

ALPO COMET NEWS

A Publication of the Comets Section of the
Association of Lunar and Planetary Observers

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alpo-astronomy.org

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Sometimes the most photogenic comets aren't the bright ones. At 14th magnitude, C/2020 PV6 (PANSTARRS) won't get a full write-up in the following pages. But fainter comets like PV6 and C/2019 K7 (Smith) are both displaying long tails to imagers. Of the comets that will be presented in detail in the pages below, 4P/Faye and 67P/Churyumov-Gerasimenko have also developed significant dust tails.

The image above of C/2020 PV6 (PANSTARRS) was taken by Dan Bartlett on 2021 August 11 from June Lake, CA with a RASA11 + ASI2600MC-P camera. The image is a co-addition of 88 x 120-s exposures.

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The monthly ALPO Comet News PDF can be found on the ALPO Comets Section website (<http://www.alpo-astronomy.org/cometblog/>). A shorter version of this report is posted on a dedicated Cloudy Nights forum (<https://www.cloudynights.com/topic/787875-alpo-comet-news-for-september-2021/>). All are encouraged to join the discussion over at Cloudy Nights. The ALPO Comet Section welcomes all comet related articles, observations, images, drawings, magnitude estimates, or spectra. One does not have to be a member of ALPO to submit material, though membership is encouraged.

Please send your observations to the Comets Section at < comets@alpo-astronomy.org >, Coordinator Carl Hergenrother < carl.hergenrother@alpo-astronomy.org > and/or Acting Assistant Coordinator Michel Deconinck < michel.deconinck@alpo-astronomy.org >.

To learn more about the ALPO, please visit us @ <http://www.alpo-astronomy.org>.

Summary

While we are still waiting for the next “Big One” or even the next “Bright Enough to be seen in my binoculars” comet, September sees quite a few comets bubbling around magnitude 10 to 11. 8P/Tuttle may get as bright as magnitude 8.5 though it is solely a southern hemisphere object. As many as 5 comets, 4P/Faye, 6P/d’Arrest, 67P/Churyumov-Gerasimenko, C/2019 L3 (PANSTARRS), and C/2020 T2 (PANSTARRS), could brighten into the magnitude 10 to 11 range.

C/2021 A1 (Leonard) still has the potential to be an interesting object this December. Recent observations suggest it may be brightening at a fast rate, so imagers and large aperture visual observers are encouraged to observe it this month as it may brighten to 12-13th magnitude by the end of the month.

Comets Section News

During August, the ALPO Comets Section received 48 images and/or sketches from Dan Bartlett, Michel Deconinck, Christian Harder, Gianluca Masi, Martin Mobberley, Mike Olason, and Uwe Pilz and 91 visual and CCD magnitude measurements from Michel Deconinck, J. J. Gonzalez, Mike Olason, and Chris Wyatt of the following comets: C/2021 O1 (Nishimura), P/2021 N2 (Fuls), P/2021 N1 (ZTF), P/2021 L2 (Leonard), C/2020 T2 (Palomar), C/2020 S3 (Erasmus), C/2020 PV6 (PANSTARRS), C/2020 K6 (Rankin), C/2020 K1 (PANSTARRS), C/2020 J1 (SONEAR), C/2020 F5 (MASTER), C/2019 U5 (PANSTARRS), C/2019 L3 (ATLAS), C/2019 K7 (Smith), C/2019 F1 (ATLAS-Africano), C/2018 U1 (Lemmon), C/2017 U7 (PANSTARRS), C/2017 K2 (PANSTARRS), 424P/La Sagra, 402P/LINEAR, 395P/Catalina-NEAT, 378P/McNaught, 284P/McNaught, 252P/LINEAR, 246P/NEAT, 241P/LINEAR, 193P/LINEAR-NEAT, 132P/Helin-Roman-Alu, 119P/Parker-Hartley, 110P/Hartley, 108P/Ciffreo, 67P/Churyumov-Gerasimenko, 29P/Schwassmann-Wachmann, 19P/Borrelly, 17P/Holmes, 15P/Finlay, 10P/Tempel, 7P/Pons-Winnecke, 6P/d’Arrest, and 4P/Faye.

We’d like to especially thank Dan Bartlett who has graciously agreed to contribute his observations to the ALPO Comets Section.

In addition to observations submitted directly to the ALPO, we occasionally use data from other sources to augment our analysis. We would like to acknowledge with thanks observations submitted directly to the ALPO as well as those originally submitted to the International Comet Quarterly, Minor Planet Center, and COBS Comet Observation Database. We would also like to thank the Jet Propulsion Laboratory for making available their Small-Body Browser and Orbit Visualizer and Seiichi Yoshida for his Comets for Windows programs that is used to produce the lightcurves in these pages. And last but not least, we’d like to thank [Syuichi Nakano](#) and the Minor Planet Center for their comet orbital elements, the asteroid surveys for their discoveries, and all of the observers who volunteer their time to adding to our knowledge of these amazing objects.

Comets Calendar for September 2021

- Sep 04-05 – 15P/Finlay passes within 0.5 deg of open cluster NGC 2331
- Sep 06 – New Moon
- Sep 08 – 283P/Spacewatch at perihelion ($q = 2.13$ au, 8.4-year orbit, $V \sim 20-21$, poor apparition, too close to Sun to be observed)
- Sep 08 – C/2021 K2 (MASTER) at perihelion ($q = 5.47$ au, long-period comet, $V \sim 17-18$)
- Sep 08 – 4P/Faye at perihelion ($q = 1.62$ au, 7.5-year orbit, $V \sim 10$, discovered in 1843, 22nd observed return, more below)
- Sep 10 – 108P/Ciffreo at perihelion ($q = 1.66$ au, 7.2-year orbit, $V \sim 15$, discovered on 1985 November 8 on images taken on 1P/Halley with a 0.9-m Schmidt at Caussols, France; 6th observed return, reached 10th mag and was observed to split in 1985)
- Sep 12 – 284P/McNaught at perihelion ($q = 2.30$ au, 7.1-year orbit, $V \sim 16$, discovered in 2007, 3rd observed return, reached 13th mag at 2007 and 2013 returns)
- Sep 13 – First Quarter Moon
- Sep 15 – C/2020 K6 (Rankin) at perihelion ($q = 5.87$ au, long-period comet, $V \sim 19$)
- Sep 17 – 6P/d'Arrest at perihelion ($q = 1.35$ au, 6.5-year orbit, $V \sim 10-11$, discovered in 1678 and 1851, 21st observed return, reached 5th magnitude in 1976)
- Sep 18-19 – 6P/d'Arrest passes in front of the Trifid Nebula (M20)
- Sep 20 – Full Moon
- Sep 20 – 423P/Lemmon at perihelion ($q = 5.42$ au, 15.3-year orbit, $V \sim 22-23$, discovered in 2008, 2nd observed return, was brighter at $V \sim 18-19$ in 2009 when it was possibly in outburst)
- Sep 20 – 425P/Kowalski at perihelion ($q = 2.89$ au, 15.9-year orbit, $V \sim 19-20$, discovered in 2005, 2nd observed return)
- Sep 20-21 – 6P/d'Arrest travels in front of the nebulosity connected to and NE of the Lagoon Nebula (M8)
- Sep 22 – C/2021 J2 (PANSTARRS) at perihelion ($q = 4.71$ au, 1253-year orbit, $V \sim 20-21$)
- Sep 22 – P/2004 R3 (LINEAR-NEAT) at perihelion ($q = 3.55$ au, 7.5-year orbit, not seen since 2004 when it peaked at $V \sim 17-18$)
- Sep 22 – 67P/Churyumov-Gerasimenko passes within 0.5 deg of Hind's Variable Nebula (NGC 1555)
- Sep 25 – C/2020 PV6 (PANSTARRS) at perihelion ($q = 2.30$ au, 271-year orbit, $V \sim 13-14$)
- Sep 25 – 8P/Tuttle near 12th mag galaxy NGC 3200
- Sep 26-27 – 8P/Tuttle passes within 0.5 deg of planetary nebula Ghost of Jupiter (NGC 3242)
- Sep 28 – Last Quarter Moon

Comets Brighter Than Magnitude 10

8P/Tuttle

Discovered on 1790 January 9 by Pierre F. A. Mechain

Rediscovered on 1858 January 5 by Horace Tuttle

Orbit (from Minor Planet Center, MPEC 2021-P47)

8P/Tuttle
Epoch 2021 July 5.0 TT = JDT 2459400.5
T 2021 Aug. 27.73755 TT Rudenko
q 1.0260106 (2000.0) P Q
n 0.07228615 Peri. 207.48893 -0.26849376 -0.50829747
a 5.7073258 Node 270.20410 +0.96326296 -0.13641415
e 0.8202292 Incl. 54.91122 +0.00596490 -0.85030868
P 13.6
From 210 observations 2008 Feb. 12-2021 Aug. 4, mean residual 0".5.
Nongravitational parameters A1 = +0.44, A2 = +0.2030.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

8P/Tuttle									Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag	40N	40S	
2021-Sep-01	08 55	+02 13	1.028	1.823	26M	Hya	8.9	0	6	
2021-Sep-06	09 11	-01 50	1.036	1.813	27M	Hya	8.7	0	8	
2021-Sep-11	09 28	-05 56	1.049	1.808	29M	Hya	8.6	0	10	
2021-Sep-16	09 44	-10 00	1.068	1.810	30M	Hya	8.5	0	11	
2021-Sep-21	10 01	-14 01	1.091	1.817	31M	Hya	8.5	0	13	
2021-Sep-26	10 18	-17 55	1.119	1.832	32M	Hya	8.6	0	14	
2021-Oct-01	10 36	-21 40	1.150	1.852	33M	Hya	8.6	0	15	
2021-Oct-06	10 53	-25 14	1.186	1.878	33M	Hya	8.8	0	16	

Comet Magnitude Formula

$m_1 = 7.0 + 5 \log d + 20 \log r(t-25)$ [Ref: Seiichi Yoshida]

Magnitude Measurements Submitted to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD	Mag	SC	APER	FL	POW	COMA	TAIL	ICQ CODE	Observer Name
	(UT)					T	Dia	DC	LENG	PA

None submitted in August

8P/Tuttle was discovered during two widely separated apparitions. Pierre François André Méchain made the first discovery on 1790 January 9. Sixty-eight years and 5 orbits later, 8P was re-discovered by Horace Parnell Tuttle on 1858 January 5. With a 13.6-year period, 8P/Tuttle is making its 13th observed return and 18th return going back to the initial 1790 discovery apparition. Tuttle's relatively large semi-major axis of 5.7 au and inclination of 54.9° makes it a Halley-type rather than a Jupiter-family comet. Its orbit currently passes 0.096 au from Earth and a relatively safe 0.74 au from Jupiter.

The comet's best apparitions occurred in 1980/1981 when it reached 6th magnitude and at its previous return in 2007/2008 when it passed 0.25 au from Earth and reached 5th magnitude. Looking ahead, Tuttle should have an even better return in 2048/2049 when it comes within 0.18 au of Earth and brightens to 4th magnitude.

Meteor watchers may remember that 8P/Tuttle is the parent body of the Ursid meteor shower in December. 8P's highly inclined orbit not only results in the Ursids radiating from the far northern constellation of Ursa Minor, but also in apparitions that are best observed from the northern hemisphere before perihelion and from the southern hemisphere after perihelion. Poor placement close to the Sun over the past few months means observing this year's return will be limited to the southern hemisphere.

Being one of the more intrinsically bright short-period comets, Tuttle can get bright enough to be seen in small telescopes even during poor apparitions. Even with a large minimum distance to Earth on September 12 of 1.81 au, Tuttle is expected to brighten to magnitude 8.5 in September. Southern observers will be able to follow Tuttle as it moves through Hydra low in the morning sky.

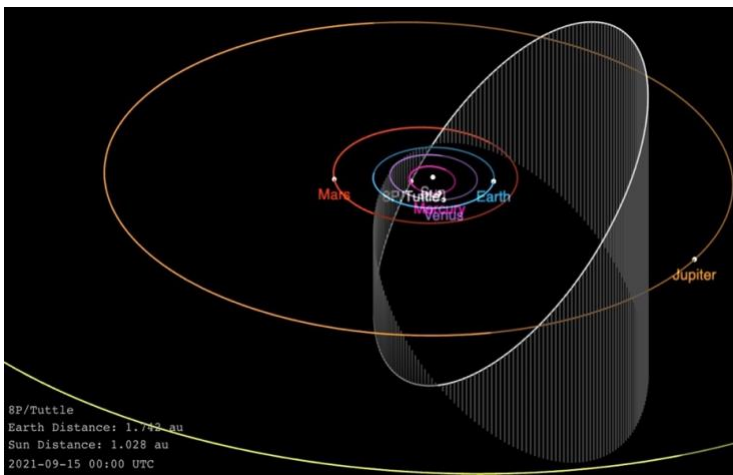


Figure 1 - Orbit of 8P/Tuttle valid for mid-September. Made with the JPL Small-Body Browser.

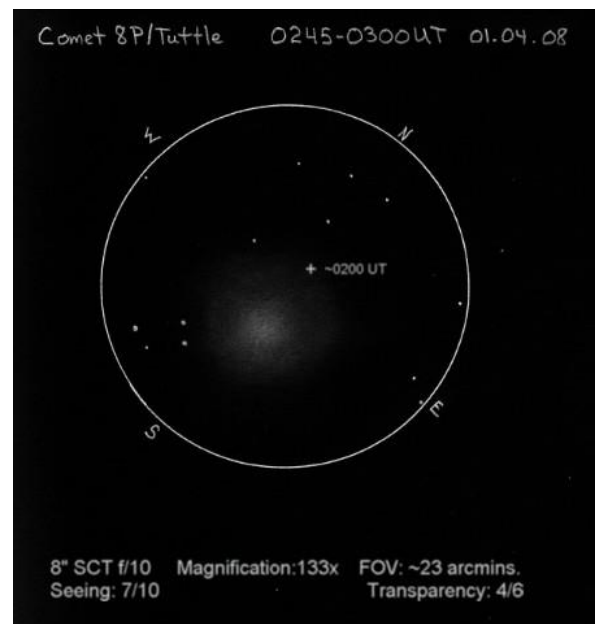


Figure 2 - Sketch of 8P/Tuttle by Michael Rosolina from its last apparition.

Comets Between Magnitude 10 and 13

C/2020 T2 (Palomar)

Discovered 2020 October 7 at 19th magnitude by the Zwicky Transient Facility (ZTF)
 Discovery Telescope: 1.2-m Samuel Oschin Schmidt on Mount Palomar
 Dynamically old long-period comet with orbital period of 5560 years

Orbit (from Syuichi Nakano, Nakano Note NK 4449)

C/2020 T2 (Palomar)
 Epoch 2021 July 5.0 TT = JDT 2459400.5
 T 2021 July 11.14758 TT Nakano
 q 2.0546863 (2000.0) P Q
 z +0.0032038 Peri. 150.38316 -0.53887199 +0.70302914
 +/-0.0000009 Node 83.04827 -0.83514131 -0.37375209
 e 0.9934172 Incl. 27.87301 -0.11025416 -0.60502843
 From 682 observations 2019 Dec. 11-2021 Apr. 2, mean residual 0".37.
 (1/a)_{org.} = +0.002916, (1/a)_{fut.} = +0.003827 (+/-0.000001), Q = 8.
 The comet will pass 3.10 AU from Jupiter on 2022 June 7 UT.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Sep-01	15 17	-15 30	2.146	2.217	72E	Lib	10.5	17	50
2021-Sep-06	15 27	-17 07	2.163	2.282	70E	Lib	10.7	15	49
2021-Sep-11	15 36	-18 40	2.183	2.348	68E	Lib	10.8	14	47
2021-Sep-16	15 46	-20 07	2.203	2.415	65E	Lib	10.9	13	45
2021-Sep-21	15 56	-21 29	2.225	2.483	63E	Sco	11.0	11	43
2021-Sep-26	16 06	-22 47	2.248	2.552	61E	Sco	11.2	10	41
2021-Oct-01	16 17	-23 59	2.272	2.622	58E	Sco	11.3	9	39
2021-Oct-06	16 27	-25 07	2.298	2.692	56E	Sco	11.5	8	36

Comet Magnitude Formula (from fit to ALPO and COBS data)

$$m1 = 1.8 + 5 \log d + 21.9 \log r(t-20)$$

Magnitude Measurements Submitted to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
2020T2	2021 08 31.42	xM 10.7	AQ	40.0L	4	59	3.7 6		ICQ XX WAY	
2020T2	2021 08 13.53	xM 10.9	AQ	40.0L	4	59	4.4 5		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 10.39	xM 10.7	AQ	40.0L	4	59	3.9 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 08.97	M 10.8	TK	9.0R	5	34	3 6		ICQ XX SOU01	Willian Souza
2020T2	2021 08 07.98	M 10.7	TK	9.0R	5	50	3 6		ICQ XX SOU01	Willian Souza
2020T2	2021 08 06.45	xM 10.6	AQ	40.0L	4	59	4.5 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 05.90	S 9.7	TK	20.3T10	77		7 3/		ICQ XX GON05	J J Gonzalez Suarez
2020T2	2021 08 04.16	C 11.9	GG	27.9T	6A300		2	135	ICQ xx OLAxx	Mike Olason

C/2020 T2 (PANSTARRS) has been hanging around 10-11th magnitude for the past few months. Visual observers estimated PANSTARRS between magnitude 9.7 and 10.9 in August with a moderately condensed coma ranging from 3' to 7' across.

C/2020 T2 has started to slowly fade. As a result, September should see it decrease in brightness from around magnitude 10.5 to 11.3. As the comet moves through the evening constellations of Libra (Sep 1-16) and Scorpius (16-30), it will be a well-placed for southern hemisphere observers, but a rather low object for northern observers.

Looking ahead, C/2020 T2 will pass in front of the photogenic nebulosity of the Antares/Rho Ophiuchi area during the first week of October.

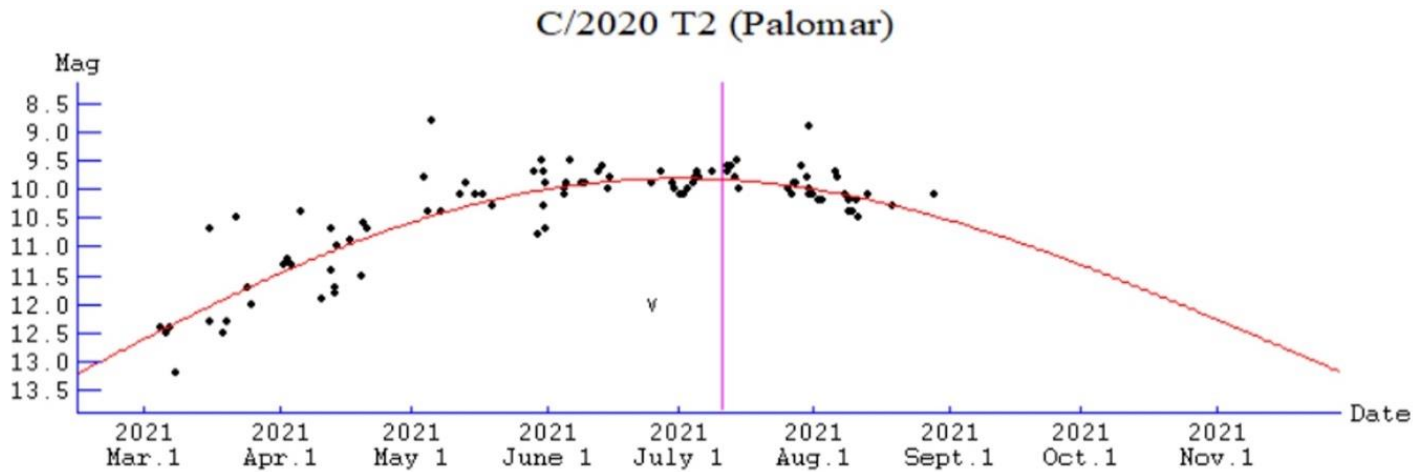


Figure 3 - Lightcurve produced with Seiichi Yoshida's Comets for Windows program from observations submitted to the ALPO and Michael Lehmann's observations submitted to COBS.

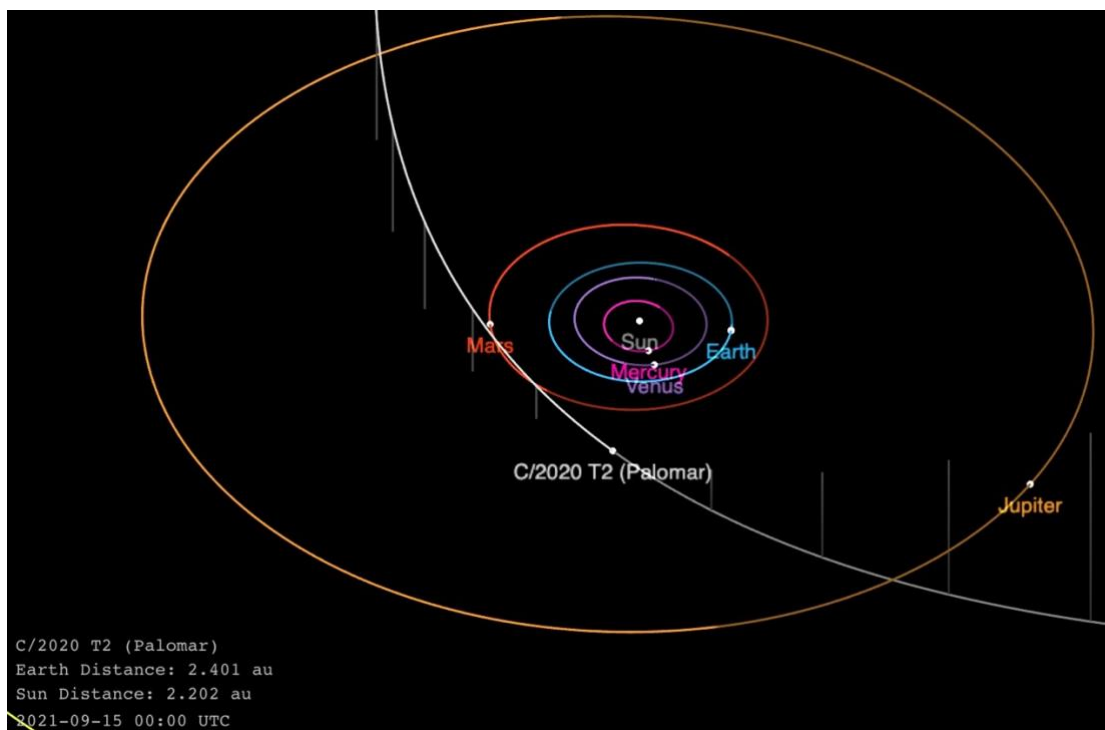


Figure 4 - Orbit of C/2020 T2 (Palomar) for mid-September. Made with the JPL Small-Body Browser.

4P/Faye

Discovered visually on 1843 November 23 by the Herve Faye

Orbit (from Syuichi Nakano, Nakano Note NK 4500)

4P/Faye
Epoch 2021 Sept. 23.0 TT = JDT 2459480.5
T 2021 Sept. 8.83079 TT Nakano
q 1.6188553 (2000.0) P Q
n 0.13183220 Peri. 206.99673 +0.76783984 -0.63988277
a 3.8234467 Node 192.93148 +0.61006246 +0.74517843
e 0.5765979 Incl. 8.00830 +0.19556526 +0.18777418
P 7.48

From 4264 observations 2006 Aug.-2021, mean residual 0".76.

Nongravitational parameters A1 = +0.64 +/- 0.01, A2 = -0.0389 +/- 0.0003.

2021 July-August observations show the residuals of +20" mainly for Right Ascension from the prediction in NK 3622 (= HICQ 2020/2021) with the delta-T correction = -0.01 day.

The comet has passed 0.63 AU from Jupiter on 2018 Mar. 7 UT.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Sep-01	04 48	+18 49	1.621	1.352	85M	Tau	10.8	54	29
2021-Sep-06	05 01	+18 36	1.619	1.318	87M	Tau	10.7	56	29
2021-Sep-11	05 14	+18 17	1.619	1.285	89M	Tau	10.7	58	29
2021-Sep-16	05 26	+17 54	1.620	1.254	90M	Tau	10.6	60	29
2021-Sep-21	05 38	+17 25	1.623	1.224	93M	Tau	10.6	61	30
2021-Sep-26	05 49	+16 52	1.628	1.194	95M	Ori	10.6	62	30
2021-Oct-01	06 00	+16 14	1.634	1.166	97M	Ori	10.6	63	31
2021-Oct-06	06 10	+15 34	1.642	1.139	100M	Ori	10.6	64	32

Comet Magnitude Formula (from fit to ALPO and COBS data)

$$m1 = 10.3 + 5 \log d + 10 \log r$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
4	2021 08 10.75	xM 12.4	AQ	40.0L	4	108	1.1 6	4.0m260	ICQ XX WYA	Christopher Wyatt
4	2021 08 06.74	xM 12.8	AQ	40.0L	4	182	0.9 5/		ICQ XX WYA	Christopher Wyatt
4	2021 08 06.09	S 10.9	TK	20.3T10	77		4 2		ICQ XX GON05	J J Gonzalez Suarez

4P/Faye was visually discovered by Herve Faye (Royal Observatory, Paris, France) on 1843 November 23 at 5th-6th magnitude. Only days after discovery, the comet was reported to be visible to the naked eye. For unknown reasons, Faye was abnormally bright in 1843. Since then, it has peaked at 9th magnitude as it did during its best returns in 1991 and 2006.

This year's apparition is the 22nd observed return with the comet only having been missed at perihelia in 1903 and 1918. 2021 is a moderately good but not great return and should see Faye reach magnitude 10.6 at the end

of September. Even after perihelion, the comet will slowly approach Earth, not reaching a minimum geocentric distance till December 5 at 0.94 au. The decreasing Earth-comet distance will keep Faye in the 10-11th magnitude range for the next few months.

Faye is currently a morning object observable from both hemispheres as its moves through Taurus (Sep 1-26) and Orion (26-30). Looking ahead to next month, 4P will travel in front of the Rosette Nebula on October 3-5. It should be quite the sight considering the nice coma structure and tail it is currently displaying (see images on the next page).

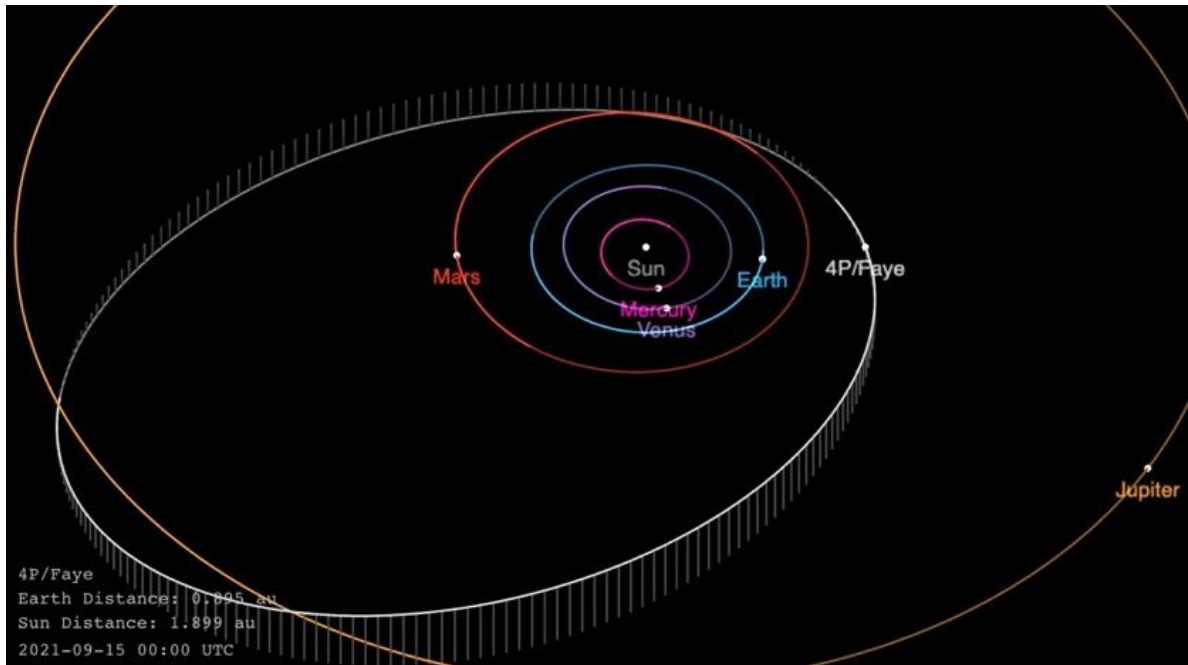


Figure 5 - Orbit of 4P/Faye from the JPL Small-Body Browser.

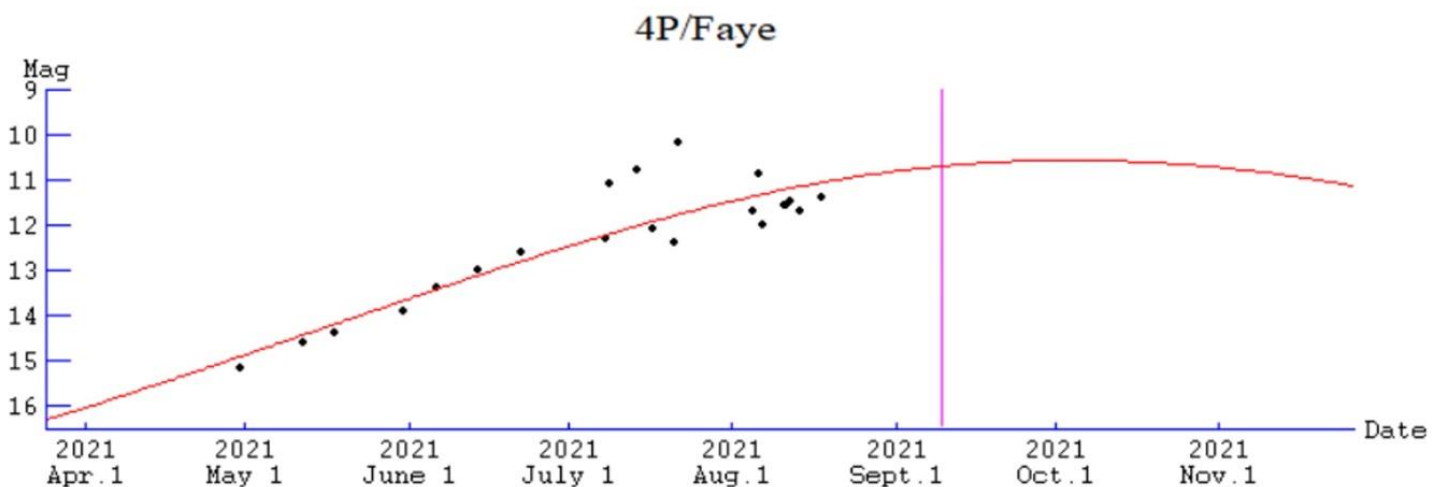


Figure 6 - Lightcurve produced with Seiichi Yoshida's Comets for Windows program from observations submitted to the ALPO and Michael Lehmann's observations submitted to COBS.

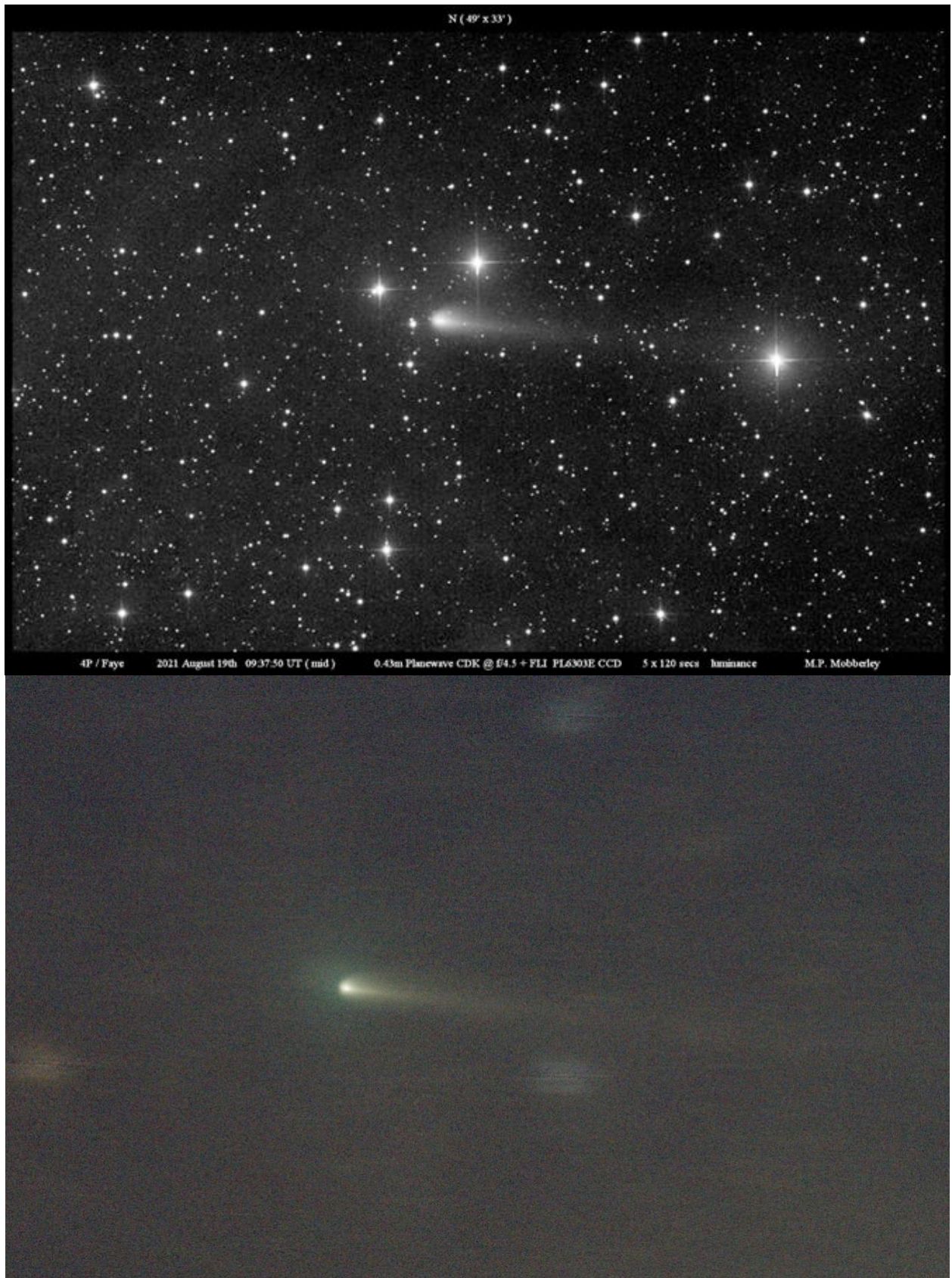


Figure 7 - Top: 4P/Faye as imaged by Martin Mobberley on August 19. Bottom: 4P/Faye in color as imaged by Dan Bartlett on August 11 with a .RASA11 and ASI2600MC-P camera (50x120s exposure).

6P/d'Arrest

Discovered on 1851 June 28 by the Heinrich Ludwig d'Arrest

Orbit (from Syuichi Nakano, Nakano Note NK 4445)

6P/d'Arrest
 Epoch 2021 Sept. 23.0 TT = JDT 2459480.5
 T 2021 Sept. 17.78204 TT Nakano
 q 1.3546116 (2000.0) P Q
 n 0.15061475 Peri. 178.10208 +0.73305041 +0.64381249
 a 3.4985739 Node 138.93551 -0.62836543 +0.76449697
 e 0.6128103 Incl. 19.51238 -0.26037278 -0.03240149
 P 6.54

From 1865 observations 2008-2021, mean residual 0".66.
 Nongravitational parameters A1 = +0.35 +/- 0.01, A2 = +0.1180 +/- 0.0005.
 Residuals on 2021 Apr.-May observations were -40" for Right Ascension and +12" for Declination from the prediction in NK 3623 (= HICQ 2021) with the delta-T correction = +0.018 day.
 The comet has made the 21st appearances after AD 1678 (IAUC 5283).
 Comet will pass 0.97 AU from Jupiter on 2039 Apr. 1 UT.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Sep-01	17 09	-14 05	1.369	0.779	99E	Oph	11.5	32	63
2021-Sep-06	17 22	-16 43	1.362	0.791	97E	Oph	11.3	29	65
2021-Sep-11	17 36	-19 14	1.357	0.806	96E	Oph	11.1	27	66
2021-Sep-16	17 52	-21 36	1.355	0.824	95E	Sgr	10.9	25	67
2021-Sep-21	18 08	-23 46	1.355	0.844	93E	Sgr	10.7	24	68
2021-Sep-26	18 25	-25 43	1.358	0.866	92E	Sgr	10.5	22	68
2021-Oct-01	18 43	-27 25	1.363	0.892	91E	Sgr	10.4	21	68
2021-Oct-06	19 02	-28 51	1.371	0.920	91E	Sgr	10.3	20	68

Comet Magnitude Formula (from fit to ALPO and COBS data)

$$m_1 = 5.4 + 5 \log d + 32.1 \log r(t-60)$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
6	2021 08 31.43	xS 12.5	AQ	40.0L	4	59	2.9 2/		ICQ XX WYA	Christopher Wyatt
6	2021 08 10.91	S 11.8	TK	20.3T10	77	6	1		ICQ XX GON05	J J Gonzalez Suarez

Heinrich Louis d'Arrest discovered 6P visually in June 1851 though we now know that it had been previously observed by Phillipe la Hire in 1678. Long-time comet watchers may remember this comet's excellent apparition in 1976 when it passed 0.15 au from Earth and reached 5th magnitude. d'Arrest's perihelion distance is larger now (1.35 au) so such close approaches are no longer possible. This year, closest approach to Earth was on August 2 at 0.75 au and perihelion will be on September 17.

Last month we mentioned that CCD photometry by Michael Lehmann found the comet a magnitude or so brighter than predicted. Visual observations by Chris Wyatt and J. J. Gonzalez confirm that d'Arrest is brighter than expected. If the comet continues its current brightness trend, it may approach a peak brightness around magnitude 10.0 in late October/early November. According to the brighter prediction, d'Arrest should brighten in September from magnitude 11.5 to 10.4 as it moves through the evening constellations of Ophiuchus (Sep 1-3), Serpens (3), Ophiuchus (3-13), and Sagittarius (13-30). Photo Op Alert: 6P will travel through the Trifid Nebula (M20) and very close to the Lagoon Nebula (M8) between September 18 and 21.



Figure 8 - Dan Bartlett imaged 6P/d'Arrest on August 5 with a RASA11 + ASI 2600MC-P camera. The image is a co-addition of 36x180s exposures median combined to minimize the stars. It is possible a faint dust trail is visible crossing the image from about 8:30 to 2:30 and passing through the brightest part of the coma.

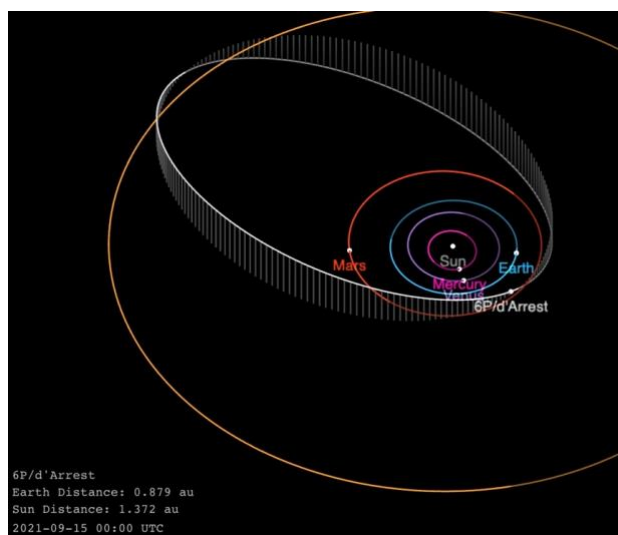


Figure 9 - Orbit of 6P/d'Arrest from JPL Small-Body Browser.

7P/Pons-Winnecke

Discovered on 1819 June 12 by the Jean-Luis Pons
 Rediscovered on 1858 March 9 by Friedrich August Theodor Winnecke

Orbit (from Minor Planet Center, MPEC 2021-P47)

7P/Pons-Winnecke
 Epoch 2021 July 5.0 TT = JDT 2459400.5
 T 2021 May 27.11293 TT Rudenko
 q 1.2342367 (2000.0) P Q
 n 0.15623635 Peri. 172.59644 -0.06057374 +0.92307530
 a 3.4141400 Node 93.37530 -0.93419396 +0.08160384
 e 0.6384926 Incl. 22.36338 -0.35158564 -0.37586274
 P 6.31
 From 1774 observations 1921 Apr. 28-2021 July 29, mean residual 0".7.
 Nongravitational parameters A1 = +0.02, A2 = +0.0021.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

7P/Pons-Winnecke									Max El	
Date	R.A.	Decl.	r	d	Elong	Const	Mag		40N	40S
2021-Sep-01	23 45	-52 00	1.680	0.812	134M	Phe	12.5		0	78
2021-Sep-06	23 39	-51 47	1.717	0.857	133M	Phe	12.8		0	78
2021-Sep-11	23 34	-51 18	1.755	0.904	133M	Phe	13.1		0	79
2021-Sep-16	23 28	-50 36	1.792	0.955	132E	Phe	13.4		0	80
2021-Sep-21	23 24	-49 43	1.830	1.009	130E	Gru	13.7		0	80
2021-Sep-26	23 20	-48 40	1.868	1.067	129E	Gru	14.0		2	82
2021-Oct-01	23 18	-47 29	1.907	1.127	127E	Gru	14.3		3	83
2021-Oct-06	23 16	-46 12	1.945	1.191	125E	Gru	14.5		4	84

Comet Magnitude Formula (from ALPO and COBS data)

$$m1 = 9.7 + 5 \log d + 26.6 \log r(t-11)$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD	Mag	SC	APER	FL	POW	COMA	TAIL	ICQ CODE	Observer Name
	(UT)						Dia DC	LENG PA		
7	2021 08 31.45 xM	12.4	AQ	40.0L	4	59	4.4 3/		ICQ XX WYA	Christopher Wyatt
7	2021 08 13.57 xM	12.8	AQ	40.0L	4	108	2.5 5/		ICQ XX WYA	Christopher Wyatt
7	2021 08 10.44 xS	11.7	AQ	40.0L	4	59	4.4 3/		ICQ XX WYA	Christopher Wyatt
7	2021 08 06.50 xM	11.6	AQ	40.0L	4	59	4.0 4		ICQ XX WYA	Christopher Wyatt

Comet 7P/Pons-Winnecke was an 8th magnitude object when visually discovered by Jean-Luis Pons on 1819 June 12. Even though a short-period orbit was calculated at that time, it unfortunately was not precise enough to support the comet's recovery at later returns. Thirty-nine years later on 1858 March 9, Friedrich August Theodor Winnecke re-discovered Pons-Winnecke. Throughout the 19th and early 20th century, Pons-Winnecke routinely reached 6th magnitude during its better apparitions. In 1927 during an especially close approach to Earth (0.04 au), the comet peaked at magnitude 3.5. Unfortunately, it hasn't had a bright return since 1939 (6th magnitude) and nowadays usually gets no brighter than ~10-11th magnitude. The recent drought of bright apparitions is due to an increase in perihelion distance from 0.76 au in 1841 to a maximum of 1.26 au in 1989.

This year's perihelion occurred on 2021 May 27 at 1.23 au as 7P is still close to its maximum perihelion distance.

The perihelion distance of Pons-Winnecke will steadily decrease over the coming decades from this year's 1.23 au to 1.13 au in 2027, 0.98 au in 2039, 0.87 au in 2051, and a minimum near 0.84 au for many perihelia from 2062 through the end of the 21st century. The smaller distances will once again allow close approaches to Earth, in particular, in 2045 (0.21 au), 2062 (0.17 au), 2073 (0.19 au), and 2084 (0.31 au).

Pons-Winnecke was at perihelion back in May, but it still a reasonably bright object due to a strong seasonal effect resulting in a peak brightness in the weeks after perihelion. Chris Wyatt observed the comet fading from around magnitude 11.6 on August 6 to 12.4 on August 31. He found the comet to be slightly condensed with a 4' coma.

Pons-Winnecke should fade from around magnitude 12.5 to 14.3 as it moves through the southern constellations of Phoenix (Sep 1-18) and Grus (18-30). Its location at southern declinations makes it a difficult object from the northern hemisphere but well placed for southern hemisphere observers.

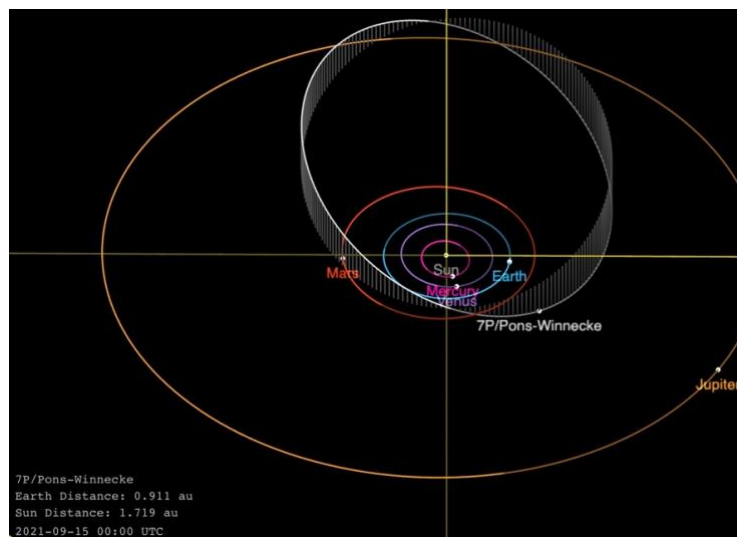


Figure 10 - Orbit of 7P/Pons-Winnecke from the JPL Small-Body Browser.

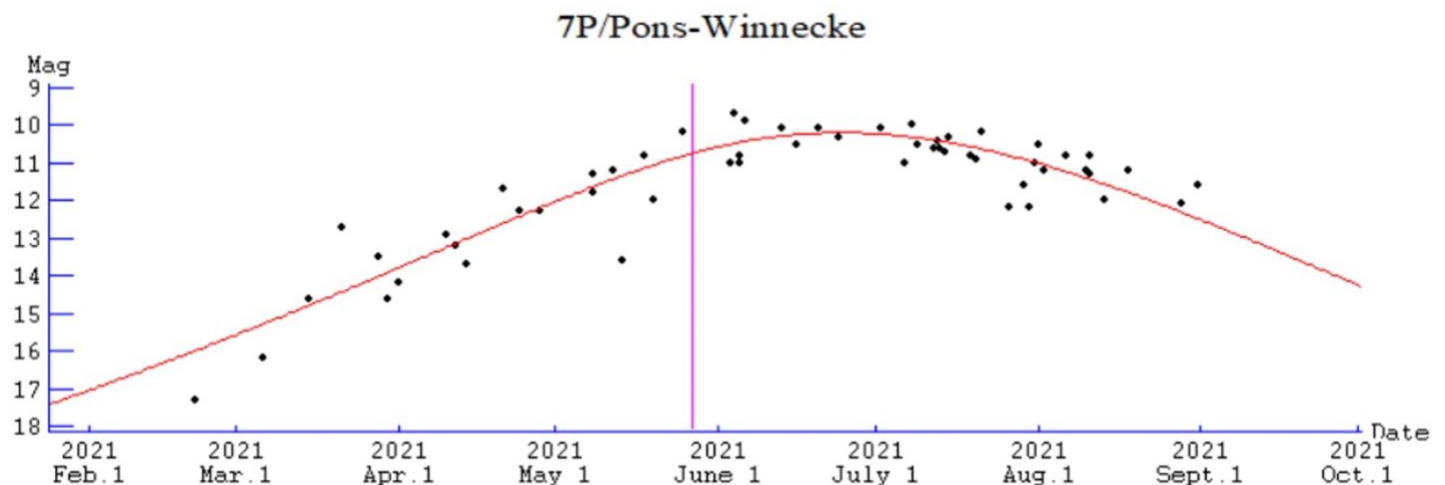


Figure 11 - Lightcurve produced with Seiichi Yoshida's Comets for Windows program from observations submitted to the ALPO and Michael Lehmann's observations submitted to COBS.

15P/Finlay

Discovered 1886 September 26 by the William Henry Finlay
Short-period comet with orbital period of ~6.56 years

Orbit (from Syuichi Nakano, Nakano Note NK 4446)

15P/Finlay
Epoch 2021 July 5.0 TT = JDT 2459400.5
T 2021 July 13.47387 TT Nakano
q 0.9919899 (2000.0) P Q
n 0.15015570 Peri. 347.82382 +0.99928830 -0.02520905
a 3.5057007 Node 13.71407 +0.03587528 +0.86500484
e 0.7170352 Incl. 6.79753 -0.01165603 +0.50112986
P 6.56

From 1134 observations 2008-2021, mean residual 0".72.
Nongravitational parameters A1 = +0.24 +/- 0.01, A2 = -0.0232 +/- 0.0001.
Residuals on 2021 April were +135" for Right Ascension and +170" for
Declination from the prediction in NK 3627 (= HICQ 2020/2021) with
the delta-T correction = -0.07 day.
The comet has passed 0.28 AU from Jupiter on 2004 May 8 UT.
The comet has made the 16th appearances after AD 1886.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

15P/Finlay									Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag	40N	40S	
2021-Sep-01	06 52	+26 56	1.216	1.424	56M	Cnc	12.4	36	9	
2021-Sep-06	07 07	+26 58	1.256	1.443	58M	Cnc	12.7	38	8	
2021-Sep-11	07 21	+26 56	1.298	1.459	60M	Cnc	12.9	40	8	
2021-Sep-16	07 34	+26 50	1.341	1.473	62M	Cnc	13.2	42	8	
2021-Sep-21	07 46	+26 43	1.386	1.484	64M	Cnc	13.4	45	8	
2021-Sep-26	07 58	+26 33	1.431	1.492	66M	Cnc	13.7	47	8	
2021-Oct-01	08 08	+26 23	1.477	1.497	69M	Cnc	13.9	50	8	
2021-Oct-06	08 18	+26 14	1.523	1.499	71M	Cnc	14.1	53	8	

Comet Magnitude Formula (from ALPO and COBS data)

$$m_1 = 13.2 + 5 \log d + 10 \log r$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
15	2021 08 11.08	S 11.4	TK	32.0L	5	144	2 1		PIL01	Uwe Pilz
15	2021 08 10.77	xS 11.9	AQ	40.0L	4	182	1.6 3/		ICQ XX WYA	Christopher Wyatt
15	2021 08 06.12	S 10.1	TK	20.3T10	100		5 2/		ICQ XX GON05	Juan Jose Gonzalez Suarez

15P/Finlay was discovered in 1886 by William Henry Finlay at the Royal Observatory at Cape of Good Hope in South Africa. The current apparition marks the 16th observed return of 15P though it was missed at a number of returns (1900, 1913, 1933, 1940, and 1947). Its best return was in 1906 when it passed 0.27 au from Earth and reached 6th magnitude. During its previous return in 2014/2015, 15P experienced two outbursts of 2-3 mag outburst with the brightest reaching 7th magnitude.

Uwe Pilz and Chris Wyatt observed 15P between magnitude 11.4 and 11.9 in early August with a 1.6 to 2' coma. J. J. Gonzalez found the comet to be as bright as magnitude 10.1 on August 6th with a 5' coma.

Perihelion was two months ago on July 13th at 0.99 au. Finlay should become a difficult visual object as it fades from magnitude 12.4 to 13.9 as it moves away from the Earth and Sun. The comet is a morning object in Gemini (Sep 1-27) and Cancer (27-30) and better placed for northern observers.

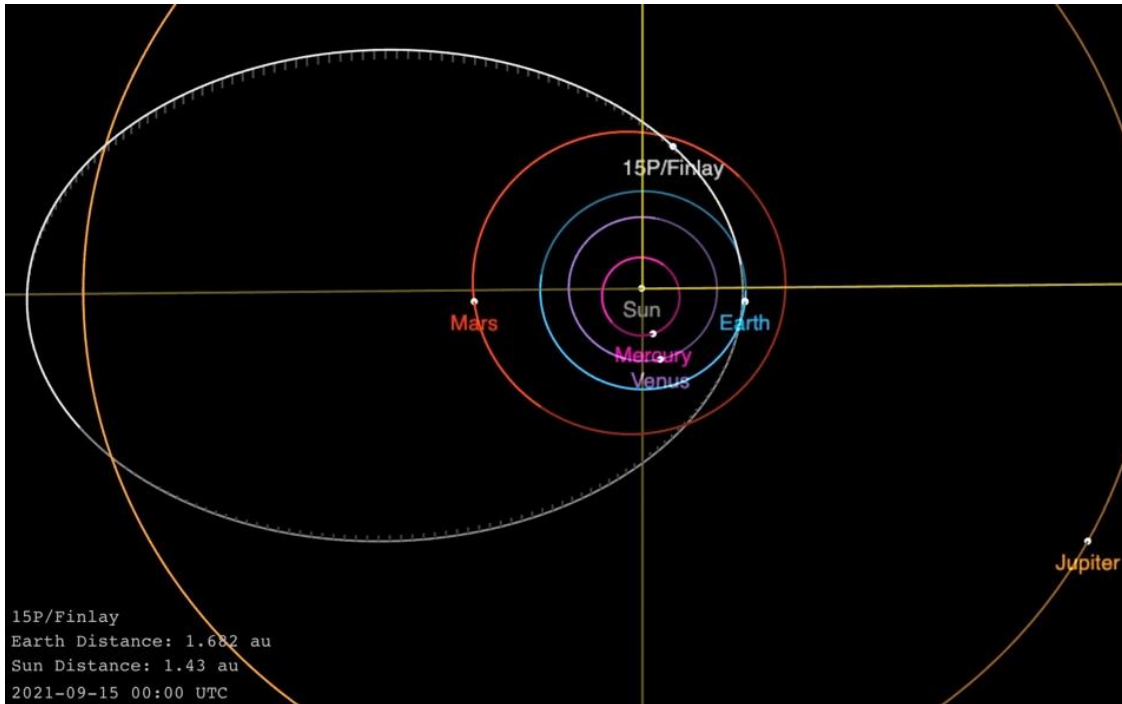


Figure 12 - Orbit of 15P/Finlay from the JPL Small-Body Browser.

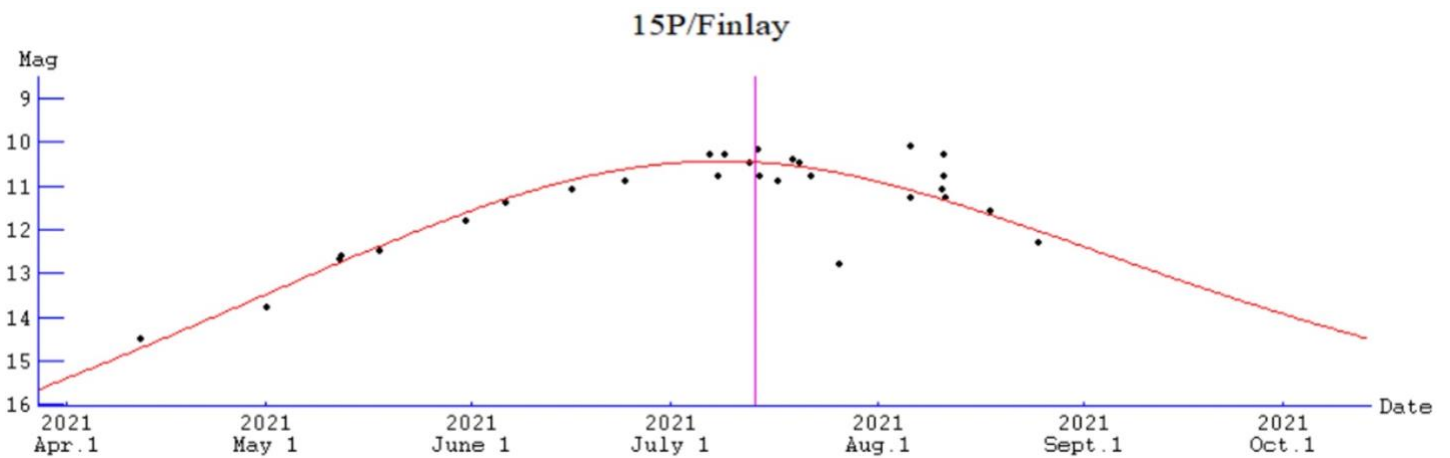


Figure 13 -

67P/Churyumov-Gerasimenko

Discovered 1969 September 11 by the Klim Ivanovic Churyumov and Svetlana Ivanovna Gerasimenko
Short-period comet with orbital period of ~6.43 years

Orbit (from Minor Planet Center, MPEC 2021-P47)

67P/Churyumov-Gerasimenko
Epoch 2021 Nov. 2.0 TT = JDT 2459520.5
T 2021 Nov. 2.06355 TT Rudenko
q 1.2106211 (2000.0) P Q
n 0.15340714 Peri. 22.13460 +0.52349722 -0.85108778
a 3.4559889 Node 36.33252 +0.77125182 +0.45339138
e 0.6497034 Incl. 3.87150 +0.36210674 +0.26473730
P 6.42
From 7006 observations 1995 July 3-2021 Aug. 5, mean residual 0".7.
Nongravitational parameters A1 = +0.07, A2 = +0.0106.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

67P/Churyumov-Gerasimenko									Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag		40N	40S
2021-Sep-01	03 03	+13 10	1.430	0.711	111M	Ari	12.0		63	37
2021-Sep-06	03 20	+14 34	1.399	0.666	111M	Ari	11.8		64	35
2021-Sep-11	03 38	+16 00	1.370	0.625	112M	Tau	11.5		66	34
2021-Sep-16	03 57	+17 25	1.343	0.588	112M	Tau	11.2		68	32
2021-Sep-21	04 17	+18 49	1.318	0.555	112M	Tau	10.9		69	31
2021-Sep-26	04 38	+20 11	1.295	0.526	112M	Tau	10.7		70	30
2021-Oct-01	04 59	+21 27	1.274	0.500	111M	Tau	10.4		72	28
2021-Oct-06	05 22	+22 38	1.256	0.479	111M	Tau	10.2		73	27

Comet Magnitude Formula (from Seiichi Yoshida)

$$m_1 = 9.5 + 5 \log d + 14.0 \log r(t-40)$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
67	2021 08 20.12	I 13.0	TK	25.0	C10	192			ICQ XX DECaa	Michel Deconinck
67	2021 08 13.58	xM 13.5	AQ	40.0	L	4 182	0.8 6	1.3m263	ICQ XX WYA	Christopher Wyatt
67	2021 08 10.73	xM 13.6	AQ	40.0	L	4 108	0.9 6	2.3m253	ICQ XX WYA	Christopher Wyatt
67	2021 08 06.73	xM 13.9	AQ	40.0	L	4 182	1.3 6		ICQ XX WYA	Christopher Wyatt
67	2021 08 06.08	S 12.7	AQ	20.3	T10	133	1.5 5		ICQ XX GON05	Juan Jose Gonzalez Suarez
67	2021 08 02.44	C 13.1	GG	27.9	T	6A120	0.3	4 m247	ICQ xx OLaxx	Mike Olason

67P was discovered on photographic plates taken on 1969 September 11 by Kiev University Astronomical Observatory astronomers Klim Ivanovic Churyumov and Svetlana Ivanovna Gerasimenko working with a 50-cm Maksutov astrograph at the Alma-Ata Astrophysical Institute in current day Kazakhstan. The current apparition is 67P's 9th observed return with perihelion occurring on 2021 November 2 at 1.21 au. A close approach to Earth at 0.42 au on November 12 makes this the comet's best return since 1982 when it came marginally closer to Earth at 0.39 au. At that return, a peak brightness of 9th magnitude was reached so a similar brightness should occur this November and December when it will be a morning object visible from

both hemispheres. 67P was famously the target of the ESA Rosetta/Philae mission, the only spacecraft to have orbited and landed on a comet. This will be 67P's first return since Rosetta ended its mission by soft landing onto the comet's surface.

Chris Wyatt, J. J. Gonzalez, Mike Olason, and Michel Deconinck observed 67P in August between magnitude 12.7 and 13.9 with a small 0.8 to 1.5' coma. Chris was also able visually observe a tail up to 2.3' in length with his 0.4-m reflector. The tail is also a striking feature in CCD images such as Mike Olason's image from August 2 below and Dan Bartlett's image from August 11 on this issue's cover page.

September should see 67P brighten from 12th to 10th magnitude as its moves through Aries (Sep 1-7) and Taurus (7-30) in the morning sky. Photo Op Alert: On September 22, 67P passes within 0.5 deg of Hind's Variable Nebula (NGC 1555).

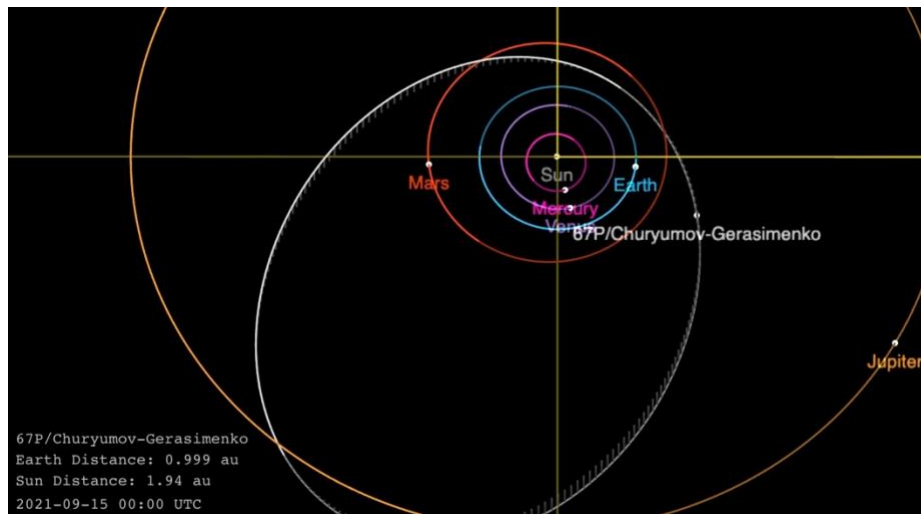


Figure 14 – Orbit of 67P/C-G from the JPL Small-Body-Browser.

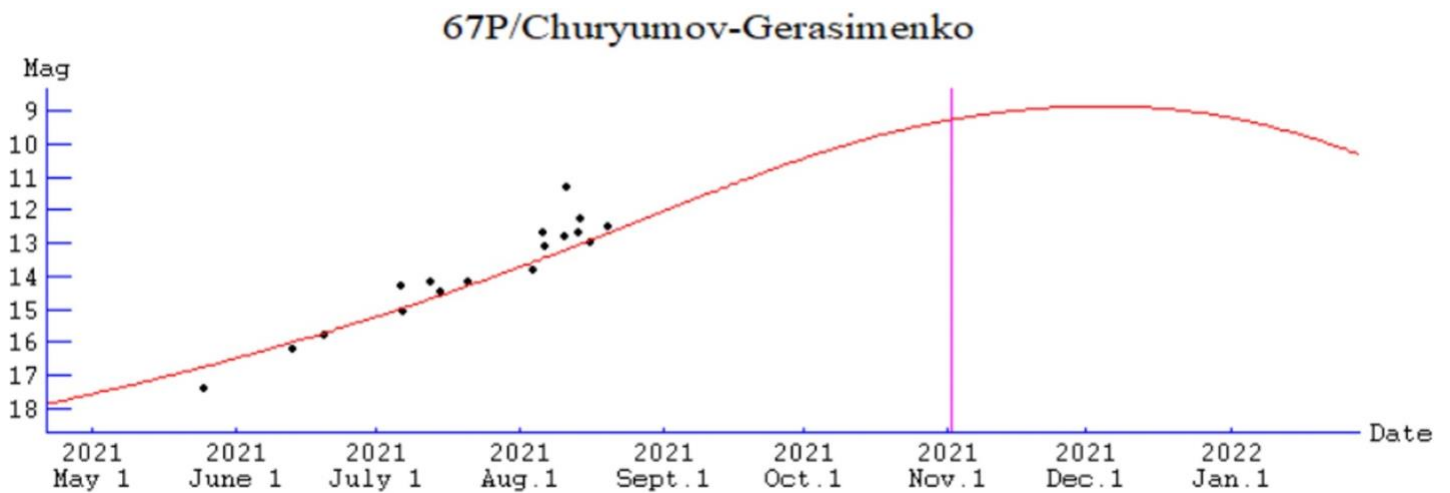


Figure 15 - Lightcurve of 67P/C-G from data submitted to the ALPO and Michael Lehmann's data submitted to the COBS site.

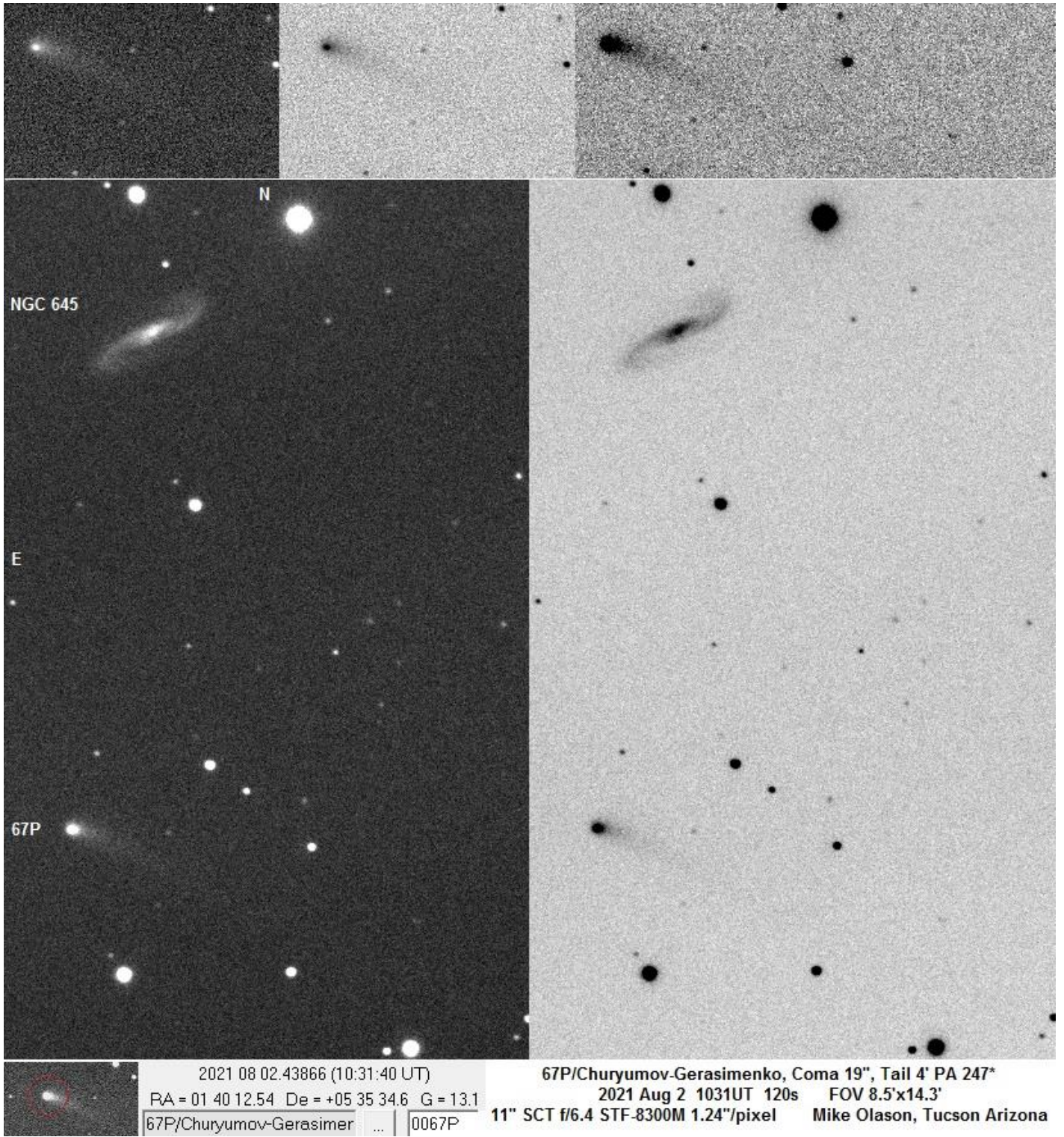


Figure 16 – 67P/C-G passed near nearly edge-on galaxy NGC 645 in this image by Mike Olason from August 2. Mike used a Celestron C-11 + f/6.4 focal reducer + STF-8300M camera.

C/2017 K2 (PANSTARRS)

Discovered 2017 May 21 by the Pan-STARRS survey with the Pan-STARRS1 1.8-m on Haleakala
Dynamically old long-period comet

Orbit (from Syuichi Nakano, Nakano Note NK 4448)

C/2017 K2 (PANSTARRS)
Epoch 2022 Dec. 7.0 TT = JDT 2459920.5
T 2022 Dec. 19.67178 TT Nakano
q 1.7969443 (2000.0) P Q
z -0.0004734 Peri. 236.19715 +0.01818315 +0.04923207
+/-0.0000004 Node 88.23537 -0.18094861 +0.98245608
e 1.0008506 Incl. 87.56309 -0.98332445 -0.17987844
From 4213 observations 2013 May 12-2021 May 3, mean residual 0".44.
(1/a)org.= +0.000028, (1/a)fut.= +0.001121 (+/-0.000000), Q= 9.
The comet will pass 2.66 AU from Jupiter on 2024 Oct. 15 and
7.88 AU from Uranus on 2029 Oct. 16 UT.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

C/2017 K2 (PANSTARRS)										Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag	40N	40S		
2021-Sep-01	16 57	+32 37	5.461	5.385	88E	Her	12.5	67	17		
2021-Sep-06	16 56	+31 35	5.418	5.391	86E	Her	12.5	65	17		
2021-Sep-11	16 56	+30 32	5.376	5.398	83E	Her	12.4	62	16		
2021-Sep-16	16 56	+29 30	5.333	5.406	80E	Her	12.4	60	15		
2021-Sep-21	16 57	+28 27	5.290	5.414	77E	Her	12.4	57	14		
2021-Sep-26	16 58	+27 26	5.247	5.422	74E	Her	12.3	55	12		
2021-Oct-01	16 59	+26 25	5.204	5.430	71E	Her	12.3	53	10		
2021-Oct-06	17 01	+25 26	5.160	5.437	68E	Her	12.3	50	7		

Comet Magnitude Formula (from ALPO and COBS data)

$$m1 = 2.2 + 5 \log d + 9.0 \log r$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
2017K2	2021 08 31.40 xM	13.0	AQ	40.0L	4	108	1.8 5/	ICQ XX WYA	XX	Christopher Wyatt
2017K2	2021 08 13.52 xM	13.0	AQ	40.0L	4	108	1.0 3/	ICQ XX WYA	XX	Christopher Wyatt
2017K2	2021 08 10.40 xM	13.2	AQ	40.0L	4	108	1.1 6	ICQ XX WYA	XX	Christopher Wyatt
2017K2	2021 08 06.45 xM	13.1	AQ	40.0L	4	108	1.0 5	ICQ XX WYA	XX	Christopher Wyatt
2017K2	2021 08 05.96 I	13.1:TK	25.0C10	192				ICQ XX DECa	XX	Michel Deconinck
2017K2	2021 08 05.91 S	12.2	AQ	20.3T10	133		1.5 4	ICQ XX GON05	XX	Juan Jose Gonzalez Suarez
2017K2	2021 08 04.30 C	13.3	GG	27.9T	6A300		0.8	ICQ xx OLAxx	xx	Mike Olason

C/2017 K2 (PANSTARRS) was discovered on 2017 May 21 by the Pan-STARRS1 1.8-m telescope at Haleakala on the Hawaiian island of Maui. At discovery the comet was around 21st magnitude and located at 16.1 au from the Sun. Pre-discovery observations were found back to May of 2013 when the comet was 23.7 au from the Sun. For comparison Uranus has a semi-major axis of 19.2 au.

C/2017 K2 (PANSTARRS) is still many months from a 2022 December 19 perihelion at 1.80 au when it should reach 6-7th magnitude. Several visual observations were made in August by Michel Deconinck, J. J. Gonzalez and Chris Wyatt as well as a CCD measurement by Mike Olason. Magnitude measurements ranged between 12.2 and 13.3 with most of the estimates falling between 13.0 and 13.3. All observers found a small moderately condensed coma of ~1-2'.

C/2017 K2 is an evening object in Hercules and is better placed for northern observers though it also visible from the southern hemisphere. The comet will continue to slowly brighten throughout the remainder of 2021 and all of 2022.

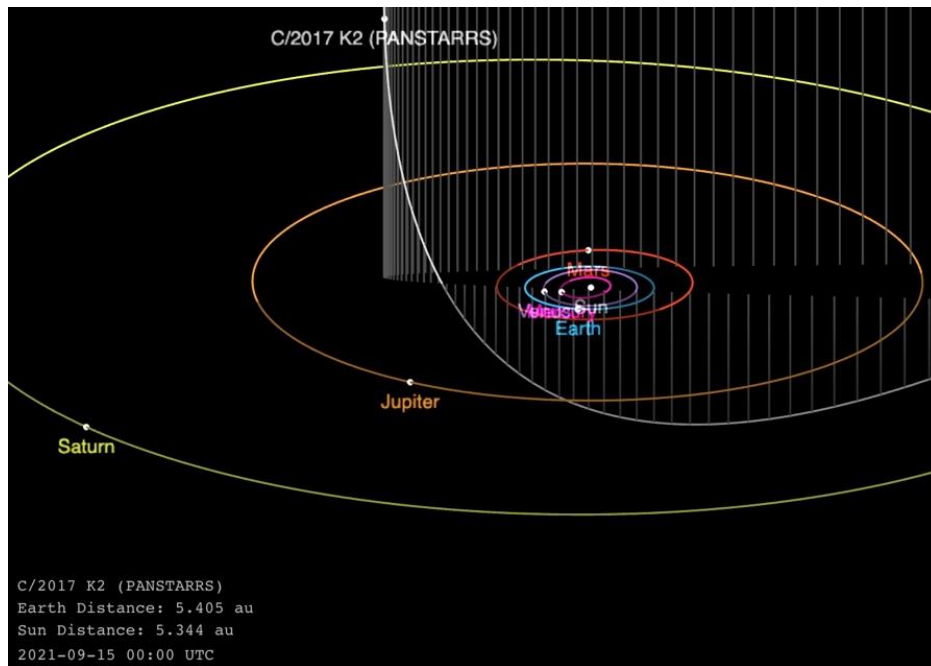


Figure 17 - Orbit of C/2017 K2 (PANSTARRS) from the JPL Small-Body Browser.

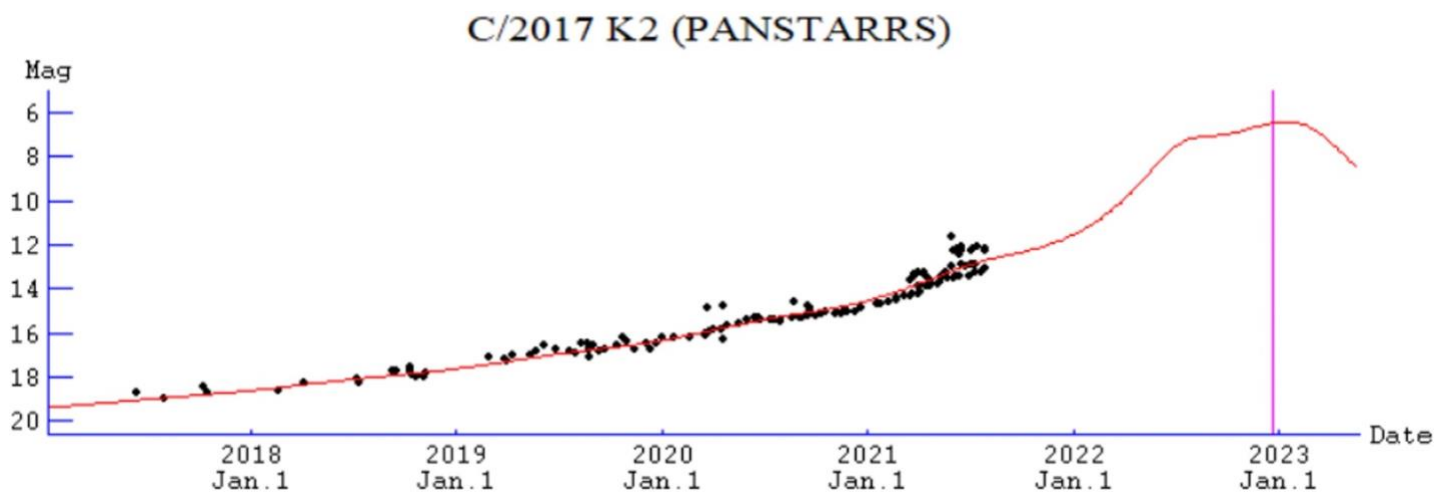


Figure 18 - Lightcurve of C/2017 K2 (PANSTARRS) from photometry submitted to the ALPO and Michael Lehmann's data submitted to the COBS site.

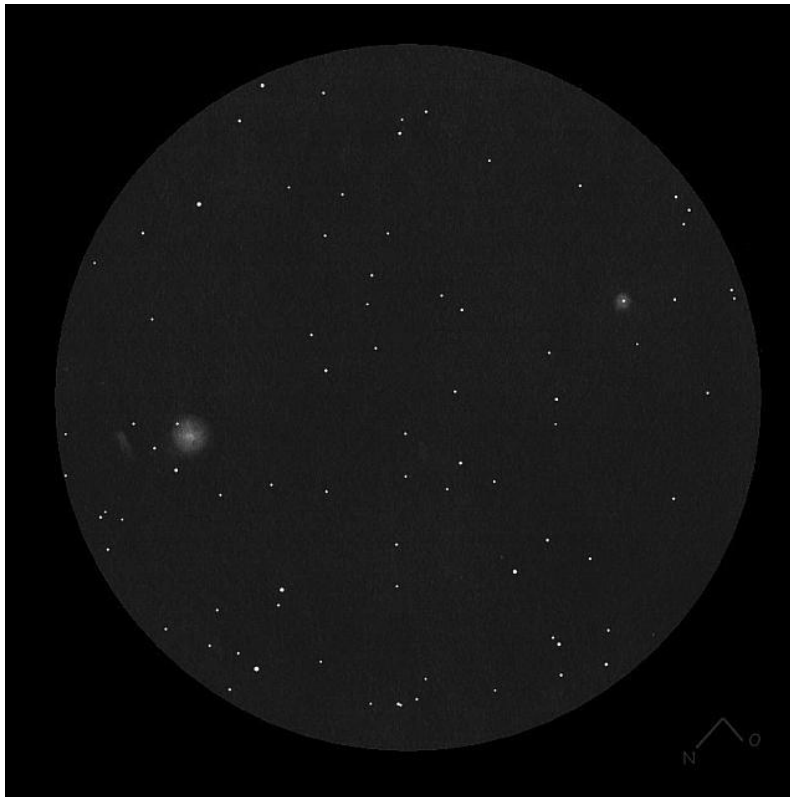


Figure 19 – Sketch of C/2017 K2 (PANSTARRS) on August 11 by Christian Harder with a 21" dobsonian at 215x. The comet is the bright diffuse object on the left. The fainter object to the left of the comet is the 15.9 mag galaxy UGC 10671. The diffuse object on the right is the 14.3 mag galaxy UGC 10677.



C/2017 K2 (PanSTARRS)
Binocular Vixen 126mm f5 - 40x

2021/08/11 - 21h10 UTC
F.O.S.: 42'

Magn.: +12.5 - Tail: N/A - Coma: ? - DC:4
Aquarellia mobile Observatory

Figure 20 - From the same night as the Christian Harder sketch, Michel Deconinck observed C/2017 K2 with Vixen 40x126 binoculars.

C/2019 L3 (ATLAS)

Discovered 2019 June 10 by the ATLAS survey with one of their 0.5-m f/2 Schmidt Dynamically old long-period comet

Orbit (from Syuichi Nakano, Nakano Note NK 4342)

C/2019 L3 (ATLAS)
 Epoch 2022 Jan. 21.0 TT = JDT 2459600.5
 T 2022 Jan. 9.61848 TT Nakano
 q 3.5544913 (2000.0) P Q
 z -0.0004539 Peri. 171.61068 -0.26052581 -0.66630775
 +/-0.0000010 Node 290.79047 +0.83675882 +0.20517556
 e 1.0016135 Incl. 48.36122 +0.48162328 -0.71689398
 From 1281 observations 2019 June 10-2021 Jan. 4, mean residual 0".36.
 (1/a)org.= +0.000021, (1/a)fut.= -0.000735 (+/-0.000001), Q= 8.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

C/2019 L3 (ATLAS)									Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag		40N	40S
2021-Sep-01	06 56	+45 31	3.748	4.140	60M	Aur	11.0		43	0
2021-Sep-06	07 03	+45 07	3.733	4.070	63M	Lyn	10.9		46	0
2021-Sep-11	07 09	+44 44	3.720	3.997	66M	Lyn	10.9		49	0
2021-Sep-16	07 15	+44 20	3.707	3.923	70M	Lyn	10.8		52	0
2021-Sep-21	07 20	+43 56	3.694	3.847	73M	Aur	10.8		56	0
2021-Sep-26	07 25	+43 32	3.682	3.770	77M	Aur	10.7		59	0
2021-Oct-01	07 30	+43 07	3.671	3.692	80M	Aur	10.7		63	0
2021-Oct-06	07 34	+42 42	3.660	3.613	84M	Lyn	10.6		67	0

Comet Magnitude Formula (from ALPO and COBS data)

$$m1 = 3.3 + 5 \log r + 8.0 \log r$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
2019L3	2021 08 11.08	S 11.2	TK	32.0L	5	80	0.7 s6/		PIL01	Uwe Pilz
2019L3	2021 08 06.10	S 11.3	TK	20.3T10	133		2.0 3/	ICQ XX	GON05	Juan Jose Gonzalez Suarez
2019L3	2021 08 02.45	C 11.4	GG	27.9T	6A600		1.0 > 2	m308 ICQ xx	OLAxx	Mike Olason

C/2019 L3 (ATLAS) is a far northern object in the morning sky. The comet's location in Auriga (Sep 1), Lynx (Sep 1-16), and back to Auriga (Sep 16-30) makes it well place for northern hemisphere observers but invisible from the southern hemisphere. Three measurements were submitted to the ALPO from J. J. Gonzalez, Mike Olason, and Uwe Pilz. All three observers found the comet around magnitude 11.2 to 11.4 with coma between 0.7 and 2.0' in diameter.

C/2019 L3 is still a few months from a 2022 January 9 perihelion at 3.57 au. The large perihelion distance means C/2019 L3 should remain a visual object well into 2022 and possibly even 2023. The comet has been brightening at rapid rate since discovery. If we assume a conservative $2.5n = 8$ rate of brightening from now till perihelion, it could become slightly brighter than magnitude 10 between December and February. At that time, it will be well placed in the opposition sky though perhaps a little low for southern hemisphere observers.

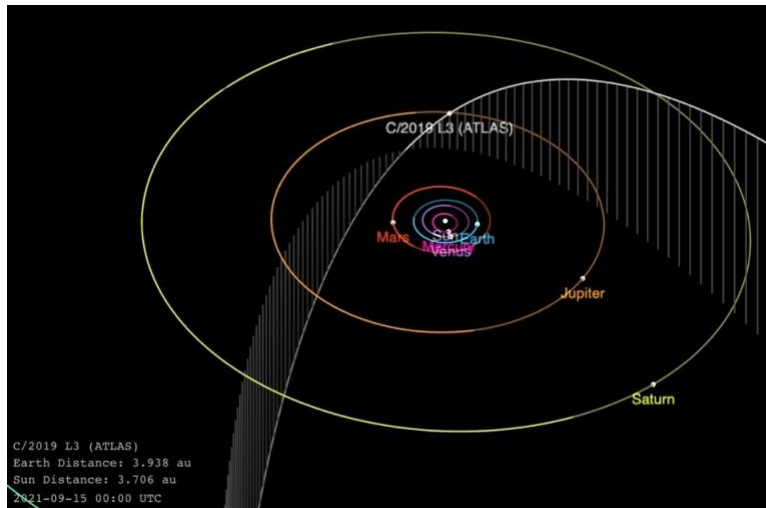


Figure 21 - Orbit of C/2019 L3 (ATLAS) from the JPL Small-Body Browser.

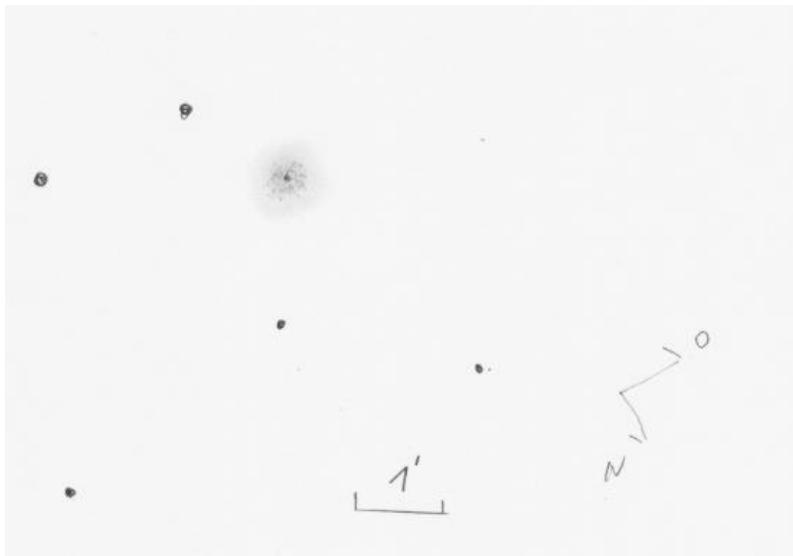


Figure 22 - Sketch of C/2019 L3 (ATLAS) by Uwe Pilz on August 10 with a 12" newtonian reflector at 144x.

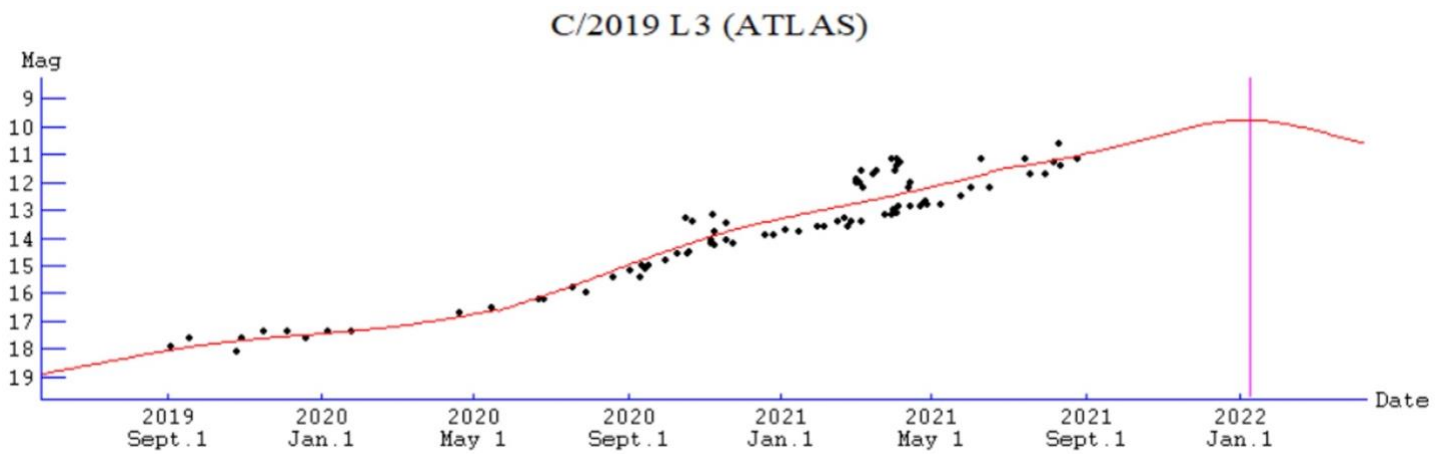


Figure 23 - Lightcurve of C/2019 L3 (ATLAS) from photometry submitted to the ALPO and Michael Lehmann's data submitted to the COBS site.

Fainter Comets of Interest (Fainter than 13.0)

29P/Schwassmann-Wachmann

Discovered 1927 November 15 by the Arnold Schwassmann and Arno Arthur Wachmann at the Hamburg Observatory in Bergedorf, Germany

Centaur comet with orbital period of ~14.8 years

Orbit (from Minor Planet Center, MPEC 2021-P47)

29P/Schwassmann-Wachmann
 Epoch 2021 July 5.0 TT = JDT 2459400.5
 T 2019 Mar. 26.71300 TT Rudenko
 q 5.7691551 (2000.0) P Q
 n 0.06641981 Peri. 49.15488 +0.99219204 -0.03314924
 a 6.0386190 Node 312.37551 -0.03070814 +0.86942155
 e 0.0446234 Incl. 9.36679 +0.12088000 +0.49295771
 P 14.8
 From 36866 observations 1902 Mar. 4-2021 Aug. 5, mean residual 0".9.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

29P/Schwassmann-Wachmann									Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag		40N	40S
2021-Sep-01	04 51	+31 09	5.909	5.941	83M	Aur	12-14		61	37
2021-Sep-06	04 53	+31 17	5.911	5.865	87M	Aur	12-14		66	35
2021-Sep-11	04 54	+31 25	5.912	5.788	92M	Aur	12-14		70	34
2021-Sep-16	04 56	+31 33	5.913	5.711	96M	Aur	12-14		74	32
2021-Sep-21	04 56	+31 40	5.915	5.635	101M	Aur	12-14		78	31
2021-Sep-26	04 57	+31 47	5.916	5.560	106M	Aur	12-14		81	30
2021-Oct-01	04 57	+31 53	5.918	5.488	110M	Aur	12-14		82	28
2021-Oct-06	04 57	+31 59	5.919	5.417	115M	Aur	12-14		82	27

Comet Magnitude Formula

None, due to frequent outbursts.

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD	Mag	SC	APER	FL	POW	COMA	TAIL	ICQ CODE	Observer Name
	(UT)						Dia DC	LENG PA		
29	2021 08 10.76	xI[14.9	AQ	40.0L	4	261			ICQ XX WYA	Christopher Wyatt
29	2021 08 04.44	C 15.4	GG	27.9T	6A600		0.5		ICQ xx OLaxx	Mike Olason

29P/Schwassmann-Wachmann was discovered photographically on 1927 November 15 by German observing team Arnold Schwassmann and Arno Arthur Wachmann. The duo discovered 4 comets together, three short-period comets (29P/Schwassmann-Wachmann, 31P/Schwassmann-Wachmann, and 73P/Schwassmann-Wachmann) and a long-period comet shared with Leslie Peltier [C/1930 D1 (Peltier-Schwassmann-Wachmann)].

29P is one of the more enigmatic comets. It is always active and rarely fainter than 17th-18th magnitude. Multiple times per year outbursts occur resulting in a peak brightness that can reach 10th magnitude though most

peaks fall in the 11th to 14th magnitude range. Richard Miles (Director of the British Astronomical Society's Asteroids and Remote Planets Section) has published a series of papers on 29P and its outbursts. He found that as many as 6 active areas are producing outbursts on a nucleus with a rotation period of ~57-58 days. 29P is also considered a member of the Centaur population. Different organizations have different definitions for what constitutes a member of the Centaurs. The two most common definitions are from the Minor Planet Center (perihelion beyond the orbit of Jupiter and semi-major axis within the orbit of Neptune) and the Jet Propulsion Laboratory (semi-major axis between the orbits of Jupiter and Neptune). Both definitions would classify 29P as a Centaur.

29P has experienced two outbursts in recent weeks. An outburst of ~2 magnitudes was first observed by J. F. Soulier on August 25 while a smaller ~1 magnitude outburst was reported by Patrick Wiggins and observers using the GROWTH India Telescope on September 4.

The comet is a morning object in Auriga and observable from both hemispheres. If you image 29P, please consider contributing to the British Astronomical Society's (BAA) 29P monitoring program coordinated by Richard Miles. You can find more information at the BAA's "Observing the outbursting comet 29P/Schwassmann-Wachmann" page (<https://britastro.org/node/18562>) and at the BAA's "Mission 29P" page (<https://britastro.org/node/25120>).

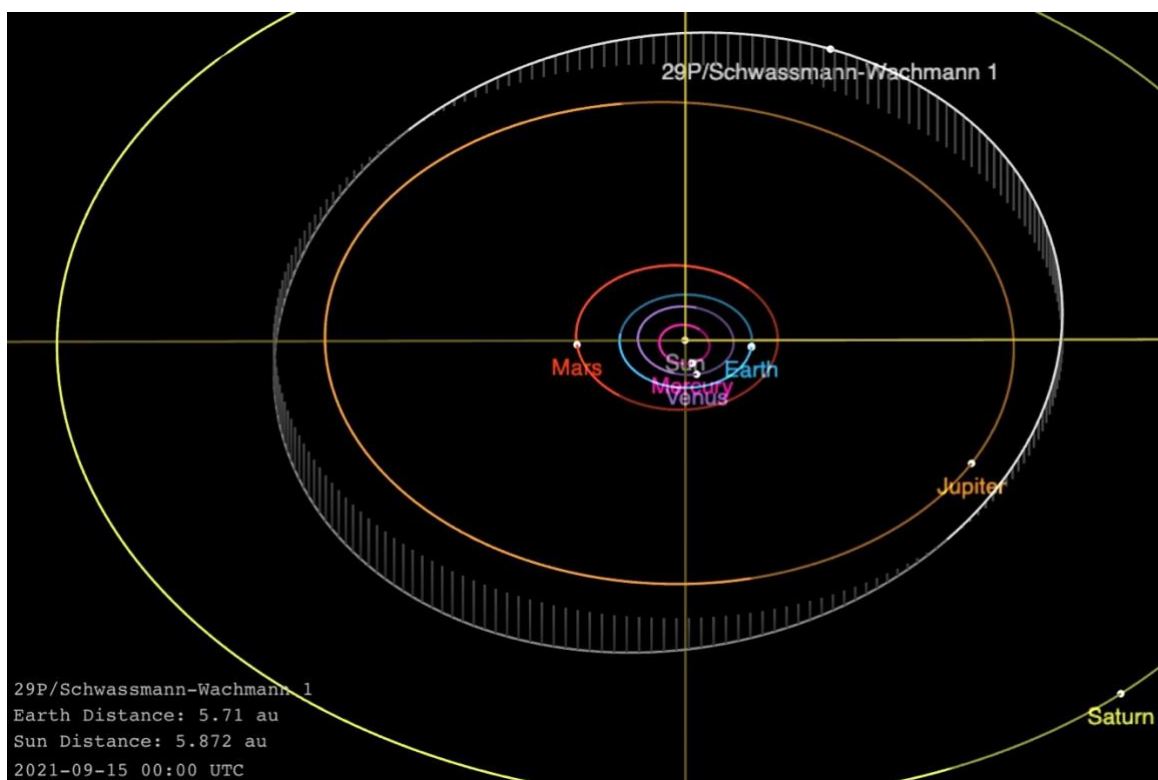


Figure 24 - Orbit of 29P from the JPL Small-Body Browser.

C/2021 A1 (Leonard)

Discovered 2021 January 3 by Greg Leonard of the Catalina Sky Survey with the 1.5-m on Mount Lemmon
Dynamically old long-period comet

Orbit (from Syuichi Nakano, Nakano Note NK 4507)

C/2021 A1 (Leonard)
Epoch 2022 Jan. 21.0 TT = JDT 2459600.5
T 2022 Jan. 3.30026 TT
q 0.6152393 (2000.0) P Nakano Q
z -0.0000203 Peri. 225.09370 +0.63774801 +0.29159700
+/-0.0000023 Node 255.89553 +0.72790120 -0.53082217
e 1.0000125 Incl. 132.68637 -0.25186767 -0.79573803
From 1016 observations 2020 Apr. 11-2021 July 22, mean residual 0".52.
(1/a)org.= +0.000525, (1/a)fut.= -0.000080 (+/-0.000002), Q= 8.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

C/2021 A1 (Leonard)									Max El (deg)	
Date	R.A.	Decl.	r	d	Elong	Const	Mag	40N	40S	
2021-Sep-01	10 54	+41 25	2.283	3.060	33E	UMa	14.0	9	0	
2021-Sep-06	10 57	+40 44	2.214	2.974	34M	UMa	13.8	8	0	
2021-Sep-11	11 01	+40 05	2.144	2.881	35M	UMa	13.6	10	0	
2021-Sep-16	11 05	+39 27	2.073	2.782	37M	UMa	13.5	13	0	
2021-Sep-21	11 09	+38 51	2.002	2.676	39M	UMa	13.2	15	0	
2021-Sep-26	11 14	+38 16	1.930	2.564	41M	UMa	13.0	18	0	
2021-Oct-01	11 18	+37 43	1.858	2.445	43M	UMa	12.8	21	0	
2021-Oct-06	11 23	+37 12	1.784	2.319	46M	UMa	12.5	24	0	

Comet Magnitude Formula (from ALPO and COBS data)

$$m_1 = 8.7 + 5 \log d + 8.0 \log r$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:

Comet Des	YYYY MM DD.DD	Mag	SC	APER	FL	POW	COMA	TAIL	ICQ CODE	Observer Name
	(UT)					T	Dia	DC	LENG	PA
None										

The 10th comet to bear Catalina Sky Survey astronomer Greg Leonard's name was found on 2021 January 3 with the Mount Lemmon 1.5-m reflector. (Greg would discover two additional comets since then.) C/2021 A1 (Leonard) was around magnitude 19 and located at a distance of 5.1 au from the Sun at discovery. Pre-discovery observations from Mount Lemmon and PANSTARRS have been found back to April 2020 (when the comet was 7.5 au from the Sun).

C/2021 A1 has the potential to become a nice object at the end of the year due to a relatively small perihelion of 0.62 au on 2022 January 3, a close approach to within 0.233 au from Earth on December 12, and a phase angle that reaches a maximum of 160 degrees at the time of close approach which may result in a few magnitudes of enhanced brightness due to forward scattering of light by cometary dust. Working against it are difficult observing circumstance due to a small solar elongation at the time of maximum brightness (minimum

elongation of 15 deg) resulting in the possibility that the comet may be too faint to be seen while so close to the Sun.

Based on CCD photometry submitted to the Minor Planet Center, COBS, and the ALPO, C/2021 A1 appeared to brighten at a rapid rate of $2.5n \sim 16$ through 2020, but then slowed down drastically to a rate closer to $2.5n \sim 6$ for most of 2021. Observations have been scarce lately as the comet passes through solar conjunction, though well north of the Sun. Surprisingly the few observations submitted to the COBS site in late July and August (by observers Harri Kiiskinen, Steffan Fritsche, and Michael Lehmann) suggest that Leonard may have started a new rapid brightening phase. The most recent observations from Harri Kiiskinen on August 29 and 30 and September 1 and 4 had the comet at magnitude 13.8-14.3. As Leonard moves further out of the glare of dawn, hopefully we'll get a better idea of its current brightening rate.

Assuming the recent Kiiskinen magnitudes are correct and a conservative $2.5n \sim 8$ brightening rate, C/Leonard is a should reach 12-13th magnitude by the end of September. As has been the case for months now, Leonard is a far northern object in Ursa Major meaning it is still not visible from the southern hemisphere. Imagers and now large aperture visual observers are strongly encouraged to monitor C/2021 A1 as it approaches its January perihelion and beyond.

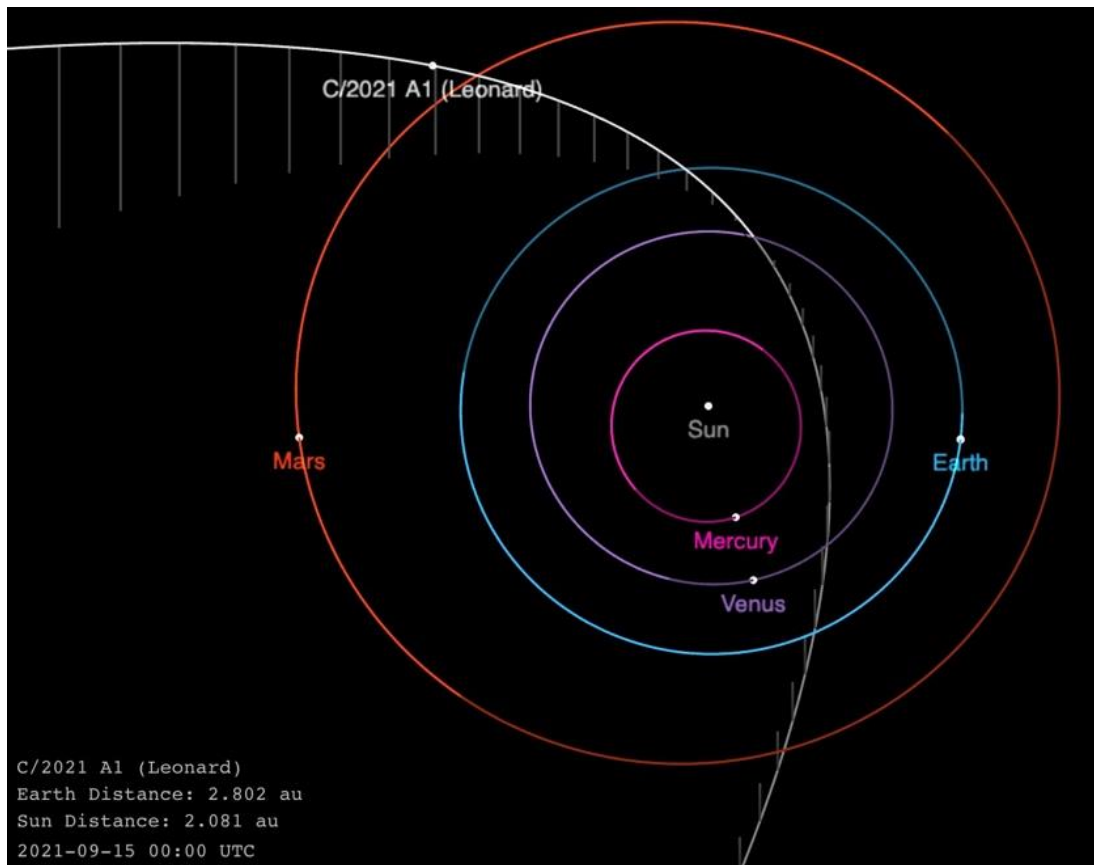


Figure 25 - Orbit of C/2021 A1 (Leonard) from the JPL Small-Body Browser.

C/2021 O3 (PANSTARRS)

Discovered 2021 July 26 by Pan-STARRS with the 1.8-m Pan-STARRS1 1.8-m on Haleakala

Orbit (from Syuichi Nakano, private email)

C/2021 O3 (PANSTARRS)
 T 2022 Apr. 21.25384 TT Nakano
 q 0.2869675 (2000.0) P Q
 Peri. 299.99950 -0.56870972 -0.81190292
 Node 189.07502 +0.64626694 -0.54021337
 e 1.0 Incl. 56.70951 -0.50883032 +0.22132140
 From 90 observations 2021 July 26-Aug. 5.

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Sep-01	22 59	+27 13	3.891	3.028	144M	Peg	18.2	77	23
2021-Sep-06	22 53	+26 43	3.831	2.949	146E	Peg	18.1	77	23
2021-Sep-11	22 48	+26 07	3.771	2.876	148E	Peg	18.0	76	24
2021-Sep-16	22 42	+25 23	3.711	2.812	149E	Peg	17.9	75	25
2021-Sep-21	22 36	+24 33	3.650	2.755	148E	Peg	17.8	75	25
2021-Sep-26	22 30	+23 36	3.589	2.706	146E	Peg	17.7	74	26
2021-Oct-01	22 25	+22 33	3.527	2.665	144E	Peg	17.6	73	27
2021-Oct-06	22 19	+21 25	3.465	2.631	140E	Peg	17.5	71	29

Comet Magnitude Formula (based on data submitted to the COBS and the MPC)

$$m_1 = 11.2 + 5 \log d + 8 \log r$$

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Recent Magnitude Measurements in ICQ format:
 Comet Des YYYY MM DD.DD Mag SC APER FL POW COMA TAIL ICQ CODE Observer Name
 (UT) T Dia DC LENG PA
 None

C/2021 O3 (PANSTARRS) was first seen on July 26 at 19th magnitude by the Pan-STARRS1 1.8-m Ritchey-Chretien on Haleakala. Though currently 4.2 au from the Sun, C/2021 O3 will get a lot closer to the Sun at perihelion. With a short published observational arc, the comet appears to be a long-period comet though it will be some weeks (unless pre-discovery observations are found) before we know whether it is dynamically old or new.

Perihelion occurs on 2022 April 21 at 0.29 au. We still don't have any information on this comet's brightening rate as few observations have been published by the MPC or submitted to COBS or the ALPO. Regardless, C/2021 O3 will experience some of the same observational issues as C/2021 A1 (Leonard). On the plus side, PANSTARRS will reach a relatively large phase angle though not as large as Leonard (only ~136 vs 160 deg). PANSTARRS will also be located at very small solar elongations near perihelion which will make it a VERY difficult object to observe until a few weeks after perihelion and then only for northern observers.

Like last month, C/2021 O3 is riding high in Pegasus in the evening for northern observers, but not so far north southern observers won't also be able to observe it. Though observations will be limited to imaging as it is expected to be around 17-18th magnitude this month.

Southern hemisphere observers should be able to follow PANSTARRS till the end of the year when the comet could be around 15-16th magnitude. Northern hemisphere observers will be able to follow it for another month or two till mid-February when it could be as bright as 13-14th magnitude. The comet will then spend the next two and a half months within 20 deg of the Sun.

The analysis that follows assumes the comet will not disintegrate. If it turns out to be dynamically new, its current brightness suggests an intrinsically faint object that may be prone to disintegration.

The comet's orbit is aligned in such a way that the comet will be mainly a northern hemisphere object except for a week or so centered on perihelion. On the date of perihelion C/2021 O3 will be an evening object located only 16 deg from the Sun. Northern hemisphere observers (for +40N) will not be able to observe it at that time as it will still be 7 deg below the horizon at the start of nautical twilight. It will be observable from the southern hemisphere (-40S) when it will be at an elevation of 5 deg at the start of nautical twilight and only 1 deg below the horizon at the start of astronomical twilight. If the comet brightens at a 2.5n ~ 10 from now till perihelion, it could be a 4th magnitude object. If its rate of brightening is 2.5n ~ 8, it will be fainter at 6-7th magnitude. Either way this will be a difficult observation.

The comet becomes observable in a dark sky (after the end of astronomical twilight) by the first few nights of May. This is around the time of maximum phase angle (135 deg) which may provide a 1-2 magnitude boost in brightness. Still, we are talking about an object that may only be around 3rd-6th magnitude and still located ~20 deg from the Sun. Though it will be fading fast, the comet will quickly move north and circumpolar by mid-May.

Like Leonard, imagers are highly encouraged to observe PANSTARRS over the coming months.

New Discoveries, Recoveries and Other Comets in the News

Remembering Carolyn Shoemaker (1929-2021) – August brought the sad news that Carolyn Shoemaker passed away. I can't hope to do Carolyn justice so instead I ask that you read the two wonderful pieces posted by David Levy at Sky & Telescope website and by the United States Geological Survey.

<https://skyandtelescope.org/astronomy-news/remembering-carolyn-shoemaker-1929-2021/>
<https://www.usgs.gov/center-news/remembering-carolyn-s-shoemaker-1929-2021>

New Comet Numberings (Ref: WGSBN Bull. 1 #6)

425P/2005 W3 = P/2021 O2 (Kowalski)
424P/2012 S2 = P/2021 L5 (La Sagra)
423P/2008 CL94 = P/2021 A12 (Lemmon)
422P/2006 S4 = P/2021 L1 (Christensen)
421P/2009 U4 = P/2020 H10 (McNaught)

P/2021 Q5 (ATLAS) – The "Asteroid Terrestrial-Impact Last Alert System" (ATLAS) project discovered a 17th magnitude short-period comet on August 29 with a 0.5-m f/2 Schmidt on Haleakala, Hawaii. Perihelion was only a few days ago on August 30 at 1.23 au. The current orbit is still uncertain but suggests the comet had a close approach within 0.06-0.25 au of Jupiter in late 2018 or early 2019. The comet may have had a very different orbit prior to that close approach explaining why it was not seen previously. The current orbit gives an orbital period of 5.6-years but that may change as the orbit is refined.

There are questions as to this comet's current brightness. Most CCD observations submitted to COBS have the comet between magnitude 15 and 18. Most also measured a coma smaller than 10". Michael Jager found a much larger coma at 130-140" but still estimated the comet at a faint 17th magnitude. J. J. Gonzalez reported a visual detection of C/2021 Q5 at magnitude 11.5 with a coma diameter of 4'. Hopefully further visual attempts will be made to confirm the true brightness of this object. If J. J.'s brightness is confirmed, I will post an update to our CloudyNights forum page. [Ref: MPEC 2021-R98, CBET 5029]

C/2021 Q4 (Fuls) – D. Carson Fuls discovered the 5th comet to be named after him. C/2021 Q4 was found on 2021 August 26 at 19-20th magnitude with the Mount Lemmon 1.5-m. Several pre-discovery images were found back to April 2020 when the comet was 22nd magnitude. Perihelion won't be till 2023 June 10 at 7.56 au when the comet will be slightly brighter at 19th magnitude. [Ref: MPEC 2021-Q102, CBET 5028]

C/2021 Q3 (ATLAS) – A 19th magnitude object first detected by the ATLAS survey on 2021 August 26 was found to be cometary in follow-up images taken by Pan-STARRS. C/2021 Q3 has a ~600 +/- 200 year orbit with a distant perihelion on 2022 January 23 at 5.20 au. It will likely get no brighter than 18th magnitude. [Ref: MPEC 2021-Q97, CBET 5027]

P/2021 Q2 = P/2011 A2 (Scotti) – B. T. Bolin of the Zwicky Transient Facility used the 1.2-m Schmidt on Mount Palomar to recover this short-period comet on 2021 August 20, 23, 24, and 25 at 18th magnitude. Perihelion will be later this year on December 2 at 1.55au. P/Scotti was discovered by former ALPO Comets Section Assistant Recorder Jim Scotti on 2011 January 11 with the Spacewatch 0.9-m on Kitt Peak. During its discovery apparition it reached 16-17th magnitude. This time around it should peak at 17th magnitude. [Ref: MPEC 2021-Q69, CBET 5026]

P/2021 Q1 = P/2014 W12 (Gibbs) – E. Schwab (Egelsbach, Germany) with D. Koschny, M. Micheli, and E. Petrescu used a 0.8-m f/3 Schmidt telescope at Calar Alto to recover this comet at 19-20th magnitude on 2021 August 16-17. P/Gibbs peaked at 16-17th magnitude in 2014. The comet already passed through perihelion on 2021 May 14 at 1.67 au and is currently 2 magnitudes fainter than its brightness in 2014 would suggest. S. Nakano found a night of pre-discovery observations from the Catalina Sky Survey taken in 2008. [Ref: MPEC 2021-Q47, CBET 5025]

P/2021 P5 = P/2015 Q1 (Scotti) – Jim Scotti had another one of his comets recovered last month. F. Kugel recovered 20th magnitude P/2015 Q1 = P/2021 P5 on images taken on 2021 August 2, 3, 7, 8, and 16. J. Maikner also reported observations from 2021 June 5 and August 5 and J.-F. Soulier from August 8. Kugel used a 0.4-m f/2.8 reflector, Maikner used a 0.30-m f/3.8 Riccardi-Honders, and Soulier a 0.25-m f/3.5 Newtonian reflector. The comet reached 15-16th magnitude in 2015/16. This time it may brighten to 18th magnitude around the time of its 2022 February 13 perihelion at 1.81 au. [Ref: MPEC 2021-Q75]

C/2021 P4 (ATLAS) – The "Asteroid Terrestrial-Impact Last Alert System" (ATLAS) search program found this 19th magnitude comet on 2021 August 10 with their 0.5-m f/2 Schmidt reflector on Haleakala, Hawaii. Perihelion occurs on 2022 July 29 at 1.08 au. Unfortunately, the comet will be located on the other side of the Sun at a geocentric range of ~2 au and low solar elongation. An assumed photometric index of $2.5n = 10$ only brings C/2021 P4 up to 11th magnitude at perihelion. Too bad perihelion wasn't in early March when a close approach to within 0.1 au of Earth would have occurred resulting in a 4-5th magnitude comet racing through the opposition sky. Oh well, perhaps it will be a better object for Earth-based observers when it returns in ~1700 years. [Ref: MPEC 2021-Q42, CBET 5024]

P/2021 P3 (PANSTARRS) – Now begins the Pan-STARRS portion of our broadcast as the next few objects were either recovered or discovered by Pan-STARRS. P/2021 P3 is a short-period comet with an orbital period of 9.3-years and perihelion back on 2021 May 28 at 2.91 au. It is unlikely to get any brighter than at its 2021 August 11 discovery when it was 20th magnitude. [Ref: MPEC 2021-Q29, CBET 5022]

C/2021 P2 (PANSTARRS) – Pan-STARRS first found this 21st magnitude object on 2021 August 7 followed by pre-discovery observations from 2021 June 19. With a distant 5.07 au perihelion on 2023 January 23, C/2021 P2 will be near peak brightness for ~2 years. Unfortunately, that peak brightness will be a faint 19th magnitude. [Ref: MPEC 2021-Q28, CBET 5023]

C/2021 P1 (PANSTARRS) – Pan-STARRS found another distant ($q = 4.37$ au) and faint (20-21st magnitude) comet on August 9 with pre-discovery observations found on July 14, 21 and August 4. Perihelion will occur on 2022 June 1. The comet is not expected to get much brighter than magnitude 20. [Ref: MPEC 2021-Q2, CBET 5020]

P/2021 N4 - Y. Ramanjooloo (University of Hawaii) reported to the CBAT the discovery of a 21-22nd magnitude Main Belt comet in images taken on 2021 July 8 and August 9 with the Pan-STARRS1 1.8-m reflector on Haleakala. Pre-discovery observations from two nights in October and November 2016 have been found by Pan-STARRS. Perihelion occurs on 2021 August 28 at 2.30 au. Being a Main Belt comet, it won't get far from the Sun with a "shallow" aphelion of only 3.79 au. The comet has likely already peaked in brightness. Unlike other Main Belt comets, no name was given to this object since its orbit is obviously asteroidal. It will be interesting to see if names will be withheld from future Main Belt comets. [Ref: MPEC 2021-Q1, MPEC 2021-Q96, CBET 5019]

P/2021 M1 = P/2008 QP20 (LINEAR-Hill) – This short-period comet was co-discovered by the LINEAR survey and the ALPO's very own Solar Section Coordinator Rik Hill. It is the second comet to be named

LINEAR-Hill, the other being the split comet P/2004 V5. During its discovery apparition in 2008, this P/LINEAR-Hill peaked at 16th magnitude. Its recovery was made by the Pan-STARRS program over seven nights in June, July, and August of this year. The current apparition sees perihelion on 2022 January 2 at 1.81 au and a peak brightness of only ~19th magnitude. P/LINEAR-Hill has an orbital period of 6.7 years. [MPEC 2021-Q68]

P/2021 K4 = P/2019 A7 (PANSTARRS) – M. Micheli reported to the CBAT that H. Hsieh and D. Faes used the 8.1-m Gemini South telescope on Cerro Pachon in Chile to recover this Main Belt comet on 2021 May 17 and June 13 at 22nd magnitude. This object reached 19th magnitude in 2019 when it was already a year after perihelion. It is now after aphelion and hence why a comet that was discovered in 2019 can be recovered only ~2 years later. Its next perihelion will be on 2023 September 12 at 2.67 au. If it brightens like it did in 2019, it may again peak around 19th magnitude in late 2023 into early 2024. [Ref: CBET 5010]

P/2021 L6 = P/2017 S5 (ATLAS) – M. Micheli also reported to the CBAT that H. Hsieh, S. Margheim, and L. Magill used the 8.1-m Gemini South telescope on Cerro Pachon in Chile to recover another Main Belt comet. P/2021 L6 was recovered on 2021 June 9, 12 and 13 at 24th magnitude. This object reached 17th magnitude in 2017. The next perihelion will be on 2023 March 19 at 2.17 au though it may only brighten to 19th magnitude during this return. [Ref: CBET 5011]

As always, the Comet Section is happy to receive all comet observations, whether textual descriptions, images, drawings, magnitude estimates, or spectra. Please send your observations via email to the Comets Section < comets @ alpo-astronomy .org >, Comets Section Coordinator Carl Hergenrother < carl.hergenrother @ alpo-astronomy .org > and/or Comets Section Acting Assistant Coordinator Michel Deconinck < michel.deconinck @ alpo-astronomy .org >.

Thank you to everyone who contributed to the ALPO Comets Section!

Stay safe and enjoy the sky!
- Carl Hergenrother

Recent Magnitudes Contributed to the ALPO Comets Section

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
						T				
C/2021 O1 (Nishimura)	2021 08 05.48	C 9.0	GG	27.9T	6A270		>1.0		ICQ xx OLAXx	Mike Olason
2021O1	2021 08 04.48	C 8.9	GG	27.9T	6A600		>1.5	280	ICQ xx OLAXx	Mike Olason
2021O1	2021 08 03.48	C 10.2	GG	27.9T	6A240		>1.0	> 1.0m291	ICQ xx OLAXx	Mike Olason
2021O1	2021 08 01.49	C 10.1	GG	27.9T	6A090		>1.0	> 1.0m298	ICQ xx OLAXx	Mike Olason
P/2021 N2 (Fuls)	2021 08 02.43	C 17.4	GG	27.9T	6A900		0.1	0.4m249	ICQ xx OLAXx	Mike Olason
P/2021 N1 (ZTF)	2021 08 04.42	C 17.3	GG	27.9T	6a200		0.3		ICQ xx OLAXx	Mike Olason
P/2021 L2 (Leonard)	2021 08 05.42	C 19.1	GG	27.9T	6a800		0.2		ICQ xx OLAXx	Mike Olason
C/2020 T2 (Palomar)	2021 08 31.42	xM 10.7	AQ	40.0L	4 59		3.7 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 13.53	xM 10.9	AQ	40.0L	4 59		4.4 5		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 10.39	xM 10.7	AQ	40.0L	4 59		3.9 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 08.97	M 10.8	TK	9.0R	5 34		3 6		ICQ XX SOU01	Willian Souza
2020T2	2021 08 07.98	M 10.7	TK	9.0R	5 50		3 6		ICQ XX SOU01	Willian Souza
2020T2	2021 08 06.45	xM 10.6	AQ	40.0L	4 59		4.5 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 08 05.90	S 9.7	TK	20.3T10	77		7 3/		ICQ XX GON05	Juan Jose Gonzalez Suarez
2020T2	2021 08 04.32	C 16.7	GG	27.9T	6A900		0.2		ICQ xx OLAXx	Mike Olason
C/2020 S3 (Erasmus)	2021 08 04.39	C 16.7	GG	27.9T	6a200		0.7	>12 m257	ICQ xx OLAXx	Mike Olason
C/2020 PV6 (PANSTARRS)	2021 08 31.41	xM 14.8	AQ	40.0L	4 261		0.3 6		ICQ XX WYA	Christopher Wyatt
2020PV6	2021 08 13.54	xM 14.7	AQ	40.0L	4 261		0.6 6		ICQ XX WYA	Christopher Wyatt
2020PV6	2021 08 10.40	xM 14.6	AQ	40.0L	4 261		0.4 5/		ICQ XX WYA	Christopher Wyatt
2020PV6	2021 08 06.46	xM 14.9	AQ	40.0L	4 261		0.5 5/		ICQ XX WYA	Christopher Wyatt
C/2020 K6 (Rankin)	2021 08 04.33	C 19.0	GG	27.9T	6a200		0.2		ICQ xx OLAXx	Mike Olason
C/2020 K1 (PANSTARRS)	2021 08 04.16	C 11.9	GG	27.9T	6A300		2.0	135	ICQ xx OLAXx	Mike Olason
C/2020 J1 (SONEAR)	2021 08 31.40	xM 13.8	AQ	40.0L	4 108		1.0 5/		ICQ XX WYA	Christopher Wyatt
2020J1	2021 08 10.38	xM 14.3	AQ	40.0L	4 182		0.5 6		ICQ XX WYA	Christopher Wyatt
2020J1	2021 08 06.44	xM 13.2	AQ	40.0L	4 108		1.5 6		ICQ XX WYA	Christopher Wyatt
2020J1	2021 08 05.89	S 11.2	TK	20.3T10	100		5 1/		ICQ XX GON05	Juan Jose Gonzalez Suarez
C/2020 F5 (MASTER)	2021 08 31.44	xM 14.8	AQ	40.0L	4 182		1.0 6		ICQ XX WYA	Christopher Wyatt
2020F5	2021 08 10.43	xM 14.4	AQ	40.0L	4 182		0.7 4/		ICQ XX WYA	Christopher Wyatt
2020F5	2021 08 06.48	xM 14.7	AQ	40.0L	4 182		0.7 5/		ICQ XX WYA	Christopher Wyatt
C/2019 U5 (PANSTARRS)	2021 08 04.28	C 16.0	GG	27.9T	6A900		0.2	0.4m 83	ICQ xx OLAXx	Mike Olason
C/2019 L3 (ATLAS)	2021 08 11.08	S 11.2	TK	32.0L	5 80		0.7 s6/		PIL01	Uwe Pilz
2019L3	2021 08 06.10	S 11.3	TK	20.3T10	133		2.0 3/		ICQ XX GON05	Juan Jose Gonzalez Suarez
2019L3	2021 08 02.45	C 11.4	GG	27.9T	6A600		1.0	> 2 m308	ICQ xx OLAXx	Mike Olason
C/2019 K7 (Smith)	2021 08 04.29	C 16.7	GG	27.9T	6A900		0.2	0.2m122	ICQ xx OLAXx	Mike Olason
C/2019 F1 (ATLAS-Africano)	2021 08 31.43	xM 14.8	AQ	40.0L	4 261		0.5 5/		ICQ XX WYA	Christopher Wyatt
2019F1	2021 08 13.56	xM 15.0	AQ	40.0L	4 261		0.3 5/		ICQ XX WYA	Christopher Wyatt
2019F1	2021 08 10.42	xM 14.9	AQ	40.0L	4 261		0.3 5/		ICQ XX WYA	Christopher Wyatt
2019F1	2021 08 06.47	xM 14.9	AQ	40.0L	4 261		0.6 5/		ICQ XX WYA	Christopher Wyatt
C/2018 U1 (Lemmon)	2021 08 31.42	xM 15.1	AQ	40.0L	4 261		0.4 4/		ICQ XX WYA	Christopher Wyatt
2018U1	2021 08 13.55	xM 15.2	AQ	40.0L	4 261		0.4 5/		ICQ XX WYA	Christopher Wyatt
2018U1	2021 08 10.41	xM 15.3	AQ	40.0L	4 261		0.4 5/		ICQ XX WYA	Christopher Wyatt
2018U1	2021 08 06.43	xM 15.3	AQ	40.0L	4 261		0.5 4/		ICQ XX WYA	Christopher Wyatt
C/2017 U7 (PANSTARRS)	2021 08 04.19	C 17.1	GG	27.9T	6a200		0.2	0.3m112	ICQ xx OLAXx	Mike Olason
C/2017 K2 (PANSTARRS)	2021 08 31.40	xM 13.0	AQ	40.0L	4 108		1.8 5/		ICQ XX WYA	Christopher Wyatt
2017K2	2021 08 13.52	xM 13.0	AQ	40.0L	4 108		1.0 3/		ICQ XX WYA	Christopher Wyatt
2017K2	2021 08 10.40	xM 13.2	AQ	40.0L	4 108		1.1 6		ICQ XX WYA	Christopher Wyatt
2017K2	2021 08 06.45	xM 13.1	AQ	40.0L	4 108		1.0 5		ICQ XX WYA	Christopher Wyatt
2017K2	2021 08 05.96	I 13.1:TK	25.0C10	192					ICQ XX DECa	Michel Deconinck
2017K2	2021 08 05.91	S 12.2	AQ	20.3T10	133		1.5 4		ICQ XX GON05	Juan Jose Gonzalez Suarez
2017K2	2021 08 04.30	C 13.3	GG	27.9T	6A300		0.8		ICQ xx OLAXx	Mike Olason

424P/La Sagra													
424	2021 08 04.24	C	16.6	GG	27.9T	6a200	0.1			0.2m169	ICQ xx	OLAxx	Mike Olason
402P/LINEAR													
402	2021 08 05.46	C	16.4	GG	27.9T	6A480	0.2				ICQ xx	OLAxx	Mike Olason
395P/Catalina-NEAT													
395	2021 08 04.26	C	17.7	GG	27.9T	6A900	0.1				ICQ xx	OLAxx	Mike Olason
378P/McNaught													
378	2021 08 02.36	C	18.7	GG	27.9T	6A600	0.2				ICQ xx	OLAxx	Mike Olason
378	2021 08 01.45	C	19.2	GG	27.9T	6A900	0.1				ICQ xx	OLAxx	Mike Olason
284P/McNaught													
284	2021 08 01.29	C	15.4	GG	27.9T	6A900	0.2		2	m252	ICQ xx	OLAxx	Mike Olason
252P/LINEAR													
252	2021 08 31.39	xS	14.0	AQ	40.0L	4 261	0.7	1/			ICQ XX	WYA	Christopher Wyatt
252	2021 08 10.38	xS	11.6	AQ	40.0L	4 59	2.3	1/			ICQ XX	WYA	Christopher Wyatt
246P/NEAT													
246	2021 08 10.42	xM	14.5	AQ	40.0L	4 182	0.5	5			ICQ XX	WYA	Christopher Wyatt
246	2021 08 06.51	xM	14.4	AQ	40.0L	4 261	0.5	4/			ICQ XX	WYA	Christopher Wyatt
241P/LINEAR													
241	2021 08 04.45	C	16.9	GG	27.9T	6a200	0.2		>	0.2m302	ICQ xx	OLAxx	Mike Olason
193P/LINEAR-NEAT													
193	2021 08 01.31	C	16.3	GG	27.9T	6a200	0.3		3	m238	ICQ xx	OLAxx	Mike Olason
132P/Helin-Roman-Alu													
132	2021 08 02.41	C	17.3	GG	27.9T	6A900	0.2			0.5m244	ICQ xx	OLAxx	Mike Olason
119P/Parker-Hartley													
119	2021 08 02.39	C	17.9	GG	27.9T	6a200	0.2			0.3m250	ICQ xx	OLAxx	Mike Olason
110P/Hartley													
110	2021 08 03.45	C	17.5	GG	27.9T	6A900	0.1			0.3m288	ICQ xx	OLAxx	Mike Olason
108P/Ciffreo													
108	2021 08 03.43	C	14.6	GG	27.9T	6A900	>0.5				ICQ xx	OLAxx	Mike Olason
67P/Churyumov-Gerasimenko													
67	2021 08 20.12	I	13.0:TK	25.0C10	192						ICQ XX	DECa	Michel Deconinck
67	2021 08 13.58	xM	13.5	AQ	40.0L	4 182	0.8	6		1.3m263	ICQ XX	WYA	Christopher Wyatt
67	2021 08 10.73	xM	13.6	AQ	40.0L	4 108	0.9	6		2.3m253	ICQ XX	WYA	Christopher Wyatt
67	2021 08 06.73	xM	13.9	AQ	40.0L	4 182	1.3	6			ICQ XX	WYA	Christopher Wyatt
67	2021 08 06.08	S	12.7	AQ	20.3T10	133	1.5	5			ICQ XX	GON05	Juan Jose Gonzalez Suarez
67	2021 08 02.44	C	13.1	GG	27.9T	6A120	0.3		4	m247	ICQ xx	OLAxx	Mike Olason
29P/Schwassmann-Wachmann													
29	2021 08 10.76	xI	14.9	AQ	40.0L	4 261					ICQ XX	WYA	Christopher Wyatt
29	2021 08 04.44	C	15.4	GG	27.9T	6A600	0.5				ICQ xx	OLAxx	Mike Olason
19P/Borrelly													
19	2021 08 31.45	xM	15.2	AQ	40.0L	4 261	0.4	6			ICQ XX	WYA	Christopher Wyatt
19	2021 08 01.44	C	15.4	GG	27.9T	6A240	0.3				ICQ xx	OLAxx	Mike Olason
17P/Holmes													
17	2021 08 03.42	C	15.6	GG	27.9T	6A300	0.3		>	1.0m270	ICQ xx	OLAxx	Mike Olason
15P/Finlay													
15	2021 08 11.08	S	11.4	TK	32.0L	5 144	2	1				PIL01	Uwe Pilz
15	2021 08 10.77	xS	11.9	AQ	40.0L	4 182	1.6	3/			ICQ XX	WYA	Christopher Wyatt
15	2021 08 06.12	S	10.1	TK	20.3T10	100	5	2/			ICQ XX	GON05	Juan Jose Gonzalez Suarez
10P/Tempel													
10	2021 08 10.74	xM	14.8	AQ	40.0L	4 261	0.6	2/			ICQ XX	WYA	Christopher Wyatt
7P/Pons-Winnecke													
7	2021 08 31.45	xM	12.4	AQ	40.0L	4 59	4.4	3/			ICQ XX	WYA	Christopher Wyatt
7	2021 08 13.57	xM	12.8	AQ	40.0L	4 108	2.5	5/			ICQ XX	WYA	Christopher Wyatt
7	2021 08 10.44	xS	11.7	AQ	40.0L	4 59	4.4	3/			ICQ XX	WYA	Christopher Wyatt
7	2021 08 06.50	xM	11.6	AQ	40.0L	4 59	4.0	4			ICQ XX	WYA	Christopher Wyatt
6P/d'Arrest													
6	2021 08 31.43	xS	12.5	AQ	40.0L	4 59	2.9	2/			ICQ XX	WYA	Christopher Wyatt
6	2021 08 10.91	S	11.8	TK	20.3T10	77	6	1			ICQ XX	GON05	Juan Jose Gonzalez Suarez
4P/Faye													
4	2021 08 10.75	xM	12.4	AQ	40.0L	4 108	1.1	6		4.0m260	ICQ XX	WYA	Christopher Wyatt
4	2021 08 06.74	xM	12.8	AQ	40.0L	4 182	0.9	5/			ICQ XX	WYA	Christopher Wyatt
4	2021 08 06.09	S	10.9	TK	20.3T10	77	4	2			ICQ XX	GON05	Juan Jose Gonzalez Suarez