTARRS	Aug 18.8	2.38	8.18	1	15.0	10.0	19
2015 Q1 P/Scotti	Feb 13.6	1.81	6.47	1	14.0	10.0	18
2015 X1 P/PANSTARRS	Sep 6.6	2.11	6.94	1	16.0	10.0	20
2016 J1 P/PANSTARRS	Feb 20.7	2.45	5.65	1	16.5	10.0	21
2017 K2 PANSTARRS	Dec 19.7	1.80			6.5	6.0	10
2017 S8 P/PANSTARRS	Sep 16.2	1.69	4.63	1	14.8	16.0	20
2019 K3 P/Larson	Feb 17.4	4.42	16.46	0	8.0	10.0	17
2019 L3 ATLAS	Jan 9.6	3.55			4.5	10.0	12
2019 T4 ATLAS	Jun 9.2	4.24			7.0	8.0	15
19P/Borrelly	Feb 1.8	1.31	6.84	16	7.1	11.7	9
22P/Kopff	Mar 18.1	1.55	6.38	18	7.0	15.0	11

41P/Tuttle-Giacobini-Kresak	Sep 13.3	1.05	5.43	11	10.8	15.9	13
44P/Reinmuth	Apr 23.3	2.11	7.10	11	8.9	10.0	14
45P/Honda-Mrkos-Pajdusakova	Apr 26.6	0.56	5.34	12	11.3	13.6	9
51P-Harrington	Oct 3.9	1.69	7.14	8	10.0	10.0	12
61P/Shajn-Schaldach	Oct 23.8	2.13	7.09	8	9.4	10.0	13
73P/Schwassmann-Wachmann	Aug 25.7	0.97	5.44	8	11.5	10.0	11
80P/Peters-Hartley	Dec 8.9	1.62	8.07	5	8.5	15.0	14
81P/Wild	Dec 15.6	1.60	6.42	7	6.6	12.3	11
86P/Wild	Feb 7.6	2.26	6.83	6	8.5	15.0	15
104P/Kowal	Jan 11.2	1.07	5.74	6	9.6	9.9	9
116P/Wild	Jul 16.9	2.20	6.52	5	5.6	13.4	11
117P/Helin-Roman-Alu	Jul 7.7	3.04	8.25	5	0.3	22.7	13
118P/Shoemaker-Levy	Nov 24.3	1.83	6.12	5	7.1	14.1	11
119P/Parker-Hartley	Aug 12.0	2.33	7.42	4	9.0	8.0	13
127P/Holt-Olmstead	Aug 10.5	2.21	6.42	4	14.0	10.0	18
129P/Shoemaker-Levy	Dec 8.9	3.92	8.85	4	11.0	10.0	19
135P/Shoemaker-Levy	Apr 7.3	2.68	7.41	2	6.5	20.0	16
148P/Anderson-LINEAR	Jun 13.7	1.63	6.88	5	17.0	5.0	20
157P/Tritton	Sep 9.8	1.57	6.67	4	14.0	10.0	17
176P/LINEAR	Nov 21.0	2.58	5.72	2	15.0	5.0	18
181P/Shoemaker-Levy	Jan 8.8	1.16	7.62	3	10.5	10.0	12
189P/NEAT	Aug 28.8	1.21	5.06	4	19.0	10.0	19
196P/Tichy	Oct 29.4	2.18	7.42	3	13.5	10.0	17
204P/LINEAR-NEAT	Nov 16.9	1.83	6.78	3	12.0	10.0	15
205P/Giacobini	Jan 13.4	1.53	6.67	3	10.0	10.0	14
211P/Hill	Oct 4.6	2.33	6.68	3	12.5	10.0	18
214P/LINEAR	Sep 26.2	1.86	6.89	2	13.0	10.0	18
230P/LINEAR	Mar 19.3	1.57	6.41	4	13.0	10.0	17
238P/Read	Jun 5.5	2.37	5.64	3	14.5	10.0	19

244P/Scotti	Nov 17.3	3.92	10.83	2	9.0	10.0	17
259P/Garradd	Feb 8.4	1.81	4.51	3	15.5	10.0	20
272P/NEAT	Jul 17.1	2.43	9.42	2	16.0	10.0	22
274P/Tombaugh-Tenagra	Apr 8.5	2.45	9.15	3	13.0	10.0	18
286P/Christensen	May 12.6	2.36	8.33	2	14.0	10.0	19
319P/Catalina-McNaught	Mar 31.4	1.19	6.74	2	15.0	10.0	17
325P/Yang-Gao	Mar 29.2	1.43	6.61	2	15.0	10.0	17
327P/Van Ness	Sep 2.4	1.56	6.73	2	16.0	10.0	17
335P/Gibbs	Aug 12.0	1.62	6.77	2	17.0	10.0	21
337P/WISE	Jul 1.2	1.65	5.96	2	17.0	10.0	18
348P/PANSTARRS	Feb 10.1	2.18	5.59	2	14.0	10.0	18
382P/Larson	Feb 17.4	4.42	16.46	1	8.0	10.0	17

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) 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. 45P will be in solar conjunction when brightest and therefore only visible in satellite coronographs.

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

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