LIGHTCURVE PHOTOMETRY OPPORTUNITIES: 2014 OCTOBER-DECEMBER

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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 several lists of asteroids that are prime targets for photometry during the period 2014 October-December.

In the first three sets of tables, "Dec" is the declination and "U" is the quality code of the lightcurve. See the asteroid lightcurve data base (LCDB) documentation for an explanation of the U code:

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

The ephemeris generator on the CALL web site allows you to create custom lists for objects reaching V ≤ 18.0 during any month in the current year, e.g., limiting the results by magnitude and declination.

http://www.minorplanet.info/PHP/call_OppLCDBQuery.php

We refer you to past articles, e.g., *Minor Planet Bulletin* **36**, 188, for more detailed discussions about the individual lists and points of advice regarding observations for objects in each list.

Once you've obtained and 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. We urge you to consider submitting your raw data to the ALCDEF page on the Minor Planet Center web site:

http://www.minorplanetcenter.net/light_curve

We believe this to be the largest publicly available database of raw lightcurve data that contains 1.5 million observations for more than 2300 objects.

Lightcurve Opportunities

Objects with U = 1 should be given higher priority over those rated U = 2 or 2+ but not necessarily over those with no period. On the other hand, d*o not overlook asteroids with* U = 2/2+ *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.

An asterisk (*) follows the name if the asteroid is reaching a particularly favorable apparition.

		Brightest			LCDB Data		
#	Name	Date	Mag	Dec	Period	Amp	U
6425	1994 WZ3*	10 01.7	14.2	+13	103.9	0.92	2
450	Brigitta*	10 05.1	13.5	+4	10.75	0.18	2
589	Croatia*	10 05.8	13.1	+1	24.821	0.16-0.25	2+
4908	Ward*	10 07.3	13.9	+5	10.96	0.93	2
879	Ricarda*	10 08.2	13.6	+28	82.9	0.37	2
1550	Tito*	10 09.2	13.0	-9	54.2	0.16-0.40	2
1615	Bardwell*	10 12.8	14.6	+6	>18.	0.2	1
1351	Uzbekistania*	10 13.5	14.0	+10	73.9	0.20-0.34	2
7330	Annelemaitre*	10 13.5	14.6	+1			
8041	Masumoto*	10 14.4	14.9	+23	34.	0.27-0.39	2
1463	Nordenmarkia*	10 21.4	13.9	+20	5.92	0.13	2
2649	Oongaq*	10 21.8	14.7	+23	8.64	0.28	2
2340	Hathor*	10 27.7	15.0	+11			
11065	1991 XE2*	10 31.3	15.0	+6	> 8.	0.1	1+
3176	Paolicchi*	11 01.6	14.9	+7	20.4	0.31	2
619	Triberga*	11 04.5	13.0	+3	29.412	0.30-0.45	2
1057	Wanda*	11 05.4	13.4	+19	28.8	0.14-0.41	2
5176	Yoichi*	11 05.6	14.1	+5			
1042	Amazone*	11 06.9	14.0	+12	540.	0.10-0.25	2
1392	Pierre*	11 09.1	14.1	+34	18.	0.09	2
1355	Magoeba*	11 10.0	14.5	+15	2.975	0.06-0.22	2
1952	Hesburgh*	11 10.1	14.0	+5	47.7	0.18	2
6176	Horrigan*	11 11.2	14.9	+8			
1213	Algeria*	11 11.6	15.0	+31	>16.	0.19	2
6086	1987 VU*	11 14.2	14.7	+14			
2976	Lautaro*	11 14.4	14.6	+12	17.41	0.12	2-
2623	Zech*	11 16.8	14.4	+27			
570	Kythera*	11 19.0	12.9	+19	8.12	0.15-0.20	2
4070	Rozov*	11 23.8	14.6	+22			
31723	1999 JT61*	11 24.3	14.4	+17			
214088	2004 JN13*	11 27.2	12.6	-16			
3841	Dicicco*	11 29.8	14.4	+25			
481	Emita*	12 01.9	11.1	+23	14.35	0.09-0.30	2
7870	1987 UP2*	12 09.6	14.2	+20	12.	0.06-0.07	1
569	Misa*	12 10.4	12.3	+25	13.52	0.25	2
4467	Kaidanovskij*	12 11.4	14.9	+41	>12.	0.03	1
1965	van de Kamp*	12 15.0	14.4	+23	>6.	0.5	1
549	Jessonda*	12 15.5	12.8	+27	2.971	0.04-0.10	2-
19144	1989 UP1*	12 15.5	14.9	+24			
43815	1991 VD4*	12 15.5	14.7	+18			
2655	Guangxi*	12 15.9	14.7	+21			
1461	Jean-Jacques*	12 21.3	14.1	+17	16.56	0.09	2
1149	Volga*	12 21.4	14.2	+21	27.5	0.26	2
2088	Sahlia*	12 22.5	14.5	+34	10.37	0.12	2
2290	Helffrich*	12 26.7	14.5	+4		0.10	

Low Phase Angle Opportunities

The Low Phase Angle list includes asteroids that reach very low phase angles. The "α" column is the minimum solar phase angle for the asteroid. 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."

You will have the best chance of success working objects with low amplitude and periods that allow covering at least half a cycle

every night. Objects with large amplitudes and/or long periods are much more difficult for phase angle studies since, for proper analysis, the data have to be reduced to the average magnitude of the asteroid for each night. This reduction requires that you determine the period and the amplitude of the lightcurve; for long period objects that can be tricky. Refer to Harris, *et al.* ("Phase Relations of High Albedo Asteroids." *Icarus* **81**, p365 ff) for the details of the analysis procedure.

As an aside, some use the maximum light to find the phase slope parameter (*G*). However, this can produce a significantly different value for both *H* and *G* versus when using average light, which is the method used for values listed by the Minor Planet Center.

#	Name	Date	α	V	Dec	Period	Amp	U
253	Mathilde	10 01.0	0.94	12.0	+01	417.7	0.45-0.50	3
305	Gordonia	10 02.3	0.69	12.9	+05	16.2	0.16-0.17	2
830	Petropolitana	10 02.4	0.86	13.3	+06	39.0	0.15	2
720	Bohlinia	10 03.1	0.54	13.5	+02	8.919	0.16-0.46	3
450	Brigitta	10 05.1	0.30	13.5	+04	10.75	0.18	2
268	Adorea	10 05.3	0.92	13.2	+02	7.80	0.15-0.20	3
150	Nuwa	10 05.8	0.34	11.4	+06	8.135	0.08-0.31	3
252	Clementina	10 09.0	0.60	13.6	+08	10.864	0.32-0.44	3
37	Fides	10 09.2	0.35	9.8	+07	7.334	0.10-0.25	3
1351	Uzbekistania	10 13.5	0.86	14.0	+10	73.9	0.20-0.34	2
332	Siri	10 16.7	0.29	12.8	+08	8.007	0.10-0.35	3
250	Bettina	10 23.0	0.63	11.5	+13	5.055	0.11-0.60	3
1223	Neckar	11 01.8	0.12	14.0	+14	7.81	0.16-0.45	3
713	Luscinia	11 03.8	0.31	12.9	+14	8.28	0.09-0.40	3
171	Ophelia	11 04.2	0.95	12.8	+12	6.665	0.14-0.46	3
401	Ottilia	11 08.9	0.45	13.6	+18	6.049	0.11-0.24	3
1186	Turnera	11 11.1	0.53	13.0	+19	12.066	0.25-0.34	2+
374	Burgundia	11 11.3	0.75	12.7	+15	6.972	0.05-0.18	3
336	Lacadiera	11 17.9	0.06	12.5	+19	13.70	0.27-0.34	3
570	Kythera	11 19.0	0.18	12.9	+19	8.120	0.15-0.18	2
774	Armor	11 21.4	0.46	13.4	+21	25.162	0.13-0.34	2
503	Evelyn	11 21.8	0.61	11.9	+19	38.7	0.30-0.5	2
3722	Urata	11 22.4	0.91	14.0	+19	5.567	0.04-0.58	3
104	Klymene	11 28.1	0.66	11.6	+23	8.984	0.26-0.3	3
596	Scheila	11 30.7	0.29	13.6	+21	15.851	0.06-0.09	2+
481	Emita	12 01.9	0.33	11.2	+23	14.35	0.09-0.30	2
23	Thalia	12 03.0	0.54	9.2	+23	12.312	0.10-0.14	3
363	Padua	12 03.1	0.35	12.4	+23	8.401	0.14	3
196	Philomela	12 10.1	0.30	10.8	+24	8.334	0.07-0.40	3
569	Misa	12 10.4	0.75	12.3	+25	13.52	0.25	2
321	Florentina	12 10.9	0.89	13.6	+25	2.871	0.31-0.52	3
419	Aurelia	12 11.6	0.87	12.8	+20	16.784	0.07-0.27	3
263	Dresda	12 19.0	0.55	13.8	+22	16.809	0.32-0.55	3
825	Tanina	12 20.7	0.57	14.0	+22	6.940	0.20-0.54	3
541	Deborah	12 22.4	0.18	13.9	+23	13.91	0.04-0.07	2+
404	Arsinoe	12 27.8	0.44	12.5	+25	8.887	0.27-0.38	3
10	Hygiea	12 30.9	0.13	10.0	+24	27.623	0.09-0.33	3

Shape/Spin Modeling Opportunities

Those doing work for modeling should contact Josef Ďurech at the email address above 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

if looking to add lightcurves for objects already in the DAMIT database.

Below is a list of objects reaching brightest this quarter with well-determined periods and for which no pole solution is in the LCDB. However, since they have a high U rating, this means there is at least one dense lightcurve of high quality. An additional dense lightcurve, along with sparse data, could lead to the asteroid being added to or improving one in DAMIT, thus increasing the total number of asteroids with spin axis and shape models.

Note that you can compare and combine the results of searches using the ephemeris generator and LCDB query (limited to with or without a pole solution) at the sites listed above to create your own customized list of objects.

		Brightest			LCDB Data		
#	Name	Date	Mag	Dec	Period	Amp	U
1030	Vitja	10 01.4	15.0	+3	5.7014	0.18-0.21	3-
8147	Colemanhawkins*	10 01.4	15.0	-4			
261	Prymno	10 02.3	12.6	-2	8.002	0.13-0.20	3
2429	Schurer*	10 02.3	15.0	-1	6.66	0.12-0.77	3-
2481	Burgi*	10 02.3	14.9	+3			
582	Olympia	10 02.5	12.8	-22	36.312	0.05-0.23	3
1860	Barbarossa	10 03.5	14.7	-8	3.255	0.28-0.35	3
280	Philia	10 04.0	14.6	+4	70.26	0.15-0.19	3
3296	Bosque Alegre*	10 04.2	14.7	-19			
123	Brunhild	10 04.6	12.2	+13	10.04	0.16-0.21	3
4359	Berlage*	10 04.8	14.6	+4	7.413	0.90	3
48411	Johnventre*	10 04.8	15.0	+5			
10645	Brac*	10 05.0	14.8	+12			
799	Gudula	10 05.9	13.3	+1	14.814	0.30	3
116	Sirona	10 07.8	12.0	+2	12.028	0.42-0.55	3
2235	Vittore	10 08.5	15.0	+10	32.1	0.21	3
252	Clementina*	10 09.0	13.5	+8	10.864	0.32-0.44	3
1562	Gondolatsch	10 09.0	14.7	-1	8.78	0.30-0.35	3-
802	Epyaxa	10 09.1	14.9	+7	4.392	0.40-0.70	3
2642	Vesale*	10 10.1	14.1	+9	5.566	0.12-0.39	3
1442	Corvina*	10 10.3	14.9	+7			
202	Chryseis	10 11.8	12.0	-3	23.67	0.04-0.23	3
14488	1994 TF15	10 12.0	15.0	+12			
4563	Kahnia*	10 12.4	14.7	-1			
611	Valeria*	10 13.9	12.9	+4	6.977	0.08-0.16	3
1739	Meyermann	10 14.0	15.0	+8	2.8219	0.22	3
327	Columbia	10 15.1	13.5	+13	5.932	0.16-0.42	3
647	Adelgunde	10 15.1	13.7	+18	32.202	0.28	3
1662	Hoffmann*	10 15.4	14.2	+14	8.784	0.26	3
533	Sara	10 15.6	13.9	+5	11.654	0.19-0.30	3
2460	Mitlincoln	10 15.8	14.8	+6	3.01	0.03-0.20	3
3755	Lecointe*	10 15.8	14.5	+15			
811	Nauheima	10 15.9	14.5	+4	4.0011	0.08-0.20	3
9120	1998 DR8*	10 16.5	14.8	+17	14.75	0.11-0.12	3
332	Siri	10 16.7	12.7	+8	8.0074	0.10-0.35	3
1643	Brown*	10 17.2	14.2	+16	5.932	0.48	3
498	Tokio	10 17.4	11.6	-5	41.85	0.10-0.23	3
4225	Hobart	10 17.5	14.9	+6			
2315	Czechoslovakia*	10 18.1	14.1	+8	10.0253	0.52	3
756	Lilliana	10 18.8	14.9	+11	7.834	0.18-0.99	3
2150	Nyctimene*	10 19.5	14.4	+5	6.131	0.59-0.66	3
592	Bathseba	10 20.9	13.2	+1	7.7465	0.22-0.32	3
585	Bilkis	10 21.5	13.7	+5	8.5751	0.10-0.41	3-
475	Ocllo*	10 22.0	12.8	+6	7.3151	0.66-0.81	3
3481	Xianglupeak*	10 22.0	14.6	+7	5.3193	0.30-0.44	3
474	Prudentia	10 22.2	13.5	+1	8.572	0.53-0.70	3
1752	van Herk	10 22.8	14.5	+14			
773	Irmintraud	10 23.1	13.4	+34	6.7514	0.05-0.15	3
559	Nanon	10 25.2	13.4	-1	10.059	0.09-0.26	3
3066	McFadden	10 25.5	14.0	-3	13.798	0.04-0.13	3
8159	Fukuoka*	10 25.5	14.8	-12			
3401	Vanphilos	10 25.7	13.9	+52	4.2261	0.50-0.54	3
3730	Hurban	10 26.0	14.6	+24			
950	Ahrensa	10 26.8	14.8	-7	202.	0.40	3
31060	1996 TB6*	10 27.0	14.9	+13	5.103	0.80	3
3700	Geowilliams	10 27.2	14.8	+32	14.387	0.40	3
6024	Ochanomizu*	10 27.3	14.9	+11			
2151	Hadwiger*	10 29.0	13.9	+17	5.872	0.07-0.38	3
3220	Murayama*	10 29.5	14.1	+16	4.8595	0.13-0.16	3
1552	Bessel*	10 30.3	15.0	+20	8.996	0.29	3
1407	Lindelof*	10 30.7	12.9	+22	31.151	0.34	3
370	Modestia	10 30.9	13.2	+27	22.5299	0.24	3
46	Hestia	10 31.3	10.6	+12	21.04	0.08-0.12	3
5598	Carlmurray	11 01.0	14.9	+22	2.9226	0.32	3
815	Coppelia	11 01.7	14.1	+7	4.421	0.17-0.24	3
4820	Fay*	11 02.0	13.9	+35	3.73	0.52	3
245	Vera*	11 03.5	10.9	+12	14.38	0.26	3
2827	Vellamo	11 03.6	15.0	+27			
713	Luscinia*	11 03.7	12.9	+14	8.28	0.09-0.40	3
171	Ophelia	11 04.3	12.8	+12	6.6654	0.14-0.46	3
78	Diana	11 04.6	11.4	+28	7.2991	0.02-0.30	3
10565	1994 AT1*	11 05.0	14.4	+9			
333	Badenia	11 06.0	12.9	+20	8.192	0.20-0.33	3-
2533	Fechtig*	11 06.0	14.9	+15			
943	Begonia	11 06.8	13.9	-2	15.66	0.24-0.34	3
1645	Waterfield	11 08.0	14.6	+17	4.861	0.18-0.20	3
3003	Koncek*	11 08.1	14.8	+1			
2637	Bobrovnikoff	11 08.6	14.7	+25	4.7939	0.13	3
401	Ottilia	11 08.9	13.6	+18	6.049	0.11-0.24	3
5292	1991 AJ1	11 08.9	14.7	-3			
5892	Milesdavis*	11 09.5	14.7	+7	10.59	0.26	3
1277	Dolores	11 10.2	14.8	+21	17.19	0.45	3
374	Burgundia	11 11.3	12.7	+15	6.972	0.05-0.18	3
1756	Giacobini*	11 12.1	13.8	+26	3.8527	0.21	3
85713	1998 SS49	11 12.3	14.7	+37			

#	Name	Brightest Date	Mag	Dec	LCDB Data Period	Amp	U
237	Coelestina	11 12.4	13.2	+10	29.215	0.16-0.3	3
1902	Shaposhnikov	11 12.7	14.6	+15	21.2	0.35-0.42	3
2078	Nanking*	11 13.0	14.0	+58	6.473	0.79-0.85	3
1388	Aphrodite	11 14.9	14.9	+18	11.9432	0.34-0.65	3
7369	Gavrilin*	11 15.0	14.6	+53	49.12	0.25	3
2195	Tengstrom*	11 15.6	13.9	+12	2.8211	0.17-0.31	3
2903	Zhuhai*	11 15.6	14.5	+18	5.263	0.32-0.54	3
715	Transvaalia*	11 16.0	13.4	+21	11.8	0.19-0.32	3
2421	Nininger	11 16.0	15.0	+13			
677	Aaltje	11 17.0	13.8	+26	16.608	0.10-0.37	3
3223	Forsius	11 17.5	14.0	+3	2.343	0.20-0.22	3
2331	Parvulesco	11 18.3	14.4	+21	32.03	0.50	3
3177	Chillicothe*	11 18.3	14.4	+29			
706	Hirundo	11 18.5	14.3	+43	22.027	0.39-0.9	3
851	Zeissia	11 18.6	14.0	+15	9.34	0.38-0.53	3
387	Aquitania	11 18.9	12.1	-4	24.144	0.25	3
515	Athalia*	11 20.3	14.5	+17			
1431	Luanda	11 21.0	14.9	+1	4.141	0.77-1.00	3-
2633	Bishop	11 21.1	15.0	+19			
1120	Cannonia	11 21.3	13.6	+12	3.816	0.15-0.16	3
1069	Planckia	11 21.4	14.1	+1	8.665	0.14-0.42	3
4755	Nicky*	11 22.2	14.9	+16	5.057	0.40	3
3673	Levy*	11 22.3	14.5	+31	2.6879	0.13	3
6388	1989 WL1*	11 23.6	14.8	+18			
3511	Tsvetaeva*	11 23.7	14.7	+17	6.2279	0.80-0.87	3
603	Timandra	11 24.8	14.9	+33	41.79	0.10	3-
1416	Renauxa	11 25.9	14.4	+35	8.7	0.1-0.4	3
1467	Mashona	11 27.3	13.9	+51	9.76	0.24-0.25	3
104	Klymene*	11 28.1	11.6	+23	8.984	0.26-0.3	3
37306	2001 KW46*	11 28.2	14.9	+15			
2185	Guangdong	11 28.3	14.8	+23	21.089	0.19	3-
412	Elisabetha	11 28.6	13.0	+7	19.635	0.08-0.20	3
2326	Tololo*	11 29.0	14.2	-3			
1262	Sniadeckia	11 30.6	14.7	+6	17.57	0.10-0.16	3
169	Zelia	11 30.7	12.5	+31	14.537	0.13-0.14	3
596	Scheila	11 30.7	13.6	+21	15.848	0.06-0.10	3
1129	Neujmina*	12 01.0	13.9	+26	5.0844	0.06-0.20	3
1410	Margret	12 01.1	15.0	+6			
7561	Patrickmichel*	12 01.1	14.7	+22			
1176	Lucidor*	12 01.5	14.1	+26	4.0791	0.05-0.06	3
6126	1989 EW1*	12 02.2	14.9	+26			
1041	Asta*	12 02.7	13.6	+26	7.554	0.12-0.14	3-
363	Padua	12 03.0	12.4	+23	8.401	0.14	3
528	Rezia	12 03.2	13.9	+29	7.337	0.36-0.39	3
2083	Smither*	12 03.4	14.5	+28	2.6717	0.09-0.10	3
476	Hedwig	12 04.0	12.4	+32	27.33	0.13	3
967	Helionape	12 04.2	14.4	+21	3.234	0.04-0.12	3
2816	Pien	12 05.2	14.9	+18			
1062	Ljuba*	12 05.4	13.7	+31	33.8	0.17-0.2	3
210	Isabella*	12 07.1	12.3	+29	6.672	0.09-0.38	3
1067	Lunaria*	12 07.4	14.0	+33	6.057	0.13-0.27	3
1405	Sibelius*	12 07.4	14.4	+34	6.051	0.11	3-
3960	Chaliubieju*	12 07.5	13.8	+17	3.986	0.27-0.30	3
1460	Haltia*	12 08.5	14.3	+23	3.56	0.30	3
5596	Morbidelli*	12 10.8	14.8	+23	5.4	0.57	3
1015	Christa	12 11.6	13.2	+14	11.23	0.12-0.20	3-
591	Irmgard	12 12.4	14.7	+41	7.35	0.23-0.26	3
2380	Heilongjiang*	12 12.5	14.7	+26	11.237	0.22	3
101	Helena	12 13.2	12.0	+39	23.08	0.09-0.13	3
482	Petrina	12 13.4	13.8	+3	11.7922	0.07-0.56	3
743	Eugenisis	12 13.6	13.6	+19	10.23	0.10-0.20	3
598	Octavia*	12 14.3	12.1	+20	10.8903	0.28-0.35	3
219	Thusnelda	12 15.1	12.4	+7	29.842	0.19-0.20	3
872	Holda	12 16.0	13.9	+13	5.945	0.20-0.47	3
3965	Konopleva*	12 16.7	14.6	+31			
81	Terpsichore	12 17.8	11.4	+37	10.943	0.06-0.10	3
6050	Miwablock*	12 17.9	14.8	+23	5.7566	0.28	3
207	Hedda	12 18.3	12.7	+29	30.098	0.09-0.11	3
627	Charis	12 18.5	14.2	+15	27.888	0.35	3
2648	Owa*	12 18.5	14.2	+26	3.5641	0.20-0.35	3
2653	Principia	12 18.8	15.0	+16	5.5228	0.34-0.50	3
726	Joella	12 19.1	13.7	+12	13.04	0.12	3
2417	McVittie*	12 19.9	14.9	+24	4.934	0.42	3
1330	Spiridonia	12 20.6	14.7	+1	9.67	0.08-0.16	3
1929	Kollaa*	12 20.9	15.0	+29	2.9887	0.20-0.22	3
718	Erida	12 21.4	14.3	+31	17.447	0.31-0.37	3
3906	Chao	12 21.5	15.0	-10	11.892	0.13	3
633	Zelima	12 21.9	14.2	+10	11.724	0.14-0.53	3-
541	Deborah	12 22.3	14.0	+23	29.368	0.04-0.10	3
2647	Sova*	12 22.8	14.2	+26	9.366	0.23-0.35	3
2350	von Lude*	12 23.2	14.8	+16			
1590	Tsiolkovskaja	12 24.7	15.0	+18	6.731	0.10-0.4	3
513	Centesima	12 26.0	13.8	+9	5.23	0.18-0.45	3
5670	Rosstaylor*	12 26.3	15.0	+21			
1080	Orchis	12 26.6	13.7	+33	16.1	0.23-0.24	3
124	Alkeste	12 27.0	11.9	+19	9.921	0.08-0.15	3
940	Kordula	12 27.5	14.4	+27	15.57	0.36	3
686	Gersuind	12 27.7	13.8	+10	6.3127	0.30-0.37	3
2962	Otto	12 27.7	14.6	+40	2.678	0.14-0.15	3-
2293	Guernica	12 28.7	14.9	+24	6.414	0.48	3
709	Fringilla	12 28.9	13.5	+41	52.4	0.18	3-
6111	Davemckay*	12 28.9	15.0	+23			
7783	1994 JD*	12 29.7	15.0	+25	31.83	0.85	3
839	Valborg	12 30.3	14.7	+39	10.366	0.14-0.19	3

Radar-Optical Opportunities

There are several resources to help plan observations in support of radar.

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
http://www.naic.edu/~pradar

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

However, these are based on *known* targets at the time the list was prepared. It is very common for newly discovered objects to move up the list and become radar targets on short notice. We recommend that you keep up with the latest discoveries using the RSS feeds from the Minor Planet Center

http://www.minorplanetcenter.net/iau/rss/mpc_feeds.html

In particular, monitor the NEA feed and be flexible with your observing program. In some cases, you may have only 1-3 days when the asteroid is within reach of your equipment. Be sure to keep in touch with the radar team if you get data (through Dr. Benner's email listed above). They may not always be observing the target but, in some cases, your initial results may change their plans. In all cases, your efforts are greatly appreciated.

Use the ephemerides below as a guide to your best chances for observing, but remember that photometry may be possible before and/or after the ephemerides given below. Note that *geocentric* positions are given. Use these web sites to generate updated and *topocentric* positions:

MPC: *http://www.minorplanetcenter.net/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.

(276049) 2002 CE26 (Aug-Oct, H = 18.4, Binary or Trinary)
Shepard *et al.* (2004, *IAUC* **8397**) using radar observations first reported this NEA as being a binary. Using photometry observations, Pravec *et al.* (2006, *Icarus* **181**, 63-93) reported a rotation period for the primary of 3.2930 h. The orbital period of the satellite was found to be 15.6 hours. The phase angle bisector longitude will be similar during this apparition as it was during the time of the Pravec *et al.* observations. This makes it likely that

mutual events (occultations or eclipses involving the satellite) will be seen. Given that possibility, high-precision observations, on the order of 0.01-0.02 mag, and – preferably – well-calibrated to at least an internal system will be required.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
10/01	12 18.9	-85 05	0.35	1.01	17.3	78.1	82	71	+0.41	-22
10/03	11 34.2	-83 56	0.37	1.01	17.4	78.3	80	77	+0.64	-21
10/05	11 07.6	-82 48	0.40	1.00	17.5	78.2	79	87	+0.84	-21
10/07	10 50.5	-81 45	0.42	1.00	17.7	77.9	78	98	+0.97	-20
10/09	10 38.6	-80 47	0.45	0.99	17.8	77.6	76	105	-1.00	-19
10/11	10 29.9	-79 54	0.47	0.99	17.9	77.1	75	108	-0.92	-19
10/13	10 23.4	-79 06	0.50	0.99	17.9	76.5	74	106	-0.76	-18
10/15	10 18.3	-78 22	0.52	0.99	18.0	75.9	74	100	-0.58	-18

2340 Hathor (Oct-Nov, H = 20.0, PHA)

The LCDB has no listing for a period for this NEA. Given that it is listed as a potentially hazardous asteroid, characterization work such as rotation period and refinement of the H-G values would be highly beneficial.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
10/20	07 01.0	+27 41	0.05	1.01	16.1	74.4	103	59	-0.14	+14
10/25	04 15.2	+18 17	0.05	1.04	15.1	32.4	146	159	+0.01	-23
10/30	02 40.0	+07 43	0.07	1.07	15.1	7.8	172	109	+0.38	-46
11/04	01 55.1	+02 03	0.10	1.09	16.1	14.9	164	27	+0.89	-57
11/09	01 32.0	-00 51	0.14	1.12	17.1	23.8	153	51	-0.95	-62
11/14	01 19.1	-02 21	0.18	1.14	17.8	30.1	145	116	-0.56	-64
11/19	01 12.0	-03 06	0.21	1.16	18.4	34.8	138	170	-0.13	-65
11/24	01 08.5	-03 22	0.25	1.17	18.9	38.5	132	114	+0.03	-66

(68267) 2001 EA16 (Nov-Dec, H = 16.8)

There are no known lightcurve parameters for 2001 EA16. The estimated size is 1.3 km, meaning that it is unlikely to have a rotation period shorter than about 2.2 hours. Keep in mind that observations at very high phase angles may produce lightcurves that include deep shadowing effects. For example, even a nearly spheroidal body can have a large amplitude lightcurve due to a large concavity. If observations are obtained over a large range of phase angles, it may be necessary to divide the entire data set into subsets where the amplitude and shape are similar within each subset.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
10/15	18 13.3	+31 29	0.14	0.98	15.8	91.0	81	130	-0.58	+21
10/25	19 23.0	+45 27	0.26	1.04	16.5	72.6	93	85	+0.01	+14
11/04	20 00.2	+49 50	0.39	1.10	17.2	63.4	96	70	+0.89	+10
11/14	20 27.7	+51 57	0.51	1.17	17.7	57.2	97	116	-0.56	+8
11/24	20 52.9	+53 22	0.63	1.23	18.2	52.6	97	85	+0.03	+6
12/04	21 18.5	+54 32	0.74	1.30	18.5	48.8	97	73	+0.93	+4
12/14	21 45.7	+55 39	0.84	1.36	18.8	45.8	96	119	-0.55	+2
12/24	22 15.2	+56 46	0.95	1.43	19.1	43.3	95	78	+0.05	+0

2005 YQ96 (Dec, H = 20.4, PHA)

The estimated size of YQ96 is about 250 meters. There are no lightcurve parameters listed in the LCDB.

DATE	RA	Dec	ED	SD	V	α	SE	ME	MP	GB
12/21	13 33.0	+39 59	0.10	0.99	18.3	86.4	88	75	-0.02	+75
12/22	13 37.0	+38 59	0.09	0.98	18.2	87.3	87	84	+0.00	+75
12/23	13 41.4	+37 49	0.08	0.98	18.1	88.3	87	92	+0.01	+75
12/24	13 46.4	+36 26	0.08	0.98	17.9	89.5	86	101	+0.05	+75
12/25	13 52.2	+34 46	0.07	0.98	17.8	91.1	85	110	+0.12	+75
12/26	13 58.8	+32 43	0.06	0.98	17.7	93.0	83	119	+0.20	+74
12/27	14 06.6	+30 10	0.06	0.98	17.5	95.4	81	127	+0.31	+73
12/28	14 15.9	+26 57	0.05	0.97	17.4	98.5	79	135	+0.42	+71

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