Comet Prospects for 2021

Unless some bright long period comets are discovered it promises to be yet another disappointing year for comet enthusiasts. 67P/Churyumov-Gerasimenko could be the only one of the returning periodic comets that receives any attention from European visual observers.

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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.

7P/Pons-Winnecke was discovered by Jean Louis Pons with a 0.12-m refractor at Marseilles in 1819, but was then lost until rediscovered by Friedrich August Theodor Winnecke with a 0.11-m refractor in Bonn in 1858. He demonstrated the identity and recovered the comet in 1869. The perihelion distance has slowly been increasing since the early 1800s. It can make close approaches to the Earth and did so in 1927 (0.04 au), 1939 (0.11), 1892 (0.12), 1819 (0.13) and 1921 (0.14). The 2021 return produces a relatively close approach at 0.44 au, but this is not sufficient to make the comet a bright object. An outburst of the meteor shower associated with the comet, the June Bootids, occurred on 1998 June 27.6, with another lesser display in 2004. The comet should be in telescopic range by April, but it is a morning object and UK observers will loose it by the end of May. When brightest at 10th magnitude in early June it will best seen from the Southern Hemisphere.

15P/Finlay might reach 9th magnitude, but it won't be observable from the UK until it is past its brightest, and then only in the morning sky. William Henry Finlay discovered the comet from the Cape Observatory on 1886 September 26, with an 18cm refractor. It

was around 11th magnitude at this and the following return. In 1906 it passed 0.3 au from the Earth and reached 6th magnitude. Jupiter perturbations in 1910 gave an unfavourable return in 1913, but a good one in 1919, though they were unfavourable after that until 1953, when it was recovered. It has been observed at every return since 1953. It is an intrinsically faint object and there are usually few visual observations. A September perihelion would give favourable observing circumstances, under which the comet could reach 5th magnitude, but this won't occur until 2034.

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. It is in solar conjunction in March and at opposition in October. The comet has moved into the northern celestial sphere, and should be adequately placed for observation from the UK in the second half of the year.

67P/Churyumov-Gerasimenko is well known from the investigations of the Rosetta spacecraft, but it could still spring surprises. The comet could reach 8th magnitude during its closest observed perihelion passage, when it also comes relatively close to the Earth. Analysis of previous apparitions suggests that the absolute magnitude is brighter when the comet's perihelion distance is closer to the Sun, as it is this year. It will be best seen in the morning sky, but is relatively well placed in the latter part of the year. From the autumn onwards it may be visible in large binoculars in the late evening.

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 to 2022, five comets may reach 9th magnitude, though not all are that well placed for observation. 19P/Borrelly will be an evening object when brightest in January. 45P/Honda-Mrkos-Pajdusakova will be too close to the Sun for observation. 67P/Churyumov-Gerasimenko should still be visible after its 2021 return. 81P/Wild is an early morning object. 104P/Kowal is another evening object at the start of the year, but may be large and diffuse. It is high time there was a bright new comet!

Comets reaching perihelion in 2021

Comet	T	q	P	N	H_1	K_1	Peak mag
D/Skiff-Kosai (1977 C1)	Jul 27.5	2.80	7.49	1			
P/SOHO (1999 J6)	Feb 16.8	0.04	5.34	3			
P/SOHO (1999 U2)	Apr 17.6	0.04	5.35	3			

P/LINEAR (2002 T5)	Dec 15.4	3.94	18.6	1	6.0	10.0	16
P/La Sagra (2012 S2)	Oct 31.7	1.36	9.28	1	17.0	10.0	18
P/Tenagra (2012 TK_8)	Oct 26.2	3.00	8.39	1	9.0	10.0	15
P/Scotti (2013 A2)	Feb 15.7	2.19	8.04	1	15.5	10.0	19
P/Tenagra (2013 EW_{90})	Feb 15.6	3.31	8.35	1	12.0	10.0	19
P/PanSTARRS (2013 O2)	May 22.7	2.10	7.38	1	14.0	10.0	20
P/Larson (2014 E1)	Jul 20.3	2.14	7.15	1	14.0	10.0	18
Sheppard-Trujillo (2014 F3)	May 19.5	5.69	60.8	0	6.0	10.0	17
P/PanSTARRS (2014 U4)	Feb 13.5	1.88	6.57	1	18.0	10.0	23
P/Gibbs (2014 W12)	Jun 19.2	1.67	6.60	1	15.0	10.0	18
P/PanSTARRS (2015 F1)	Oct 27.7	2.54	6.61	1	12.5	10.0	18
P/NEOWISE (2015 J3)	Apr 22.2	1.49	6.13	1	16.5	10.0	17
P/PanSTARRS (2016 BA_{14})	Jun 17.3	1.01	5.26	1	21.0	10.0	22
P/PanSTARRS (2016 G1)	Mar 22.2	2.04	4.15	1	14.0	10.0	18
P/PanSTARRS (2016 P1)	Jun 10.3	2.27	5.71	1	15.0	10.0	19
P/PanSTARRS (2016 Q2)	May 11.9	7.08			6.0	10.0	19
A/ (2017 MB_1)	May 2.8	0.59	3.66	1			
PanSTARRS (2017 Y2)	Apr 25.1	5.18	63.3	0	8.0	10.0	18
4P/Faye	Sep 9.4	1.62	7.48	22	9.7	8.5	12
6P/d'Arrest	Sep 17.8	1.35	6.54	20	12.4	15.0	14
7P/Pons-Winnecke	May 27.1	1.23	6.31	24	10.7	10.0	10
10P/Tempel	Mar 24.3	1.41	5.36	24	6.8	16.6	11
15P/Finlay	Jul 13.5	0.99	6.56	15	8.8	20.0	9
16P/Brooks	Apr 18.2	1.88	6.99	18	11.9	8.2	16
17P/Holmes	Feb 19.8	2.08	6.93	12	10.0	10.0	15 ?
52P/Harrington-Abell	Oct 5.2	1.78	7.60	10	6.6	20.3	13
57P/du Toit-Neujmin-Delporte	Oct 17.4	1.72	6.40	9	12.5	15.0	17
67P/Churyumov-Gerasimenko	Nov 2.1	1.21	6.42	9	9.2	7.1	8
70P/Kojima	Nov 3.1	2.01	7.05	8	11.0	15.0	17

75D/Kohoutek	Mar 4.9	1.78	6.65	2			
98P/Takamizawa	Jan 4.9	1.66	7.40	5	12.1	10.0	16
102P/Shoemaker	Jan 22.4	2.07	7.45	5	8.0	15.0	15
106P/Schuster	Aug 18.8	1.53	7.30	5	10.0	15.0	14
108P/Ciffreo	Sep 10.1	1.66	7.23	5	11.7	10.0	14
110P/Hartley	Oct 18.3	2.46	6.84	5	5.5	20.0	15
120P/Mueller	May 7.1	2.48	7.88	4	12.0	10.0	18
132P/Helin-Roman-Alu	Nov 13.1	1.69	7.66	4	10.1	10.0	12
158P/Kowal-LINEAR	May 10.9	4.80	11.10	3	9.0	10.0	19
191P/McNaught	Mar 20.1	2.23	6.93	3	13.0	10.0	19
193P/LINEAR-NEAT	Aug 25.3	2.17	6.77	3	11.4	10.0	15
201P/LONEOS	May 26.7	1.22	6.14	3	12.7	10.0	15
206P/Barnard-Boattini	Mar 4.5	1.56	6.51	3	19.0	10.0	23
221P/LINEAR	Dec 18.1	1.75	6.42	3	14.0	10.0	19
246P/NEAT	Feb 22.8	2.86	8.05	2	2.5	15.0	11
252P/LINEAR	Jul 10.9	1.00	5.33	3	10.7	20.0	12
283P/Spacewatch	Sep 8.0	2.13	8.42	3	16.0	10.0	22
284P/McNaught	Sep 12.7	2.30	7.06	2	13.0	10.0	17
297P/Beshore	Jan 22.9	2.34	6.39	2	6.9	10.0	12
320P/McNaught	Jan 17.1	0.97	5.44	2	20.5	10.0	22
323P/SOHO	Jan 17.7	0.04	4.15	5			
324P/La Sagra	May 6.0	2.62	5.45	2	13.0	10.0	19
332P/Ikeya-Murakami	Aug 18.4	1.58	5.43	2	18.0	10.0	21
342P/SOHO	Oct 19.4	0.05	5.31	4	20.0	10.0	7
2018 U1 Lemmon	Nov 3.1	4.99			5.0	10.0	15
2019 B3 PANSTARRS	Jan 20.0	6.82			5.5	10.0	18
2019 F1 ATLAS-Africano	Jun 22.8	3.60			5.5	10.0	13
2019 O3 A/[PanSTARRS]	Mar 6.1	8.82			9.9	10.0	24
2019 T1 A/[PanSTARRS]	Jan 14.3	4.28			13.6	5.0	20
2019 T2 A/[Lemmon]	Apr 22.3	2.65			13.2	5.0	17

2019 T3 ATLAS	Mar 2.7	5.95			5.0	12.0	18

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. 17P underwent a massive outburst in 2007 making it a naked eye object. Whilst this is unlikely to repeat, smaller outbursts are possible. 332P/Ikeya-Murakami was discovered when in outburst in 2010 and multiple components were observed at the next return in 2016. 342P will be in solar conjunction when brightest and therefore only visible in satellite coronographs. 2017 MB_1 showed cometary features, but has not been named.

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

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