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LIGHTCURVE PHOTOMETRY OPPORTUNITIES: 2010 OCTOBER - DECEMBER

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Once again the spotlight is on several near-Earth asteroids (NEAs) for radar support that may present some challenges given their fast sky motion, faintness, and/or proximity to the Sun. For more background on the program details for each of the opportunity lists, refer to previous issues, e.g., *Minor Planet Bulletin* **36**, 188.

As always, we urge observations of asteroids even if they have well-established lightcurve parameters, especially if they do not yet have good spin axis or shape models. Every lightcurve of sufficient quality provides valuable information in support of such efforts, which are needed to resolve a number of questions about the evolution of individual asteroids and the general population. Furthermore, data over many apparitions can help determine if an asteroid's rotation rate is being affected by the YORP effect, a thermal effect that can cause a smaller, irregularly-shaped asteroid to speed up or slow down. This is done by seeing if a constant sidereal period fits all the data equally well or if a small linear change in the period produces better results. See Lowry et al. (2007) *Science* **316**, 272-274 and Kaasalainen et al. (2007) *Nature* **446**, 420-422.

Lightcurves, new or repeats, of NEAs are also important for solving spin axis models, specifically the orientation of the asteroid's axis of rotation. Pole directions are known for only about 30 NEAs out of a population of 6800. This is hardly sufficient to make even the most general of statements about pole alignments, including whether or not YORP is forcing pole orientations into a limited number of preferred directions (see La Spina et al., 2004, *Nature* **428**, 400-401).

The Opportunities Lists

We present four lists of "targets of opportunity" for the period 2010 October-December. 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:

www.minorplanetobserver.com/astlc/LightcurveParameters.htm

Note that the lightcurve amplitude in the tables could be more, or less, than what's given. Use the listing only as a guide.

Objects with no U rating or $U = 1$ should be given higher priority when possible. *We urge that you 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.

The first list is an *abbreviated list* of those asteroids reaching V < 14.5 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. More completed lists, including objects V < 16.0 can be found on the CALL web site.

http://www.minorplanetobserver.com/astlc/targets_3q_2010.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 shape and spin axis modeling. Those doing work for modeling should contact Josef Durech at the email address above and 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 made to determine the lightcurve period, amplitude, and shape are needed to supplement the radar data. High-precision work, 0.01-0.03 mag, is preferred. 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

Once you have analyzed your data, it's important that you 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
2437	Amnestia	10 01.5	14.3	+ 6			
1982	Cline	10 03.8	13.9	- 3			
1996	Adams	10 04.5	14.5	+ 9	2	3.08	0.23
3894	Williamcooke	10 07.0	14.5	- 6			
1663	van den Bos	10 08.8	13.6	- 4			
879	Ricarda	10 13.4	13.6	+30	2	82.9	0.37
1521	Seinajoki	10 13.0	14.6	+10			
101496	1998 XM3	10 15.1	14.6	+ 3			
4349	Tiburcio	10 15.3	13.8	-10			
6425	1994 WZ3	10 15.2	14.1	+12			
296	Phaetusa	10 16.8	13.9	+ 6			
2429	Schurer	10 19.4	14.5	+14	2	7.07	0.28
1080	Orchis	10 20.3	13.4	+14			
1383	Limburgia	10 21.1	14.4	+11			
2175	Andrea Doria	10 22.5	14.4	+13			
705	Erminia	10 22.4	12.5	+28	2	53.96	0.12
7081	Ludibunda	10 23.9	14.7	+16			
3133	Sendai	10 26.8	13.7	+12			
2699	Kalinin	10 26.1	14.4	- 2			
902	Probitas	10 27.1	14.2	+21	2+	10.11	0.18
20310	1998 FD117	10 27.9	14.7	+14			
1328	Devota	10 27.8	14.3	+14	2-	17.49	0.20
17312	7622 P-L	10 28.6	14.8	+11			
319	Leona	10 28.5	13.3	+ 5	1	9.6	0.03
1253	Frisia	10 28.2	14.4	+13			
1550	Tito	10 28.7	12.9	+ 4	2	54.2	0.23
645	Agrippina	10 28.7	13.8	+19	2	32.6	0.18
10217	Richardcook	11 01.0	14.6	+33			
2848	ASP	11 01.4	14.2	+16			
4298	Jorgenunez	11 03.6	14.4	+11			
3277	Aaronson	11 04.1	14.1	+ 6			
619	Triberga	11 04.7	13.0	+ 3	2	29.41	0.30-0.45
2360	Volgo-Don	11 05.0	14.4	+16			
1133	Lugduna	11 06.9	13.3	+13			
7837	Mutsumi	11 07.8	14.4	+18			
1646	Rosseland	11 07.0	14.1	+ 1	2	69.2	0.13
838	Seraphina	11 09.0	13.4	+21	2	15.67	0.07-0.30
1357	Khama	11 10.2	14.8	+ 5			
149	Medusa	11 11.7	12.5	+16	2	26.	>0.33
2853	Harvill	11 15.0	14.5	+15			
846	Lipperta	11 16.9	13.3	+19	1	>24.	>0.02
1312	Vassar	11 18.0	14.5	-14			
6734	Benzenberg	11 19.9	14.6	+19	1		0.19
5534	1941 UN	11 20.4	13.6	+32	2		
764	Gedania	11 20.8	13.3	+25	2	24.97	0.09-0.35
2219	Mannucci	11 22.8	14.5	+18	1		0.3
571	Dulcinea	11 22.6	13.1	+30	1	>24.	>0.15
4729	Mikhailmil'	11 23.3	14.3	+21			
574	Reginhild	11 23.1	13.3	+33			
6111	Davemckay	11 25.7	14.6	+17			
2649	Oongaq	11 30.4	14.2	+21	2	8.64	0.28
27496	2000 GC125	12 04.3	14.6	- 2	2	4.70	0.10
1190	Pelagia	12 05.8	14.5	+27			
5288	Nankichi	12 10.0	14.5	+29	2	13.78	0.19
4289	Biwako	12 11.1	14.2	+24			
1177	Gonnessia	12 12.7	13.8	+20	2	6.81	0.11
2301	Whitford	12 19.0	13.8	+26			
3388	Tsanghinchi	12 21.2	14.5	+12	2	3.24	0.33

Low Phase Angle Opportunities

#	Name	Date	α	V	Dec	Period	Amp	U
207	Hedda	10 05.6	0.84	12.5	+03	>12.	0.03	1
5714	Krasinsky	10 16.4	0.19	14.9	+09			
1383	Limburgia	10 21.1	0.09	14.5	+11			
1256	Normannia	10 21.3	0.76	14.8	+13	6.8	0.06	1
1486	Marilyn	10 26.1	0.09	14.8	+12			
3133	Sendai	10 26.8	0.58	14.2	+12			
1328	Devota	10 27.8	0.43	14.3	+14			
1253	Frisia	10 28.3	0.16	14.4	+13			
1082	Pirola	10 29.0	0.96	14.0	+11			
2848	ASP	11 01.4	0.51	14.2	+16			
6413	Iye	11 03.5	0.71	14.9	+16			
2360	Volgo-Don	11 05.0	0.20	14.4	+16			
7837	Mutsumi	11 08.0	0.77	14.8	+18			
846	Lipperta	11 16.9	0.09	13.4	+19	>24.	0.02	1
2697	Albina	11 17.5	0.92	14.7	+22	9.6	0.02	1
6734	Benzenberg	11 20.0	0.12	14.7	+19			
5392	Parker	11 20.6	0.70	14.8	+21	45.	0.2	1
1912	Anubis	11 21.7	0.56	14.7	+19			
2057	Rosemary	11 22.0	0.70	14.7	+22			
2286	Fesenkov	11 22.0	0.04	15.0	+20			
2219	Mannucci	11 22.9	0.85	14.5	+18			
4729	Mikhailmil'	11 23.4	0.51	14.3	+21			
2379	Heiskanen	11 24.3	0.25	14.8	+20			
1440	Rostia	11 29.9	0.49	15.0	+23			
4540	Oriani	12 02.9	0.28	15.0	+21			
14999	1997 VX8	12 04.2	0.94	14.9	+24			
561	Ingwelde	12 07.0	0.80	15.0	+20			
2831	Stevin	12 07.9	0.43	14.5	+22			
4289	Biwako	12 11.1	0.30	14.3	+24			

Shape/Spin Modeling Opportunities

#	Name	Brightest Date	Mag	Dec	Per (h)	Amp	U
97	Klotho	10 05.1	10.1	-06	35.15	0.07 0.3	3
347	Pariana	10 30.2	13.0	+00	4.0529	0.09 0.42	3
389	Industria	11 04.7	11.6	+26	8.53	0.18 0.34	3
65	Cybele	11 08.8	11.8	+12	4.036	0.04 0.12	2
480	Hansa	11 20.1	11.4	+19	16.19	0.20 0.58	3
337	Devosa	11 21.3	11.0	+33	4.65	0.08 0.75	3
37	Fides	11 28.4	9.6	+26	7.3335	0.10 0.25	3
212	Medea	12 10.7	12.0	+28	10.283	0.04 0.13	3
375	Ursula	12 11.8	12.2	+45	16.83	0.17	2
419	Aurelia	12 22.8	12.9	+20	16.788	0.07 0.27	3
42	Isis	12 31.	11.8	+26	13.597	0.24 0.35	3
93	Minerva	12 31.	12.2	+35	5.982	0.04 0.10	3
139	Juewa	12 31.	12.0	+10	20.991	0.20	3
335	Roberta	12 31.	13.5	+14	12.054	0.05 0.17	3

Radar-Optical Opportunities

Use the ephemerides to judge your best chances for observing. Note that the intervals in the ephemerides are not always the same and that *geocentric* positions are given. Use the web sites below to generate updated and *topocentric* positions. In the ephemerides, E.D. and S.D. are, respectively, the Earth and Sun distances (AU), V is the V magnitude, and α is the phase angle.

Minor Planet Center: *http://cfa-www.harvard.edu/iau/mpc.html*
JPL Horizons: *http://ssd.jpl.nasa.gov/?horizons*

The first three objects are repeats from MPB 37-3 since they are best observed in October.

(137032) 1998 UO1 (2010 October, H = 16.7)

Periods ranging from ~3 to 4 h have been reported for this NEA. Radar observations show *D* ~ 1.2 km and a nearly spheroidal shape. There were hints of a companion in the radar but nothing conclusive. High-precision observations will be needed to have any chance of detecting a satellite, if it exists. Note that ephemeris has 1-day intervals.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
10/01	16 25.13	+11 06.4	0.082	0.964	15.69	115.0
10/02	17 12.73	+14 35.2	0.084	0.978	15.07	103.4
10/03	17 58.13	+17 16.0	0.089	0.993	14.71	92.6
10/04	18 38.41	+19 03.8	0.097	1.007	14.55	83.2
10/05	19 12.43	+20 08.1	0.107	1.022	14.52	75.4
10/06	19 40.42	+20 42.2	0.119	1.036	14.58	69.2
10/07	20 03.26	+20 57.3	0.132	1.050	14.68	64.1
10/08	20 21.93	+21 01.1	0.146	1.064	14.80	60.0
10/09	20 37.33	+20 58.4	0.160	1.078	14.94	56.7
10/10	20 50.17	+20 52.2	0.176	1.092	15.09	54.0

(153814) 2001 WN5 (2010 October, H = 18.3)
There are no known lightcurve parameters for this NEA. Its estimate size is about 650 meters. The somewhat fast sky motion and estimated magnitude favors larger telescopes so that exposure times can be kept to a minimum. In 2028, the asteroid passes at 0.6 lunar distances, the close known approach by an object of this size for the next two centuries.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
10/01	17 36.01	-08 24.8	0.127	0.980	17.21	96.0
10/06	18 41.50	-05 32.6	0.112	1.003	16.54	85.2
10/11	19 58.70	-01 34.3	0.107	1.029	16.00	70.9
10/16	21 14.43	+02 29.6	0.115	1.056	15.78	56.5
10/21	22 16.64	+05 36.7	0.134	1.085	15.85	45.4
10/26	23 03.11	+07 39.4	0.161	1.116	16.11	38.1
10/31	23 37.20	+08 57.2	0.194	1.148	16.45	33.9
11/05	0 02.79	+09 48.9	0.231	1.181	16.83	31.6

(162269) 1999 VO6 (2010 October, H = 17.0)
This NEA has an estimated size of 1.2 km. There are no known lightcurve parameters. It's decidedly a Northern Hemisphere target as it rides near the north celestial pole during October.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
10/01	3 32.88	+64 26.1	0.254	1.115	16.34	57.5
10/03	3 53.35	+67 04.1	0.221	1.090	16.08	60.7
10/05	4 27.82	+70 14.4	0.189	1.065	15.82	65.0
10/07	5 34.33	+73 40.3	0.158	1.040	15.57	71.1
10/09	7 47.01	+75 13.4	0.130	1.014	15.39	79.9
10/11	10 26.57	+69 09.9	0.106	0.987	15.42	93.2
10/13	11 58.40	+53 15.5	0.091	0.960	16.03	112.3

2007 RU17 (2010 October, H = 18.2)
There are no known lightcurve parameters for this asteroid with an estimated diameter of 0.68 km. Given the large range of phase angles, this object could be an excellent study to determine H and G parameters (absolute magnitude and phase slope parameter).

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
10/10	1 41.27	+11 38.7	0.319	1.313	16.90	8.6
10/13	1 28.38	+11 40.2	0.274	1.271	16.31	4.6
10/16	1 10.48	+11 37.3	0.231	1.228	15.80	3.4
10/19	0 44.90	+11 24.9	0.191	1.184	15.63	10.2
10/22	0 07.18	+10 50.8	0.155	1.139	15.47	20.9
10/25	23 10.71	+09 27.2	0.126	1.093	15.38	36.5
10/28	21 50.79	+06 31.2	0.108	1.046	15.57	58.3
10/31	20 17.85	+02 06.4	0.107	0.999	16.28	83.8

2003 UV11 (2010 October, H = 19.3)
The estimated size of this asteroid is only 400 meters. In late October it reaches V = 12.0, making it an easy visual target to show the neighbors. However, its sky motion then will be extremely fast, making good photometry difficult. Better opportunities for getting a lightcurve occur about a week before the spectacular fly-by.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
10/19	3 03.38	+14 38.2	0.166	1.151	16.68	19.2
10/21	2 59.88	+14 56.6	0.136	1.125	16.13	17.3
10/23	2 54.14	+15 24.1	0.106	1.097	15.46	14.8
10/25	2 43.70	+16 10.4	0.077	1.070	14.58	11.3
10/27	2 20.17	+17 44.2	0.048	1.042	13.29	6.1
10/29	0 50.89	+21 45.4	0.022	1.014	12.02	20.7
10/31	18 18.15	+04 04.5	0.018	0.985	15.15	117.3
11/02	16 28.17	-07 16.7	0.043	0.955	20.49	148.2

2002 VE68 (2010 November, H = 20.3)
A preliminary period of 13.5 h was found by Pravec et al. The amplitude was > 0.8 mag, indicating a very elongated body. Given the period, a collaboration among observers at well-separated longitudes is in order. The estimated size is only 0.26 km.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
10/29	7 37.19	+65 03.7	0.057	1.010	16.61	71.2
11/01	5 49.44	+68 30.7	0.047	1.015	15.85	60.9
11/04	3 04.91	+64 09.4	0.039	1.018	15.07	47.5
11/07	1 11.95	+47 39.0	0.035	1.020	14.55	35.9
11/10	0 18.15	+27 17.9	0.038	1.021	14.75	37.2
11/13	23 50.64	+11 08.2	0.046	1.020	15.43	47.0
11/16	23 34.91	+00 17.0	0.056	1.019	16.14	56.3
11/19	23 25.17	-06 52.9	0.069	1.017	16.77	63.6

3282 Epona (2010 November, H = 15.5)
A period of 2.381 h has been determined by Pravec et al. with an amplitude ranging from 0.05-0.38 during the 1999 apparition. Be prepared for anything in-between. The estimated size is 2.6 km.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
11/05	19 10.83	+39 31.4	0.201	0.990	14.96	84.7
11/10	21 14.65	+36 12.9	0.202	1.054	14.49	66.3
11/15	22 45.86	+27 56.9	0.237	1.117	14.53	52.1
11/20	23 40.84	+20 24.6	0.293	1.178	14.89	44.1
11/25	0 15.03	+15 02.3	0.363	1.237	15.35	40.2
11/30	0 38.23	+11 23.5	0.442	1.294	15.82	38.4
12/05	0 55.35	+08 55.0	0.525	1.349	16.26	37.5
12/10	1 08.92	+07 13.8	0.612	1.402	16.67	37.0

2005 GC120 (2010 December, H = 19.6)
There are no known lightcurve parameters for this 0.34 km asteroid. Somewhat larger telescopes will be needed given the faintness and sky motion of this NEA.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
12/01	22 28.88	-23 43.2	0.044	0.981	16.27	95.7
12/03	23 42.22	-02 45.9	0.048	0.999	15.64	73.1
12/05	0 31.76	+12 26.0	0.060	1.016	15.71	57.7
12/07	1 04.84	+21 29.9	0.077	1.034	16.04	49.2
12/09	1 27.85	+26 56.9	0.096	1.051	16.42	44.5
12/11	1 44.65	+30 25.5	0.116	1.068	16.80	41.7
12/13	1 57.51	+32 46.7	0.137	1.085	17.15	40.1
12/15	2 07.76	+34 26.9	0.158	1.102	17.47	39.1

2010 JL33 (2010 December, H = 17.7)
This 900-meter NEA will put on a nice visual show for modest backyard telescopes around the December 10th. It should be a relatively easy photometry target as well. There are no lightcurve parameters.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
12/06	19 21.52	+07 01.5	0.057	0.948	17.06	129.9
12/10	22 10.83	+49 07.8	0.044	0.992	13.65	78.9
12/14	2 42.86	+55 12.8	0.072	1.038	13.68	40.9
12/18	4 05.38	+48 01.3	0.115	1.084	14.42	28.0
12/22	4 34.85	+43 42.8	0.162	1.130	15.10	23.0
12/26	4 49.86	+41 02.7	0.211	1.177	15.70	21.0
12/30	4 59.28	+39 13.1	0.261	1.224	16.24	20.5
01/03	5 06.11	+37 52.1	0.314	1.271	16.73	20.8

2006 VB14 (2010 December, H = 18.6)
There are no lightcurve parameters for this asteroid with an estimated size of 0.6 km. Those with larger scopes can take on the added project of determining the H and G parameters while those with modest scopes have the best chance for lightcurve work the middle part of the month.

DATE	RA(2000)	DC(2000)	E.D.	S.D.	Mag	α
11/25	8 51.64	+49 51.7	0.194	1.089	17.10	54.1
11/30	8 15.24	+46 56.8	0.152	1.085	16.34	46.4
12/05	7 18.05	+40 15.8	0.113	1.078	15.33	33.4
12/10	5 58.08	+24 38.2	0.086	1.069	13.99	11.0
12/15	4 31.97	-00 53.5	0.081	1.057	14.34	25.7
12/20	3 23.02	-21 34.6	0.102	1.042	15.58	52.8
12/25	2 36.16	-32 25.7	0.137	1.025	16.65	68.6
12/30	2 05.12	-37 58.2	0.176	1.005	17.46	77.9

INSTRUCTIONS FOR AUTHORS

The *Minor Planet Bulletin* is open to papers on all aspects of minor planet study. Theoretical, observational, historical, review, and other topics from amateur and professional astronomers are welcome. The level of presentation should be such as to be readily understood by most amateur astronomers. The preferred language is English. All observational and theoretical papers will be reviewed by another researcher prior to publication to insure that results are presented clearly and concisely. Typically, papers will be published within three months of receipt. However, material submitted by the posted deadline may or may not appear in that issue, depending on available space and editorial processing.

The *MPB* will not generally publish articles on instrumentation. Persons interested in details of CCD instrumentation should consult web sites that provide both general information and specifics for given programs, such as:

American Association of Variable Star Observers (AAVSO). An excellent CCD photometry handbook can be found on this site. http://www.aavso.org

International Occultation Timing Association (IOTA). http://www.lunar-occultations.com/iota/iotandx.htm

Astrometry measurements should be submitted to the IAU Minor Planet Center http://minorplanetcenter.org/iau/mpc.html and are no longer being published or reproduced in the *MPB*.

Checking Previous Research

When reporting lightcurve results, all authors should consult the Astrophysics Data System (ADS, http://adsabs.harvard.edu/abstract_service.html) and the Asteroid Lightcurve Database (http://www.minorplanetobserver.com/astlc/LightcurveParameters.htm) to look for previous results on each object on which you are publishing. If using the LCDB, your reference to previous results should not be to the LCDB. Instead, your reference should be to the original author and publication where the currently accepted "best result" is reported, e.g. Lagerkvist (1978). Claims of priority: "These are the first lightcurves reported for asteroid x." are not appropriate style for the *Minor Planet Bulletin*. Instead: "A search of the Asteroid Lightcurve Database does not reveal any previously reported results for asteroid x."

If previous results have been reported and they are different from yours (beyond the error margins), try fitting your data to those other periods and report the results of these alternative fits as part of the paper. This can be a brief statement, e.g., "The data were checked against the period of 10.45 h found by Smith (2010) but this produced a very unconvincing fit."

Manuscript Preparation

Authors are asked to carefully comply with the guidelines below in order to minimize the time required for editorial tasks.

We strongly encourage that all submissions be made electronically using MS Word or OpenOffice files (saved in MS Word format). If using Word 2007 or 2010, please save in DOC instead of DOCX format.

It is strongly requested that all manuscripts be prepared using the MS Word template found at:

http://www.minorplanetobserver.com/mpb/default.htm.

Manuscripts should be less than 1000 words. Longer manuscripts may be returned for revision or delayed pending available space. For general articles, the number of tables plus figures should not exceed two.

For lightcurve articles, authors are encouraged to combine as many objects together in a single article as possible. When presenting data on more than one asteroid, the asteroids should be listed in numerical order throughout – in the abstract, text body, and in any tables. Unnumbered asteroids should be listed after any numbered asteroids and by designation, which is – generally – the order of discovery. See recent *MPB* issues for examples.

Note that your article may not start at the upper left of a page. Therefore, do not worry too much to prepare a "perfect" layout.

Tables

Tables should be numbered consecutively in Roman numerals. The font size should be large enough to allow for clear reproduction, usually no less than 7 point, preferably 8 point. Keep the number of columns to a minimum and try to avoid multi-line cells, except for headers. Place tables at the end of the text, after any figures. The layout editor will place them how and where appropriate. Generally, use only white backgrounds for tables.

Please do not embed tables as objects, e.g., as an Excel spreadsheet table. Instead, create a text box and insert a Word table within the text box. Turn off the "Anchor to Text" property in order to make it easier to change the layout of the paper as needed. Using a text box is particularly important if the table will span more than one column. *Do not* use section breaks in order to span a table across the page.

Figures

Figures should be numbered consecutively in Arabic numerals. When only one or two figures are involved, you can insert them