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## 2019 HL4

C. Hoegner, B. Stecklum, P. Bacci, M. Maestriperi, L. Tesi, G. Fagioli, S. Foglia, G. Galli, L. Buzzi, V. Robert, et al.

► **To cite this version:**

| C. Hoegner, B. Stecklum, P. Bacci, M. Maestriperi, L. Tesi, et al.. 2019 HL4. 2019. hal-03971742

**HAL Id: hal-03971742**

**<https://cnrs.hal.science/hal-03971742>**

Submitted on 3 Feb 2023

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## MPEC 2019-J10 : 2019 HL4

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M.P.E.C. 2019-J10

Issued 2019 May 3, 04:09 UT

The Minor Planet Electronic Circulars contain information on unusual minor planets and routine data on comets. They are published on behalf of Division F of the International Astronomical Union by the Minor Planet Center, Smithsonian Astrophysical Observatory, Cambridge, MA 02138, U.S.A.

Prepared using the [Tamkin Foundation Computer Network](#)

MPC@CFA.HARVARD.EDU

URL <https://www.minorplanetcenter.net/> ISSN 1523-6714

### 2019 HL4

#### Observations:

K19H04L	C2019	04	14.45743914	51	46.428+44	42	28.56	21.1	GVEJ010F51
K19H04L	C2019	04	14.46557814	51	43.854+44	42	15.24	21.6	GVEJ010F51
K19H04L	C2019	04	14.47366814	51	41.351+44	42	00.64	21.4	GVEJ010F51
K19H04L	C2019	04	16.46580614	41	28.523+43	33	19.03	21.1	GVEJ010F51
K19H04L	C2019	04	16.47538014	41	25.030+43	32	56.01	21.2	GVEJ010F51
K19H04L	C2019	04	16.49437314	41	18.226+43	32	10.73	21.3	GVEJ010F51
K19H04L*	C2019	04	28.29194	12	59.48.96	+22	37.00.5	19.3	GVEJ010703
K19H04L	C2019	04	28.29723	12	59.44.89	+22	35.50.5	19.4	GVEJ010703
K19H04L	C2019	04	28.30253	12	59.40.92	+22	34.40.8	19.3	GVEJ010703
K19H04L	C2019	04	28.30782	12	59.36.96	+22	33.30.6	19.0	GVEJ010703
K19H04L	C2019	04	28.33009512	59	19.75	+22	28.33.6	19.6	GVEJ010H01
K19H04L	C2019	04	28.33545412	59	15.70	+22	27.22.5	19.3	GVEJ010H01
K19H04L	C2019	04	28.34880412	59	05.62	+22	24.25.1	19.8	GVEJ010H01
K19H04L	C2019	04	28.35213012	59	03.11	+22	23.41.0	20.0	GVEJ010H01
K19H04L	C2019	04	28.40009	12	58.27.31	+22	13.04.8	20.1	GVEJ010I52
K19H04L	C2019	04	28.40027	12	58.27.13	+22	13.02.3	19.6	GVEJ010I52
K19H04L	C2019	04	28.40046	12	58.27.02	+22	13.00.6	20.0	GVEJ010I52
K19H04L	KC2019	04	28.84450	12	53.08.37	+20	32.10.3	19.1	RVEJ010K63
K19H04L	KC2019	04	28.84752	12	53.06.06	+20	31.28.4	18.9	RVEJ010K63
K19H04L	KC2019	04	28.85096	12	53.03.43	+20	30.40.9	18.8	RVEJ010K63
K19H04L	KC2019	04	28.87975	12	52.41.56	+20	23.59.1	19.9	VqEJ010C77
K19H04L	KC2019	04	28.88528	12	52.37.10	+20	22.41.3	19.1	VqEJ010C77
K19H04L	KC2019	04	28.89257	12	52.31.35	+20	20.59.9	19.4	VqEJ010C77
K19H04L	C2019	04	29.14268	12	49.27.71	+19	21.49.6	19.0	GVEJ010I52
K19H04L	C2019	04	29.14293	12	49.27.51	+19	21.46.1	19.1	GVEJ010I52
K19H04L	C2019	04	29.14317	12	49.27.31	+19	21.42.5	19.2	GVEJ010I52
K19H04L	C2019	04	29.14341	12	49.27.13	+19	21.39.2	19.2	GVEJ010I52
K19H04L	KC2019	04	29.23253	12	48.16.98	+18	59.54.9	19.3	GVEJ010V01
K19H04L	KC2019	04	29.23976	12	48.11.29	+18	58.09.0	18.9	GVEJ010V01
K19H04L	KC2019	04	29.24699	12	48.05.59	+18	56.23.9	19.1	GVEJ010V01
K19H04L	C2019	04	29.29438	12	47.27.94	+18	45.01.8	19.5	GVEJ010703
K19H04L	C2019	04	29.30006	12	47.23.50	+18	43.36.8	19.1	GVEJ010703
K19H04L	C2019	04	29.30575	12	47.18.83	+18	42.12.0	19.5	GVEJ010703
K19H04L	C2019	04	29.31143	12	47.14.45	+18	40.50.7	19.8	GVEJ010703
K19H04L	KC2019	04	29.81072312	40	59.05	+16	34.30.5	18.9	GVEJ010587
K19H04L	KC2019	04	29.81125712	40	58.68	+16	34.22.0		VEJ010587
K19H04L	KC2019	04	29.81497912	40	55.67	+16	33.24.5		VEJ010587
K19H04L	KC2019	04	29.82372	12	40.47.76	+16	31.07.9	18.7	RoEJ010K88
K19H04L	KC2019	04	29.82772	12	40.44.53	+16	30.05.3	18.9	RoEJ010K88
K19H04L	KC2019	04	29.83173	12	40.41.34	+16	29.03.4	18.9	RoEJ010K88
K19H04L	KC2019	04	29.84323	12	40.33.93	+16	26.07.1	18.7	VqEJ010I93
K19H04L	KC2019	04	29.84581	12	40.31.84	+16	25.26.8	18.6	VqEJ010I93
K19H04L	KC2019	04	29.84848	12	40.29.69	+16	24.45.6	19.0	VqEJ010I93
K19H04L	KC2019	04	29.87933	12	40.03.59	+16	16.35.1	19.2	VSEJ010C43



B. Stecklum. Measurer B. Stecklum. 1.34-m f/3 Schmidt + CCD.  
 104 San Marcello Pistoiese. Observers P. Bacci, M. Maestriperi. Measurers P. Bacci, L. Tesi, G. Fagioli. 0.60-m reflector + CCD.  
 203 GiaGa Observatory. Observers S. Foglia, G. Galli. Measurer G. Galli. 0.36-m f/5.76 Schmidt-Cassegrain + CCD.  
 204 Schiaparelli Observatory. Observer L. Buzzi. 0.84-m f/3.5 reflector + CCD.  
 511 Haute Provence. Observers V. Robert, K. Baillie, M. Lemoigne, S. Bouquillon, B. Carry, P. David, M. Delbo, M. Denefeld, D. Hestroffer, F. Spoto, D. Souami, P. Tanga, F. Taris, W. Thuillot. Measurers W. Thuillot, S. Bouquillon, F. Taris, T. Carlucci, C. Barache. 1.20-m f/6 reflector + CCD.  
 587 Sormano. Observers A. Butti, L. Iachelini, A. Mahu, L. Molteni. Measurer A. Butti. 0.5-m f/6.8 reflector + CCD.  
 595 Farra d'Isonzo. Observer E. Pettarin. 0.61-m f/4.5 reflector + CCD.  
 658 National Research Council of Canada. Observer D. D. Balam. 1.82-m reflector + CCD.  
 703 Catalina Sky Survey. Observers D. C. Fuls, H. Groeller. Measurers B. M. Africano, E. J. Christensen, G. A. Farneth, D. C. Fuls, A. R. Gibbs, A. D. Grauer, H. Groeller, R. A. Kowalski, S. M. Larson, G. J. Leonard, T. A. Pruyne, D. Rankin, R. L. Seaman, F. C. Shelly. 0.68-m Schmidt + 10K CCD.  
 958 Observatoire de Dax. Observers P. Dupouy, J. B. de Vanssay. Measurer P. Dupouy. 0.43-m f/2.7 reflector + CCD.  
 C43 Hoyerswerda. Observer P. Lindner. 0.30-m f/6.3 Schmidt-Cassegrain + CCD.  
 C77 Bernezzo Observatory. Observer A. Mantero. 0.25-m f/4.0 reflector + CCD.  
 C95 SATINO Remote Observatory, Haute Provence. Observer J. Jahn. 0.60-m f/3.2 Newtonian reflector + CCD.  
 F51 Pan-STARRS 1, Haleakala. Observers J. Bulger, K. Chambers, T. Lowe, E. Magnier, A. Schultz, M. Willman. Measurers S. Chastel, M. Huber, Y. Ramanjooloo, R. Wainscoat, R. Weryk. 1.8-m Ritchey-Chretien + CCD.  
 H01 Magdalena Ridge Observatory, Socorro. Observers W. H. Ryan, E. V. Ryan. Measurer W. H. Ryan. 2.4-m f/8.9 Ritchey-Chretien + CCD.  
 H21 Astronomical Research Observatory, Westfield. Observer R. Holmes. Measurers S. Foglia, L. Buzzi, T. Linder, R. Holmes. 0.76-m f/3.0 astrograph + CCD.  
 I52 Steward Observatory, Mt. Lemmon Station. Observers D. C. Fuls, H. Groeller, B. M. Africano. Measurers B. M. Africano, E. J. Christensen, G. A. Farneth, D. C. Fuls, A. R. Gibbs, A. D. Grauer, H. Groeller, R. A. Kowalski, S. M. Larson, G. J. Leonard, T. A. Pruyne, D. Rankin, R. L. Seaman, F. C. Shelly. 1.0-m reflector + CCD.  
 I93 St Pardon de Conques. Observer F. Losse. 0.40-m f/3.7 reflector + CCD.  
 J69 North Observatory, Clanfield. Observer D. Briggs. 0.41-m f/4.5 Newtonian reflector + CCD.  
 J95 Great Shefford. Observer P. Birtwhistle. 0.41-m f/6.3 Schmidt-Cassegrain + CCD.  
 K38 M57 Observatory, Saltrio. Observer G. Baj. 0.3-m f/5.5 Ritchey-Chretien + CCD.  
 K63 G. Pascoli Observatory, Castelvecchio Pascoli. Observer R. Bacci. 0.41-m f/3.2 Newtonian reflector + CCD.  
 K80 Platanus Observatory, Lusowko. Observer T. Kluwak. 0.28-m f/2.2 Schmidt + CCD.  
 K87 Dettelbach Vineyard Observatory. Observer B. Haeusler. 0.30-m Schmidt-Cassegrain + CCD.  
 K88 GINOP-KHK, Piszkesteto. Observers K. Sarneczky, A. Pal. Measurer K. Sarneczky. 0.60-m Schmidt + CCD.  
 L01 Visnjan Observatory, Tican. Observers K. Korlevic, G. Kervina. Measurer K. Korlevic. 1.0-m f/2.9 reflector + CCD.  
 V01 Mountainville Observatory, Alpine. Observer B. Sheets. 0.35-m Schmidt-Cassegrain + CCD.  
 W34 Squirrel Valley Observatory, Columbus. Observer R. L. Flynn. 0.2-m f/7.0 Schmidt-Cassegrain + CCD.  
 Z80 Northolt Branch Observatory. Observer G. Wells. Measurers D. Bamberger, G. Wells. 0.25-m f/8.0 Ritchey-Chretien + CCD.  
 Z99 Clixby Observatory, Cleethorpes. Observer A. Mickleburgh. 0.36-m f/8 Schmidt-Cassegrain + CCD.

## Orbital elements:

2019 HL4  
 Epoch 2019 Apr. 27.0 TT = JDT 2458600.5 Earth MOID = 0.0548 AU  
 MPC  
 M 338.16551 (2000.0) P Q  
 n 0.59621163 Peri. 211.58370 -0.36165641 +0.88783045  
 a 1.3980920 Node 39.36854 -0.73431947 -0.08321734  
 e 0.2622866 Incl. 26.65268 -0.57443847 -0.45258366  
 P 1.65 H 23.1 G 0.15 U 6

## Residuals in seconds of arc

190414	F51	0.4+	0.6-	190429	958	0.3+	1.6-	190430	511	1.0+	0.6+
190414	F51	0.1-	0.3+	190429	958	0.3+	2.2-	190430	511	0.2+	0.3-
190414	F51	0.1+	0.2-	190429	C95	0.1-	0.5-	190430	511	0.6+	0.1+
190416	F51	0.0	0.2+	190429	958	0.2-	1.6-	190430	511	0.9+	0.6+
190416	F51	0.4-	0.1-	190429	C95	0.0	0.5-	190430	511	0.7+	0.2+
190416	F51	0.1+	0.2+	190429	J95	0.4+	0.1-	190501	033	0.2+	0.4-
190428	703	0.3+	0.9+	190429	J95	0.3+	0.5-	190501	033	0.0	0.5-
190428	703	0.4-	0.3+	190429	J95	0.0	0.2+	190501	033	0.2+	0.5-
190428	703	0.3+	0.3+	190429	C95	0.1+	0.0	190501	033	0.1+	0.3-
190428	703	1.0+	0.4-	190429	J69	0.1+	0.2-	190501	I52	0.3+	0.3-
190428	H01	0.2+	0.1+	190429	J69	0.0	0.3-	190501	I52	0.3+	0.6-
190428	H01	0.2+	0.0	190429	Z99	0.0	0.0	190501	I52	0.2+	0.5-
190428	H01	0.0	0.3-	190429	Z99	0.1-	0.6-	190501	I52	0.5+	0.5-
190428	H01	0.1-	0.2-	190429	J69	0.0	0.1-	190501	658	0.6-	0.8+
190428	I52	0.4+	0.1-	190429	Z99	0.5+	0.6-	190501	658	0.6-	0.2+
190428	I52	0.2-	0.2-	190429	C95	0.1-	0.2+	190501	658	0.4-	0.3+
190428	I52	0.2+	0.6+	190429	J69	0.3+	0.0	190501	658	0.1-	0.2+
190428	K63	0.2+	0.7-	190429	204	0.1+	0.3-	190501	658	0.1-	0.3-
190428	K63	0.5+	0.6-	190429	033	0.1+	0.4-	190501	104	0.1+	0.4-
190428	K63	0.9+	0.2-	190429	033	0.2+	0.3-	190501	104	0.1+	0.4-
190428	C77	2.6+	0.6+	190429	033	0.0	0.4-	190501	104	0.2+	0.5-

190428 C77	0.1+	0.2+	190429 033	0.0	0.5-	190501 595	0.4+	0.7-
190428 C77	1.4-	1.0+	190429 204	0.2+	0.1+	190501 595	0.3+	0.1+
190429 I52	0.2+	0.3-	190430 204	0.1+	0.3-	190501 L01	0.0	0.1-
190429 I52	0.1+	0.2-	190430 Z80	0.7+	0.4+	190501 595	0.4+	0.6-
190429 I52	0.1-	0.3-	190430 Z80	0.2+	0.0	190501 L01	0.3+	0.0
190429 I52	0.1+	0.2-	190430 658	1.4-	0.8+	190501 L01	0.2-	0.2+
190429 V01	0.2+	1.1-	190430 658	1.2-	0.7+	190501 K87	0.5+	0.5-
190429 V01	0.3+	1.4-	190430 658	1.1-	0.5+	190501 K87	0.6+	0.3-
190429 V01	0.3+	0.8-	190430 658	0.9-	0.6+	190501 K87	0.6+	0.2-
190429 703	0.7+	0.2-	190430 658	0.7-	0.4+	190501 K88	0.6+	0.0
190429 703	1.5+	1.3-	190430 K80	0.4+	0.4-	190501 K88	0.3+	0.3-
190429 703	0.9-	1.9-	190430 K80	0.2+	0.5-	190501 K88	0.4+	0.4-
190429 703	0.7+	0.8+	190430 K87	0.1-	0.7-	190501 K38	0.2+	0.8-
190429 587	0.2-	0.0	190430 K87	0.2-	0.8-	190501 203	0.1+	0.7-
190429 587	0.6+	0.3-	190430 K87	0.3-	0.9-	190501 K38	0.0	0.7-
190429 587	0.0	0.2-	190430 K87	0.3-	0.5-	190501 203	0.3+	0.5-
190429 K88	0.3+	0.3+	190430 511	1.1+	0.9+	190501 K38	0.1+	0.2-
190429 K88	0.0	0.2-	190430 511	0.9+	0.5+	190501 203	0.1-	0.5-
190429 K88	0.3+	0.2+	190430 511	0.8+	0.5+	190501 K38	0.1-	1.2-
190429 I93	0.6+	0.2-	190430 511	0.8+	0.5+	190502 W34	0.3+	0.8-
190429 I93	0.2+	0.4-	190430 511	0.3+	0.1-	190502 W34	0.8+	0.4-
190429 I93	0.0	0.2-	190430 511	1.0+	0.9+	190502 W34	0.2+	0.0
190429 C43	0.1+	0.4-	190430 511	0.6+	0.4+	190502 H21	0.1+	0.4-
190429 C43	0.3+	0.2-	190430 511	0.6+	0.4+	190502 H21	0.3+	0.2-
190429 C43	0.2+	0.0	190430 511	0.5+	0.4+	190502 H21	0.2+	0.5-

## Ephemeris:

2019 HL4		a, e, i = 1.40, 0.26, 27				q = 1.0314		
Date	TT	R. A. (2000)	Decl.	Delta	r	Elong.	Phase	V
2019 04 03		15 26 56.1	+47 15 52	0.2719	1.1488	117.0	50.9	22.5
...								
2019 04 18		14 32 29.4	+42 24 39	0.1548	1.1016	125.8	47.7	21.1
...								
2019 04 26		13 25 54.1	+29 48 22	0.1008	1.0803	135.5	40.7	19.9
...								
2019 05 02		12 11 49.8	+06 11 21	0.07667	1.0665	138.7	38.6	19.2
2019 05 03		11 57 59.7	+00 56 28	0.07533	1.0644	137.1	40.1	19.2
2019 05 04		11 43 58.0	-04 26 28	0.07494	1.0623	134.8	42.3	19.3
...								
2019 05 10		10 21 50.0	-32 02 38	0.09083	1.0513	115.1	60.5	20.2
...								
2019 05 18		08 57 06.3	-48 39 37	0.1392	1.0402	98.1	74.3	21.5
...								
2019 06 02		07 32 06.2	-56 58 50	0.2455	1.0314	87.1	79.1	22.9

A. U. Tomatic

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