Comet Prospects for 2014

At present 2014 does not offer much for the visual observer in the way of returning periodic comets, with the most interesting one being 209P/LINEAR, which could reach 11th magnitude when it passes 0.06 AU from the earth in May. Two comets at perihelion in 2013 may still be naked eye objects at the beginning of 2014. 2012 K1 (PanSTARRS) may reach 6th magnitude after its August perihelion, but is unfortunately a morning object. Martians will have the spectacle of a Great Comet in October.

This draft version was last updated with elements and magnitude parameters to 2013 October 8.

These predictions focus on comets that are likely to be within range of visual observers. Members are encouraged to make visual magnitude estimates, particularly of periodic comets, as long term monitoring over many returns helps understand their evolution. 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 CCD observers, especially those with time on instruments such as the Faulkes telescope. CCD observers are encouraged to report total magnitude estimates, using the format given in the BAA Guide and using the methodology developed by Roger Dymock. When possible use a waveband approximating to Visual or V magnitudes. Such estimates can be used to extend the visual light curves, and hence derive more accurate absolute magnitudes, and to derive equivalent parameters for fainter comets.

In addition to those in the BAA Handbook, ephemerides for new and currently observable comets are published in the *Circulars*, and on the Section, CBAT and Seiichi Yoshida's web pages. Complete ephemerides and magnitude parameters for all comets predicted to be brighter than about 21^{m} are given in the International Comet Quarterly Handbook; details of subscription to the ICQ are available on the Internet. The BAA Observing Guide to Comets is available from the BAA Office; a new edition is planned for 2013.

William Henry Finlay discovered **15P/Finlay** 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. This year the comet is at a southern declination, but might be picked up by well placed observers in October. Observing circumstances for UK observers improve in December, when it could be visible in large binoculars.

29P/Schwassmann-Wachmann is an annual comet that has outbursts, which over the last decade seem to have become more frequent. The comet had one of its strongest outbursts yet recorded in early 2010. The comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity. The comet is at a southern declination, reaching opposition in Lupus in May and passing through solar conjunction in December.

154P/Brewington remains well placed in the evening sky for the first quarter of the year as it fades from around 11th magnitude, following its perihelion in 2013 December.

209P/LINEAR was discovered as an apparently asteroidal object of 18th magnitude on 2004 February 3.40. It is intrinsically faint, but on May 29.33 it passes only 0.055 AU from the Earth; the 8th closest approach by a comet. 252P/LINEAR will pass even closer at a distance of 0.036 AU on 2016 March 21.52. As might be expected, the observing window is quite short. The comet comes into visual range in early May when it is at high northern declination and rushes south so fast that UK observers will lose it by the end of the month. Southern Hemisphere observers then get a brief chance to see it as it heads towards high southern declinations. There is also a strong possibility of a meteor outburst with a ZHR of perhaps 100 from the comet on May 23/24 at 07:21 UT. The expected radiant is around RA 8h 11m Dec +79°, with the USA and southern Canada the most favoured location.

289P/Blanpain made a close approach to the Earth (0.11 AU) at the end of October at its discovery return and was discovered around a month later, when it was near perihelion. It was perhaps around 5th magnitude. There is an identity with Apollo asteroid 2003 WY_{25}, which was noted to have a faint coma by David Jewitt in 2004. The comet is the source of the Phoenicid meteor shower, which outburst in 1956, and this could be active again in early December 2014. The comet's brightness at the discovery return may have been due to a fragmentation event, as the absolute magnitude of the asteroid is very much fainter. If a similar outburst occurred at this return the comet could reach 11th magnitude, however it is more likely that it will only be a target for CCD imagers with access to large telescopes.

290P/Jager was discovered by Michael Jager on 16- and 9-min Technical Pan film exposures with a 0.25-m f/2.8 Schmidt camera. It was quite widely observed visually. The observations are best fitted by a linear type light curve, with the comet becoming brightest some six weeks after perihelion. The observing circumstances in 2014 are almost identical to the discovery return, as perihelion is only four days later in the year. The comet is well placed for observation during the first third of the year, and could reach 10th magnitude.

2012 K1 (PanSTARRS) could be visible from the start of the year, but it doesn't get into the evening sky until March. By April it should be visible in large binoculars and it remains well placed for viewing into June. It passes through solar conjunction and reappears in the morning sky in September, when it might be just visible to the naked eye from favourable locations. It moves south, so that UK observers lose it in October, but it remains a binocular object for Southern Hemisphere observers until the end of the year. It passes a degree from 8^{m} NGC 55 around December 18.

After what we hope was a brilliant appearance, **2012 S1 (ISON)** passes only 4° from the north celestial pole in early January 2014. It may still be a naked eye object sporting a tail, however there is uncertainty in whether it will survive beyond perihelion. It fades quickly, but remains well placed until April, when it sinks into the evening twilight.

2013 A1 (Siding Spring) could reach 8th magnitude in September and is essentially a Southern Hemisphere object. It comes into visual range in May and then should be followed until November when it drops into the twilight. It is a southern circumpolar object when it comes closest to Earth at the beginning of September. The comet makes a very close approach to Mars six days prior to perihelion, when it will be a spectacular object in Martian skies, being only 0.0009 au from the planet at its closest and perhaps magnitude -9.

2013 R1 (Lovejoy) reached perihelion on 2013 December 22 and will still be near its brightest in the New Year. There is considerable uncertainty in its likely magnitude, but the indications are that it will be at least a binocular object at the start of January. It is really a morning object, beginning the year in Hercules. In early February it passes close to planetary nebula NGC 6572. It fades quickly and will be a telescopic object by March.

The other periodic and parabolic comets that are at perihelion during 2014 are unlikely to become brighter than 12th magnitude or are poorly placed. Ephemerides for these can be found on the CBAT WWW pages. Several D/ comets have predictions for a return, though searches at favourable returns in the intervening period have failed to reveal the comet and its orbit has been perturbed by Jupiter to give a larger perihelion distance. There is however always a chance that it will be rediscovered accidentally by one of the Sky Survey patrols. Several SOHO comets are predicted to return, however these will only be visible from the SOHO or STEREO satellites.

Looking ahead to 2015, there are currently no bright comets predicted. What excitement there is comes from 67P/Churyumov-Gerasimenko, which reaches perihelion in August. It creeps into the morning sky shortly after perihelion and visual observations will be important to put the Rosetta observations into the context of previous apparitions.

Comets reaching perihelion in 2014

Comet	T	q	P	N	H_1	K_1	Peak mag
286P/Christensen	Jan 6.2	2.38	8.37	2	14.0	10.0	20
293P/Spacewatch	Jan 10.4	2.11	6.94	1	14.5	10.0	18
2007 R2 (P/Gibbs)	Jan 15.6	1.47	6.38	1	17.0	10.0	20
292P/Li	Feb 4.8	2.52	15.1	1	5.9	15.0	14
107P/Wilson-Harrington	Feb 5.3	0.99	4.29	9	15.0	5.0	16
129P/Shoemaker-Levy	Feb 11.6	3.91	8.89	3	11.0	10.0	19
2013 N3 (PanSTARRS)	Feb 12.0	3.03	20.2	1	13.0	10.0	21
169P/NEAT	Feb 15.3	0.61	4.21	2	16.0	5.0	15
2013 P2 (PanSTARRS)	Feb 17.1	2.83			11.5	10.0	18
2012 X1 (LINEAR)	Feb 21.6	1.60			8.0	10.0	12
2007 H3 (P/Garradd)	Mar 1.3	1.83	6.55	1	14.0	10.0	18
2008 A2 (P/LINEAR)	Mar 3.5	1.30	5.74	1	15.5	10.0	16
52P/Harrington-Abell	Mar 7.5	1.77	7.58	8	6.6	20.3	12

290P/Jager	Mar 12.5	2.16	15.2	2	8.6	5.0	11
25D/Neujmin	Mar 13.1	1.29	5.43	2	10.5	10.0	9?
2002 R5 (P/SOHO)	Mar 15.0	0.05	5.75	2			
2013 G7 (McNaught)	Mar 16.8	4.69			7.5	10.0	17
2003 Q1 (P/SOHO)	Mar 22.6	0.05	5.28	2			
117P/Helin-Roman-Alu	Mar 27.2	3.06	8.29	3	2.5	20.0	14
17P/Holmes	Mar 27.5	2.06	6.89	10	10.0	15.0	17
119P/Parker-Hartley	Apr 2.6	3.03	8.85	3	9.0	8.0	15
124P/Mrkos	Apr 9.6	1.65	6.04	3	13.1	15.0	15
1996 X5 (P/SOHO)	Apr 9.8	0.05	5.77	2			
2003 Q6 (P/SOHO)	Apr 14.3	0.04	5.30	2			
1996 X3 (P/SOHO)	Apr 15.7	0.05	5.77	3			
2013 P5 (P/PanSTARRS)	Apr 15.8	1.94	3.24	1	17.0	10.0	21
156P/Russell-LINEAR	Apr 16.6	1.58	6.81	4	13.0	15.0	18
2001 Q11 (P/NEAT)	Apr 23.1	1.95	6.41	1	14.5	10.0	19
191P/McNaught	May 6.2	2.04	6.63	2	13.0	10.0	18
209P/LINEAR	May 6.3	0.97	5.09	2	17.0	5.0	11
2002 AR_2 (P/LINEAR)	May 15.4	2.05	12.3	1	12.0	10.0	17
134P/Kowal-Vavrova	May 21.5	2.57	15.6	2	7.1	10.0	12
132P/Helin-Roman-Alu	May 21.7	1.91	8.23	3	10.1	10.0	15
4P/Faye	May 29.6	1.66	7.51	21	8.0	13.1	13
2005 JQ_5 (P/Catalina)	May 30.0	0.83	4.42	1	17.5	10.0	17
16P/Brooks	Jun 7.7	1.47	6.14	16	11.9	8.2	15
181P/Shoemaker-Levy	Jun 10.4	1.12	7.52	3	10.5	10.0	12
222P/LINEAR	Jul 4.5	0.78	4.84	2	16.5	15.0	15
2012 U1 (PanSTARRS)	Jul 5.0	5.27			7.5	10.0	18
75D/Kohoutek	Jul 9.4	1.78	6.67	3	10.5	10.0	15?
72D/Denning-Fujikawa	Jul 11.4	0.78	9.02	2	15.5	25.0	13?
106P/Schuster	Jul 20.1	1.55	7.28	4	10.0	15.0	14
2003 O3 (P/LINEAR)	Jul 24.7	1.25	5.48	1	18.0	10.0	19
2013 P4 (PanSTARRS)	Aug 8.4	5.97	56	1	7.5	10.0	19
210P/Christensen	Aug 17.2	0.53	5.65	2	13.5	10.0	11
2012 K8 (Lemmon)	Aug 19.2	6.46			6.0	10.0	18
2002 S4 (P/SOHO)	Aug 23.4	0.05	5.95	2			
2008 Q2 (P/Ory)	Aug 24.6	1.38	5.84	1	16.5	10.0	18
2011 S1 (P/Gibbs)	Aug 26.6	6.89	25.4	1	9.5	10.0	22
11P/Tempel-Swift-LINEAR	Aug 26.8	1.55	6.30	6	15.0	10.0	18
2012 K1 (PanSTARRS)	Aug 27.6	1.05			4.5	10.0	6
206P/Barnard-Boattini	Aug 27.9	1.15	5.83	2	19.0	10.0	19
289P/Blanpain	Aug 28.2	0.96	5.32	2	10.5	10.0	11
2008 J2 (P/Beshore)	Aug 30.3	2.35	6.39	1	9.0	10.0	14
2013 J1 (McNaught)	Sep 2.5	2.29			13.0	10.0	17
2007 H1 (P/McNaught)	Sep 2.7	2.29	7.04	1	10.0	10.0	14
2001 BB_{50} (P/LINEAR-NEAT)	Sep 3.7	2.36	13.7	1	13.0	10.0	19
170P/Christensen	Sep 18.3	2.92	8.61	2	12.0	10.0	18
2003 U3 (P/NEAT)	Oct 15.4	2.49	11.4	1	12.0	10.0	17
32P/Comas Sola	Oct 17.6	2.00	9.58	10	5.9	19.5	13
108P/Ciffreo	Oct 18.4	1.71	7.23	4	9.2	15.0	12
70P/Kojima	Oct 20.8	2.01	7.05	6	11.0	15.0	17
2013 A1 (Siding Spring)	Oct 25.3	1.40			6.0	10.0	8
135P/Shoemaker-Levy	Nov 1.6	2.68	7.41	3	6.5	20.0	17
80P/Peters-Hartley	Nov 10.1	1.61	8.07	5	8.5	15.0	14
2013 G3 (PanSTARRS)	Nov 10.5	3.80			9.0	10.0	18
269P/Jedicke	Nov 14.6	4.08	19.8	2	8.0	10.0	17
40P/Vaisala	Nov 15.8	1.82	10.98	7	8.9	15.0	15
2004 V1 (P/Skiff)	Nov 20.3	1.40	9.91	1	16.0	10.0	17
2013 P3 (Palomar)	Nov 23.8	8.65			5.5	10.0	19
193P/LINEAR-NEAT	Nov 24.8	2.17	6.76	2	11.4	10.0	16

110P/Hartley	Dec 17.8	2.48	6.86	4	6.9	10.0	12
2000 QJ_{46} (P/LINEAR)	Dec 20.5	1.89	14.0	1	14.0	5.0	16
15P/Finlay	Dec 27.1	0.98	6.51	14	8.5	22.6	9
287P/Christensen	Dec 28.4	3.05	8.55	1	11.0	10.0	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. 25D was last seen in 1927, 72D in 1978 and 75D in 1988. 17P/Holmes outburst after its last return and a return to quiescence is assumed. Magnitude information is not given for the SOHO comets; these have not been numbered by the IAU despite having been observed over several returns.

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

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