LIGHTCURVE PHOTOMETRY OPPORTUNITIES: 2012 JANUARY–MARCH

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We present lists of asteroid photometry opportunities for objects reaching a favorable apparition and have no or poorly-defined lightcurve parameters. Additional data on these objects will help with shape and spin axis modeling via lightcurve inversion. We also include lists of objects that will be the target of radar observations. Lightcurves for these objects can help constrain pole solutions and/or remove rotation period ambiguities that might not come from using radar data alone.

We present four lists of "targets of opportunity" for the period 2012 January-March. For background on the program details for each of the opportunity lists, refer to previous issues, e.g., *Minor Planet Bulletin* **36**, 188. In the first three sets of tables, "Dec" is the declination, "U" is the quality code of the lightcurve, and "α" is the solar phase angle. See the asteroid lightcurve data base (LCDB) documentation for an explanation of the U code:

http://www.minorplanet.info/lightcurvedatabase.html

Objects with U = 1 should be given higher priority when possible. *Do not overlook asteroids with* U = 2 *on the assumption that the period is sufficiently established.* Regardless, do not let the existing period influence your analysis since even high quality ratings have been proven wrong at times. Note that the lightcurve amplitude in the tables could be more or less than what's given. Use the listing only as a guide.

The first list is an *abbreviated list* of those asteroids reaching V < 15.0 at brightest during the period and have either no or poorly-constrained lightcurve parameters. The goal for these asteroids is to find a well-determined rotation rate. A more complete list as well as one including objects V < 16.0 can be found on the CALL web site.

http://www.minorplanet.info/CALL/targets_2012_Q1.htm

The Low Phase Angle list includes asteroids that reach very low phase angles. Getting accurate, calibrated measurements (usually V band) at or very near the day of opposition can provide important information for those studying the "opposition effect."

The third list is of those asteroids needing only a small number of lightcurves to allow spin axis and/or shape modeling. Those doing work for modeling should contact Josef Ďurech at the email address above and/or visit the Database of Asteroid Models from Inversion Techniques (DAMIT) web site for existing data and models:

http://astro.troja.mff.cuni.cz/projects/asteroids3D

The fourth list gives a brief ephemeris for planned radar targets. Supporting optical observations to determine the lightcurve period, amplitude, and shape are needed to supplement the radar data. *High-precision work, 0.01-0.02 mag, is preferred, especially if the object is a known or potential binary*. Those obtaining lightcurves in support of radar observations should contact Dr. Benner directly at the email given above.

Future radar targets:
http://echo.jpl.nasa.gov/~lance/future.radar.nea.periods.html

Past radar targets:
http://echo.jpl.nasa.gov/~lance/radar.nea.periods.html

Arecibo targets:
http://www.naic.edu/~pradar/sched.shtml

Goldstone targets:
http://echo.jpl.nasa.gov/asteroids/goldstone_asteroid_schedule.html

As always, we encourage observations of asteroids even if they have well-established lightcurve parameters and especially if they are lacking good spin axis and/or shape model solutions. Every lightcurve of sufficient quality supports efforts to resolve a number of questions about the evolution of individual asteroids and the general population. For example, pole directions are known for only about 30 NEAs out of a population of 8000. This is hardly sufficient to make even the most general of statements about NEA pole alignments, including whether or not the thermal YORP effect is forcing pole orientations into a limited number of preferred directions (see La Spina *et al.*, 2004, *Nature* **428**, 400-401). Data from many apparitions can help determine if an asteroid's rotation rate is being affected by YORP, which can also cause the rotation rate of a smaller, irregularly-shaped asteroid to increase or decrease. See Lowry *et al.* (2007) *Science* **316**, 272-274 and Kaasalainen *et al.* (2007) *Nature* **446**, 420-422.

The ephemeris listings for the optical-radar listings include lunar elongation and phase. Phase values range from 0.0 (new) to 1.0 (full). If the value is positive, the moon is waxing – between new and full. If the value is negative, the moon is waning – between full and new. The listing also includes the galactic latitude. When this value is near 0°, the asteroid is likely in rich star fields and so may be difficult to work. It is important to emphasize that the ephemerides that we provide are only guides for when you might observe a given asteroid. Obviously, you should use your discretion and experience to make your observing program as effective as possible.

Once you've analyzed your data, it's important to publish your results. Papers appearing in the *Minor Planet Bulletin* are indexed in the Astrophysical Data System (ADS) and so can be referenced by others in subsequent papers. It's also important to make the data available at least on a personal website or upon request.

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Lightcurve Opportunities

#	Name	Brightest Date	Mag	Dec	U	LCDB Data Period	Amp
621	Werdandi	1 02.9	13.9	+25	2	9.39	0.58
5435	Kameoka	1 05.7	14.9	+20			
8882	Sakaetamura	1 07.4	15.0	-10	2	2.83	0.66
3115	Baily	1 08.5	13.6	+13	2+	16.22	0.08-0.14
555	Norma	1 09.5	14.1	+21	2	30.6	0.20
3063	Makhaon	1 12.0	15.0	+21	2	8.64	0.03-0.15
3017	Petrovic	1 13.7	14.1	+ 9	2	4.06	0.40
4801	Ohre	1 14.8	14.8	+24			
1373	Cincinnati	1 15.1	15.0	+25	2	5.28	0.14
9780	Bandersnatch	1 16.8	14.6	+21	2+	8.23	0.16
5297	Schinkel	1 16.9	15.0	+14			
1311	Knopfia	1 20.6	15.0	+16	1+	9.65	1.3
2464	Nordenskiold	1 21.7	14.7	+21			
2026	Cottrell	1 22.3	15.0	+21			
6972	Helvetius	1 26.5	14.8	+ 8			
1660	Wood	1 30.6	13.7	-25			
4700	Carusi	1 30.2	14.7	+25			
47035	1998 WS	1 31.7	14.6	+69			
4874	Burke	2 01.6	14.7	+19			
27174	1999 BB2	2 02.9	14.4	+25			
28913	2000 OT	2 03.2	14.0	+16	2	15.30	0.35
3141	Buchar	2 04.8	14.7	+18	2+	11.41	0.47
1724	Vladimir	2 06.9	14.7	+ 7	2	12.57	0.14
2965	Surikov	2 09.2	14.3	+25	2	9.07	0.29
1985	Hopmann	2 09.3	14.4	+ 8			
585	Bilkis	2 15.8	12.6	+ 5	2+	8.57	0.41
3580	Avery	2 17.1	14.6	+14			
2842	Unsold	2 19.6	14.8	+ 5			
4350	Shibecha	2 19.9	14.8	+32			
162421	2000 ET70	2 20.6	13.2	-21			
6618	1936 SO	2 20.1	14.4	+16	2+	8.29	0.20
3397	Leyla	2 22.1	15.0	+48			
3764	Holmesacourt	2 22.0	15.0	+11			
8045	Kamiyama	3 03.0	14.6	- 8			
192642	1999 RD32	3 04.5	14.6	+ 2			
1502	Arenda	3 06.3	14.7	+ 2	2	45.8	0.4
1841	Masaryk	3 07.6	15.0	+ 8	2+	7.53	0.52
2635	Huggins	3 15.5	14.5	- 5			
1228	Scabiosa	3 17.0	14.8	- 2			
4892	Chrispollas	3 18.0	14.9	- 7			
18243	Gunn	3 20.4	14.8	+ 1			
2846	Ylppo	3 26.5	15.0	+ 8	2-	> 12.	0.25
1465	Autonoma	3 27.6	14.8	+ 2	2	4.88	0.13

Low Phase Angle Opportunities

#	Name	Date	α	V	Dec	Period	Amp	U
158	Koronis	01 01.6	0.16	12.8	+23	14.218	0.28-0.43	3
621	Werdandi	01 02.9	0.76	13.9	+25	9.396	0.58	2
316	Goberta	01 15.4	0.24	13.4	+21	8.605	0.20-0.27	3
1017	Jacqueline	01 15.9	0.37	13.9	+20	7.87	0.6	3
370	Modestia	01 18.9	0.67	13.5	+19	22.5299	0.24-0.40	3
165	Loreley	01 20.1	0.27	12.3	+21	7.226	0.05-0.17	3
213	Lilaea	01 22.9	0.07	12.8	+20	8.045	0.07-0.20	3
240	Vanadis	01 23.2	0.23	11.6	+20	10.64	0.34	3
817	Annika	02 02.4	0.98	13.7	+19	10.56	0.27	3
586	Thekla	02 05.1	0.85	13.0	+14	13.670	0.30	3
140	Siwa	02 09.6	0.74	12.9	+17	34.407	0.05-0.15	3-
96	Aegle	02 10.1	0.19	11.0	+15	13.82	0.05-0.29	3
243	Ida	02 16.7	0.14	13.6	+12	4.634	0.45-0.86	3
461	Saskia	02 16.8	0.18	14.0	+12	7.348	0.25-0.36	3
924	Toni	02 16.9	0.22	13.7	+12	21.	0.1	1
606	Brangane	02 17.0	0.70	14.0	+10	12.2950	0.21	3-
1182	Ilona	02 23.6	0.31	13.9	+11	29.8	1.2	2
46	Hestia	02 23.8	0.55	12.2	+08	21.04	0.11	3
147	Protogeneia	02 25.2	0.85	13.1	+07	7.853	0.28	3
297	Caecilia	02 26.0	0.23	14.0	+08	4.163	0.15-0.27	3
16	Psyche	03 02.8	0.29	10.3	+08	4.196	0.03-0.42	3
325	Heidelberga	03 03.2	0.15	13.1	+07	6.737	0.20	3
33	Polyhymnia	03 03.5	0.29	13.8	+08	18.608	0.14-0.21	3
327	Columbia	03 07.1	0.53	13.9	+07	5.9320	0.16-0.42	3
332	Siri	03 08.3	0.97	13.6	+07	8.0074	0.10-0.15	3
36	Atalante	03 15.8	0.50	12.6	+03	9.93	0.12-0.17	3

Low Phase Angle Opportunities (continued)

#	Name	Date	α	V	Dec	Period	Amp	U
257	Silesia	03 19.9	0.92	13.9	+03	15.7095	0.31	3
93	Minerva	03 21.6	0.28	11.2	+00	5.982	0.04-0.10	3
1269	Rollandia	03 21.6	0.78	13.7	+02			
55	Pandora	03 24.3	0.39	12.0	+00	4.8040	0.07-0.40	3
720	Bohlinia	03 27.5	0.62	13.3	-01	8.919	0.17-0.46	3
373	Melusina	03 30.0	0.62	14.0	-06	12.97	0.25	3
379	Huenna	03 30.1	0.19	13.9	-03	7.022	0.09	2-
150	Nuwa	03 30.2	0.27	12.8	-05	8.135	0.08-0.31	3

Shape/Spin Modeling Opportunities

There are two lists here. The first is for objects for which good occultation profiles are available. These are used to constrain the models obtained from lightcurve inversion, eliminating ambiguous solutions and fixing the size of asteroid. Lightcurves are needed for modeling and/or to establish the rotation phase angle at the time the profile was obtained. The second list is of those objects for which another set of lightcurves from one more apparitions will allow either an initial or a refined solution.

Occultation Profiles Available

#	Name	Brightest Date	Mag	Dec	Period	LCDB DATA Amp	U
200	Dynamene	1 01.	12.4	+22	19.	0.10	2
40	Harmonia	1 01.	10.6	+13	8.910	0.13 0.36	3
230	Athamantis	1 01.	11.3	+12	24.0055	0.1 0.26	3
420	Bertholda	1 01.	13.5	+19	11.04	0.29	3
27	Euterpe	1 01.	11.0	+03	10.410	0.15 0.21	3
466	Tisiphone	1 03.4	12.9	+27	8.824	0.16	3
153	Hilda	1 06.4	13.6	+14	5.9587	0.05 0.20	3
204	Kallisto	1 06.5	13.3	+11	19.489	0.09 0.26	3
790	Pretoria	1 15.1	13.7	+03	10.37	0.08 0.16	3
70	Panopaea	1 17.3	12.6	+36	15.797	0.06 0.12	3
757	Portlandia	1 27.0	12.9	+32	6.5837	0.24 0.45	3
490	Veritas	1 27.8	13.0	+08	7.930	0.33 0.58	3
578	Happelia	1 29.2	13.8	+27	10.061	0.11 0.20	3
25	Phocaea	2 03.8	12.4	-13	9.9341	0.03 0.25	3
1437	Diomedes	2 08.2	14.9	+14	24.49	0.22 0.70	3-
530	Turandot	2 11.8	14.6	+17	19.947	0.10 0.16	2+
375	Ursula	2 14.8	12.2	+17	16.83	0.17	2
386	Siegena	2 16.6	11.7	+03	9.763	0.11 0.18	3
498	Tokio	2 19.5	13.5	+21	20.	>0.36	1+
144	Vibilia	2 28.1	12.3	+15	13.819	0.15	3
559	Nanon	3 08.6	13.0	+16	10.059	0.08 0.26	3
791	Ani	3 17.0	14.5	+17	16.72	0.32	2
106	Dione	3 17.9	12.4	+06	16.26	0.08	3
93	Minerva	3 21.7	11.1	+00	5.982	0.04 0.10	3
334	Chicago	3 22.7	13.0	+04	7.361	0.15 0.67	3
49	Pales	3 25.9	12.9	-06	10.42	0.18	3

Inversion Modeling Candidates

#	Name	Brightest Date	Mag	Dec	Period	LCDB Data Amp	U
281	Lucretia	1 01.	14.9	+18	4.348	0.38	3
270	Anahita	1 01.	12.2	+16	15.06	0.25-0.34	3
966	Muschi	1 01.	14.3	+31	5.355	0.31	3
622	Esther	1 01.	13.2	+01	47.5	0.57	2
446	Aeternitas	1 01.	13.6	+03	15.7413	0.48	3
852	Wladilena	1 01.	14.2	+04	4.6134	0.30-0.32	3
336	Lacadiera	1 01.	12.8	+17	13.70	0.27-0.34	3
1243	Pamela	1 01.	14.2	+14	26.017	0.42-0.71	2
1188	Gothlandia	1 01.	15.0	+10	3.493	0.68	3
1665	Gaby	1 01.	14.8	+10	66.	0.27	2
1282	Utopia	1 01.	14.7	+37	13.623	0.28-0.36	3
391	Ingeborg	1 02.3	13.6	-15	26.391	0.22-0.79	3
1185	Nikko	1 17.4	14.1	+28	3.79	0.27-0.50	3
235	Carolina	1 17.5	13.1	+31	17.610	0.38	3
233	Asterope	1 19.5	12.1	+09	19.70	0.25-0.55	3
1013	Tombecka	1 20.7	12.7	+42	6.053	0.44	3
629	Bernardina	1 21.8	13.4	+28	3.763	0.23-0.39	3
399	Persephone	1 26.8	13.1	+32	9.136	0.40	3
540	Rosamunde	1 27.2	13.0	+09	9.336	0.40-0.66	3-
573	Recha	1 30.9	14.0	+25	7.16633	0.22-0.34	3
1687	Glarona	2 04.4	14.3	+19	6.3	0.75	3
753	Tiflis	2 05.9	13.7	+31	9.85	0.35-0.8	3
784	Pickeringia	2 06.7	13.8	+31	13.17	0.20-0.40	2
1379	Lomonosowa	2 14.3	13.9	+03	24.488	0.63	3

Inversion Modeling Candidates (continued)

#	Name	Brightest Date	Mag	Dec	Period	LCDB Data Amp	U
1301	Yvonne	2 17.5	13.3	-04	7.320	0.52-0.90	3
553	Kundry	2 18.7	14.6	+20	12.605	0.52	3
605	Juvisia	2 21.2	14.7	+16	15.93	0.25	2
746	Marlu	3 10.1	15.0	+09	7.787	0.23	2
510	Mabella	3 10.9	13.5	-03	19.4	0.25	3
1889	Pakhmutova	3 19.6	15.0	+16	17.490	0.50	3-
706	Hirundo	3 23.1	14.9	-13	22.027	0.75-0.9	3
823	Sisigambis	3 28.2	13.4	-09	21.0	0.08-0.6	2-

Radar-Optical Opportunities

Use the ephemerides below to judge your best chances for observing. Some of the targets may be too faint to do accurate photometry with backyard telescopes. However, accurate astrometry using techniques such as "stack and track" is still possible and can be helpful for those asteroids where the position uncertainties are significant. Note that the intervals in the ephemerides are not always the same and that *geocentric* positions are given. Use these web sites to generate updated and *topocentric* positions:

MPC: *http://www.minorplanetcenter.org/iau/MPEph/MPEph.html*
JPL: *http://ssd.jpl.nasa.gov/?horizons*

In the ephemerides below, ED and SD are, respectively, the Earth and Sun distances (AU), V is the estimated Johnson V magnitude, and α is the phase angle. SE and ME are the great circles distances (in degrees) of the Sun and Moon from the asteroid. MP is the lunar phase and GB is the galactic latitude. "PHA" in the header indicates that the object is a "potentially hazardous asteroid", meaning that at some (long distant) time, its orbit might take it very close to Earth.

The first two objects are repeats from the previous issues since they can be observed sometime during the first quarter of 2012.

(24475) 2000 VN2 (2012 Jan-Feb, H = 16.5)
2002 VN2 is a 1.6 km NEA. There are no known lightcurve parameters. It will linger around for the final two months of 2011 and be within relatively easy reach for modest instruments the entire time. Well-linked observations (those on a common system with only small adjustments to nightly zero points required) over the entire span of the ephemeris could show how the amplitude varies with phase angle. Because the asteroid never reaches below 7° phase angle, let alone close to 0°, finding an accurate value for the absolute magnitude (*H*) and phase slope parameter (*G*) won't be likely.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
01/01	02 37.3	+39 17	0.21	1.12	14.6	45.3	126	72	+0.48	-19
01/06	02 36.5	+45 42	0.21	1.11	14.8	48.9	122	76	+0.89	-13
01/11	02 38.9	+51 39	0.22	1.10	14.9	51.7	118	81	-0.97	-8
01/16	02 45.3	+57 05	0.23	1.10	15.1	53.7	115	86	-0.54	-2
01/21	02 56.9	+61 56	0.24	1.10	15.3	55.0	113	91	-0.06	+3
01/26	03 15.4	+66 11	0.26	1.11	15.4	55.6	112	97	+0.08	+7
01/31	03 43.0	+69 45	0.27	1.11	15.5	55.7	111	103	+0.48	+12
02/05	04 22.0	+72 31	0.29	1.12	15.7	55.3	111	108	+0.90	+16

2001 YE4 (2011 Dec-2012 Jan, H = 20.6, PHA)
There are no known lightcurve parameters for this NEA coming in at only 200 m diameter. Fast rotation and/or tumbling are a possibility, so try to get as high-precision data as possible.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
12/25	07 33.9	+68 40	0.07	1.03	16.7	44.3	133	132	+0.00	+29
12/26	06 37.3	+70 38	0.06	1.03	16.7	44.8	133	128	+0.02	+24
12/27	05 28.2	+71 16	0.06	1.02	16.6	46.0	131	119	+0.06	+19
12/28	04 17.1	+70 12	0.06	1.02	16.6	47.9	130	106	+0.13	+14
12/29	03 16.1	+67 29	0.06	1.02	16.7	50.6	127	92	+0.20	+8
12/30	02 29.7	+63 38	0.06	1.02	16.8	53.8	123	77	+0.29	+3
12/31	01 55.9	+59 09	0.06	1.01	16.9	57.4	120	63	+0.38	-3
01/01	01 31.2	+54 25	0.06	1.01	17.0	61.3	116	49	+0.48	-8

(29075) 1950 DA (2011 Dec-2012 Feb, H = 17.3, PHA)
This 1200 m NEA will pass Earth by about 5.4 million km in 2105 March. Busch *et al.* (2007) used radar observations to determine an accurate rotation period of 2.1216 h as well as a shape and spin axis model. Lightcurve observations this time around will help remove the two-fold ambiguity between the two poles found by Busch *et al.* One of those poles yields a model that has a small but non-zero chance of impacting the Earth in 2880. The other does not. The models also differ in diameter and, therefore, different optical and radar albedos. If the pole direction can be resolved by new lightcurves, they'll also provide the right shape model, albedos, and constraints on the composition, which may be metallic. For a list of close approaches by asteroids, see
http://www.minorplanetcenter.net/iau/lists/PHACloseApp.html

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
12/20	08 13.5	+45 48	0.83	1.73	18.8	19.9	143	107	-0.28	+33
12/25	08 08.0	+47 05	0.78	1.69	18.6	18.5	147	107	+0.00	+32
12/30	08 00.1	+48 22	0.73	1.66	18.3	17.5	150	107	+0.29	+31
01/04	07 49.7	+49 35	0.69	1.62	18.2	16.9	151	108	+0.75	+29
01/09	07 36.8	+50 39	0.66	1.59	18.0	17.3	151	107	+1.00	+28
01/14	07 21.6	+51 27	0.62	1.55	17.9	18.6	150	107	-0.76	+25
01/19	07 04.7	+51 56	0.60	1.52	17.8	20.8	147	107	-0.22	+23
01/24	06 46.8	+52 01	0.57	1.48	17.8	23.9	142	107	+0.01	+20
01/29	06 29.1	+51 39	0.55	1.44	17.7	27.5	137	107	+0.30	+18
02/03	06 12.7	+50 52	0.54	1.40	17.7	31.5	132	107	+0.76	+15
02/08	05 58.3	+49 44	0.53	1.37	17.8	35.6	126	107	+1.00	+12
02/13	05 46.5	+48 18	0.52	1.33	17.8	39.8	120	108	-0.69	+10

(192642) 1999 RD32 (2012 Jan-Mar, H = 16.4)
There are no known lightcurve parameters for this NEA, which has an effective diameter of about 1.6 km (assuming an albedo of p_v = 0.2). It may actually be a little larger since Masi et *al.* report it to be a type C (darker) object based on SDSS colors. A well-designed collaboration over the first two months of the year should be able to find an accurate set of H-G parameters. A good set of dense lightcurves over the entire apparition could lead to a reasonable shape and spin axis model from lightcurve inversion alone, although photometric *and* radar data would be even better.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
01/20	10 12.0	+10 24	0.73	1.65	17.8	18.4	148	142	-0.13	+49
01/25	10 08.9	+10 01	0.65	1.59	17.4	15.9	154	143	+0.03	+48
01/30	10 04.0	+09 39	0.57	1.54	16.9	12.9	160	143	+0.39	+47
02/04	09 56.8	+09 15	0.50	1.48	16.4	9.3	166	144	+0.84	+45
02/09	09 46.8	+08 47	0.43	1.42	15.8	5.4	172	144	-0.98	+43
02/14	09 32.9	+08 13	0.37	1.36	15.3	4.5	174	143	-0.58	+39
02/19	09 13.9	+07 28	0.31	1.29	15.1	10.4	166	143	-0.09	+35
02/24	08 47.7	+06 23	0.26	1.23	14.9	19.5	155	141	+0.04	+29
02/29	08 11.5	+04 45	0.22	1.17	14.7	31.6	142	139	+0.40	+20
03/05	07 21.6	+02 15	0.18	1.10	14.7	47.7	125	135	+0.86	+8

(141018) 2000 WC47 (2012 Jan-Mar, H = 18.7)

The estimated diameter for this NEA is 0.6 km. It will remain relatively bright throughout the first quarter of 2012. Radar observations are planned for April at Arecibo. There are no known lightcurve parameters.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
01/10	09 18.4	+20 44	0.30	1.25	17.6	20.9	153	20	-0.99	+41
01/20	09 22.2	+23 04	0.24	1.22	16.9	14.5	162	121	-0.13	+43
01/30	09 22.2	+26 21	0.20	1.19	16.3	9.7	168	107	+0.39	+44
02/09	09 19.5	+30 20	0.17	1.15	16.0	13.2	165	28	-0.98	+44
02/19	09 16.0	+34 34	0.15	1.13	15.9	22.3	154	153	-0.09	+44
02/29	09 15.4	+38 24	0.14	1.10	16.0	32.3	144	72	+0.40	+44
03/10	09 22.5	+41 17	0.13	1.08	16.0	41.0	134	67	-0.96	+45

2011 CP4 (2012 Feb, H = 21.0)

This NEA has an estimated size of about 200 meters. There are no known lightcurve parameters as of this writing. Telescopes of 0.5-m or larger will have a better chance of obtaining sufficiently accurate photometry. Given the size, the chances of this have a rotation of 3 hours or less are fairly good. It may even have a much shorter period. Keep this in mind when doing period analysis.

This object has large plane-of-sky pointing uncertainties, so it's crucial that accurate astrometry be obtained as soon as possible. Otherwise, it won't be possible to get photometric or radar observations.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
02/15	12 47.1	-00 56	0.15	1.10	18.7	40.1	134	171	-0.47	+62
02/16	12 51.1	-00 20	0.14	1.09	18.4	40.4	134	172	-0.35	+63
02/17	12 56.1	+00 28	0.12	1.07	18.1	41.0	135	172	-0.25	+63
02/18	13 02.9	+01 33	0.10	1.06	17.8	41.9	134	173	-0.16	+64
02/19	13 12.2	+03 04	0.08	1.05	17.4	43.4	133	174	-0.09	+65
02/20	13 26.2	+05 22	0.07	1.03	17.0	45.9	131	175	-0.04	+67
02/21	13 49.3	+09 05	0.05	1.02	16.5	50.6	127	177	-0.01	+67
02/22	14 33.7	+15 45	0.04	1.01	16.0	60.4	118	180	+0.00	+64

(263976) 2009 KD5 (2012 Feb-Apr, H = 18.4, PHA)

Hicks *et al.* (2010) found a rotation period of 2.664 h for this 600-m NEA. The amplitude at that time (L_{PAB} ~ 250°) was only 0.15 mag. L_{PAB} is ~200° for this apparition. Depending on the spin axis orientation, this may result in a larger amplitude lightcurve. Foster *et al.* (2010) raised the possibility that this is a binary asteroid. Given that about 2/3 the NEAs with comparable periods are binary, there's a chance that 2009 KD5 may be as well. Accurate photometry will be required to help decide the matter – assuming that mutual events or a strong secondary period are there to be found.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
02/10	14 57.6	+37 08	0.22	1.07	17.5	63.0	105	169	-0.94	+62
02/20	14 43.0	+44 45	0.24	1.11	17.6	54.9	113	170	-0.04	+62
03/01	14 17.3	+50 32	0.27	1.15	17.7	48.9	119	170	+0.50	+61
03/11	13 41.3	+53 56	0.30	1.18	17.9	45.0	123	171	-0.90	+62
03/21	13 01.2	+54 41	0.34	1.21	18.1	43.0	124	172	-0.03	+62
03/31	12 26.3	+53 00	0.37	1.24	18.4	42.5	123	173	+0.52	+64
04/10	12 02.3	+49 37	0.42	1.27	18.7	43.1	120	176	-0.85	+66

(162421) 2000 ET70 (2012 Feb-Mar, H = 18.1, PHA)

This modest-sized NEA (650 m) has no known lightcurve parameters. In general, objects with sizes of about 140 meters or less, are more likely to be superfast rotators – those with periods <2.1 h. Therefore, this asteroid is more likely to have a period of 2 hours or more. It will be moving quickly across the sky, so take lots of short exposures. Don't stack them, but use the high density of data points to "beat down the noise" due to shorter exposures. If possible, keep exposures at least 10 second so that scintillation is not the dominant noise.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
02/15	14 13.3	+12 14	0.06	1.01	14.2	60.9	116	176	-0.47	+66
02/17	13 39.5	+02 45	0.05	1.02	13.7	53.1	125	176	-0.25	+63
02/19	12 58.3	-08 54	0.05	1.02	13.4	45.4	133	174	-0.09	+54
02/21	12 10.6	-20 59	0.05	1.02	13.3	41.0	137	172	-0.01	+41
02/23	11 19.9	-31 07	0.05	1.03	13.5	41.6	136	168	+0.01	+28
02/25	10 31.1	-38 07	0.06	1.03	13.9	45.2	132	165	+0.09	+17
02/27	09 48.3	-42 22	0.07	1.03	14.3	49.4	128	163	+0.23	+9
02/29	09 13.0	-44 44	0.08	1.03	14.7	53.1	123	161	+0.40	+3
03/02	08 45.0	-45 59	0.09	1.04	15.1	56.1	120	160	+0.59	-2
03/04	08 22.9	-46 35	0.10	1.04	15.5	58.5	117	159	+0.78	-5

(7341) 1991 VK (2012 Mar-Apr, H = 16.7, PHA)

Pravec *et al.* (1998) found a period of 4.2096 h for this 1.2 km NEA. Their observations covered a wide range of phased angles, which was demonstrated by the amplitude ranging from 0.28 to 0.70 mag. The high phase angles during this apparition could produce not only large amplitudes but somewhat unusual lightcurves as shadowing comes into play. New lightcurves could constrain the pole direction.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
03/10	13 04.1	-35 59	0.21	1.15	15.2	39.0	133	192	-0.96	+27
03/15	12 52.5	-33 49	0.23	1.18	15.3	32.5	140	192	-0.50	+29
03/20	12 42.4	-31 37	0.26	1.22	15.4	26.8	147	193	-0.07	+31
03/25	12 33.9	-29 25	0.28	1.25	15.5	21.8	152	194	+0.05	+33
03/30	12 27.0	-27 17	0.31	1.29	15.7	18.0	156	194	+0.42	+35
04/04	12 21.7	-25 15	0.35	1.33	15.9	15.6	159	195	+0.89	+37
04/09	12 17.9	-23 22	0.38	1.37	16.1	14.8	160	196	-0.93	+39
04/14	12 15.4	-21 39	0.42	1.40	16.4	15.3	158	197	-0.44	+40
04/19	12 14.2	-20 08	0.46	1.44	16.7	16.7	156	198	-0.05	+42
04/24	12 14.1	-18 49	0.51	1.48	17.0	18.5	152	199	+0.06	+43