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The International Meteor Organization is comprised of members from all over the world. Activities are coordinated through its bimonthly journal *WGN* (printed in English) which annually contains about 220 pages of general meteor news, observing program guidelines, reports and analyses, and other articles by amateurs and professionals.

New membership in the International Meteor Organization is $15 US or 500 BEF (Belgian francs) and includes a one year subscription to *WGN*. To join or for more information contact one of the following persons: (North America) Peter Brown, 181 Sifton Ave., Ft. McMurray, Alberta T9H 4V7 Canada; (Japan) Masahiro Koseki, 4-3-5 Annaka Annaka-shi, Gunmaken 379-01 Japan; (all others) Ann Schroyens, Stuivenbergvaart 48, B-2800 Mechelen, Belgium.

CLOSE MUTUAL APPROACHES OF MINOR PLANETS IN 1990

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The table below lists 54 cases where one minor planet comes to within 120" of another and both are of magnitude 16 or brighter. A challenge for minor planet observers!

Here I present a list of close approaches between numbered minor planets larger than 20 km during 1990 where:

- the elongation of the Sun is more than 31°.
- both minor planets are brighter than visual magnitude 16.
- and the minimum geocentric separation is less than 120".

The table gives the following data:

1. Date: date and time of closest geocentric approach (in U.T.). All other information is given for this instant.

2. Closest approach: gives the minimum geocentric distance (in seconds of arc) and the position angle (in degrees) of the *nearest* minor planet with respect to the *farthest* one.

3. Minor planet 1: contains information about the *nearest* minor planet:
   - number and name
   - visual magnitude
   - parallax in seconds of arc
   - apparent motion in seconds of arc per hour
   - position angle of the direction of motion in degrees

4. Minor planet 2: information about the *farthest* minor planet. The same data as for the nearest one are given. In addition the right ascension and declination (1950.0) are printed.

5. Sun and Moon:
   - elongation of the Sun in degrees
   - elongation of the Moon (degrees)
   - illuminated fraction of the Moon in %

The author is most indebted to Dr. Joseph De Kerf, General Manager of the Scientific Computer Centre of Agfa-Gevaert N.V., Mortsel, Belgium. The author would be pleased to receive reports from observers of these events.

Close mutual approaches of minor planets

(Dist. < 120 ; El. Sun > 30 ; magn. < 16.0)

Date (U.T.)	Min. dist.	Pos. ang.	Minor planet 1 Name	Vis. mag.	Hor. par.	Motion per hour	pos. ang.	Minor planet 2 Name	Vis. mag.	Hor. par.	Motion per hour	pos. ang.	Right ascens. (1950.0)	Declination (1950.0)	Elongation Sun	Elongation Moon	Ill. frac. Moon
	h m	"	0			"/h	0				"/h	0	h m	0 '	0	0	%
1989 dec 30	1 47.5	53.00	72	1 Ceres	6.99	5.22	34.96	283	425 Cornelia	13.92	4.59	31.74	272	5 39.94	+26 18.1	167	145	4
1990 jan 2	23 34.0	108.03	340	792 Metcalfia	15.96	2.55	51.48	73	583 Klotilde	15.84	2.07	39.91	74	21 58.11	- 4 51.7	48	23	34
jan 5	15 29.0	114.46	181	1036 Ganymed	12.24	5.35	148.55	85	409 Aspasia	12.96	2.78	58.71	75	22 11.67	- 1 40.0	50	56	63
jan 12	4 25.2	68.53	344	298 Baptistina	15.37	4.72	33.39	72	280 Philia	15.94	3.70	25.84	71	1 41.96	+16 32.2	98	94	99
jan 14	10 3.9	101.58	44	161 Athor	14.19	3.35	55.37	113	73 Klytia	14.41	2.98	46.42	109	14 48.50	-16 57.6	68	72	88
jan 19	0 19.5	106.74	122	584 Semiramis	11.73	6.29	37.49	257	1319 Disa	14.99	4.22	30.55	273	6 49.48	+20 52.8	163	108	49
jan 24	5 15.6	106.19	103	2151 Hadwiger	15.92	3.01	55.42	57	48 Doris	12.85	2.58	46.40	69	0 10.21	- 0 31.7	58	90	7
jan 28	21 2.9	34.06	5	1030 Vitja	15.74	3.38	35.01	90	547 Praxedis	15.88	2.68	21.44	87	14 27.67	-11 40.9	89	116	5
feb 7	1 2.5	13.70	102	1197 Rhodesia	15.61	2.80	57.74	84	363 Padua	14.66	2.64	55.66	94	17 52.72	-24 09.3	49	165	91
feb 11	21 50.8	103.02	70	914 Palisana	14.03	3.56	23.00	108	288 Glauke	15.25	3.29	18.26	65	3 56.92	+17 15.1	98	106	95
feb 16	13 55.2	4.88	348	1242 Zambesia	14.95	4.19	24.40	277	108 Hecuba	12.96	4.04	18.34	284	11 59.75	+ 0 04.0	147	44	61
feb 20	23 18.8	27.21	284	976 Benjamina	13.73	4.36	27.86	289	681 Gorgo	15.72	3.60	29.25	302	8 56.72	+ 6 00.2	160	140	21
mar 18	4 35.3	36.07	16	696 Leonora	14.42	3.77	4.94	162	665 Sabine	14.17	3.20	5.54	238	7 58.39	+15 53.3	121	132	63
mar 27	23 15.8	49.52	146	578 Happelia	13.14	5.02	34.77	286	555 Norma	14.45	4.62	30.83	295	12 41.42	- 0 43.8	175	165	2
apr 1	23 46.8	90.10	207	230 Athamantis	12.29	3.15	65.55	82	986 Amelia	15.32	2.54	51.43	70	4 06.82	+17 43.0	51	33	45
apr 4	6 10.1	97.94	180	42 Isis	11.76	3.83	84.46	78	949 Hel	15.37	2.67	48.80	69	21 23.12	-18 49.2	56	169	69
apr 15	8 5.1	27.79	228	99 Dike	12.87	6.32	27.31	157	845 Naema	15.42	3.93	12.41	184	17 12.13	-28 49.0	124	2	77
apr 16	7 19.7	13.83	262	180 Garumna	15.08	3.66	59.64	93	240 Vanadis	13.95	3.55	59.26	91	6 25.11	+23 29.2	70	175	69
apr 17	15 25.4	69.79	36	255 Oppavia	15.17	4.01	31.07	127	769 Tatjana	15.15	2.61	13.79	129	8 39.27	+26 27.4	98	163	56
apr 22	3 6.4	87.53	339	194 Prokne	11.96	4.61	55.59	68	148 Gallia	13.18	3.17	29.37	68	20 00.89	- 0 57.1	89	48	13
may 3	1 12.8	47.09	324	336 Lacadiera	14.49	3.50	70.31	65	313 Chaldaea	14.66	2.74	50.11	70	23 01.01	- 1 09.2	55	160	62
may 21	11 24.4	56.15	178	93 Minerva	11.81	5.17	17.57	112	1351 Uzbekistania	15.68	3.24	8.10	149	20 20.17	-31 46.7	118	78	13
may 29	21 43.7	33.62	320	847 Agnia	15.57	2.69	64.36	69	1353 Maartje	15.76	2.42	54.91	72	1 47.75	+13 06.1	38	111	35
jun 8	20 19.2	112.69	235	1248 Jugurtha	14.65	4.13	14.40	123	2562 1973FF1	15.62	3.70	5.95	79	21 40.68	-22 14.3	116	58	100
jun 9	10 6.0	56.34	211	2407 1973DH	14.81	5.14	7.60	249	1092 Lilium	14.85	4.84	11.40	270	20 03.73	-23 39.8	139	30	99
jun 16	9 0.9	49.64	207	604 Tekmessa	15.69	2.39	37.50	114	175 Andromache	15.32	2.07	29.40	114	10 08.76	+13 23.2	65	152	48
jun 17	3 39.8	107.81	279	140 Siwa	13.50	3.43	28.00	119	1796 Riga	15.44	2.99	26.37	94	11 49.25	+ 4 55.5	90	166	39
jun 22	22 10.6	40.26	43	757 Portlandia	15.39	3.07	64.32	114	307 Nike	15.82	2.59	52.04	110	9 43.87	+18 16.7	51	49	0
jun 30	4 55.3	68.57	281	527 Euryanthe	13.57	6.05	33.01	252	368 Haidea	13.54	5.55	28.74	281	17 32.12	-14 48.5	163	73	53
jul 29	11 4.4	85.58	320	714 Ulula	14.21	2.83	66.43	96	189 Phthia	14.62	2.83	65.79	91	5 44.78	+20 25.4	39	127	49
jul 30	23 52.6	35.88	51	1013 Tombecka	14.88	2.93	73.04	119	622 Esther	15.94	2.49	55.47	111	11 11.02	+ 9 39.7	38	68	63
aug 5	18 4.0	0.81	130	11 Parthenope	11.92	2.71	60.47	91	12 Victoria	12.66	2.64	56.75	96	6 12.40	+20 45.5	39	150	99
aug 11	10 31.0	103.73	176	25 Phocaea	13.22	2.72	60.42	102	397 Vienna	15.59	2.19	46.38	107	11 32.97	- 4 39.8	38	157	74
aug 15	13 21.2	95.45	144	155 Scylla	15.94	3.46	82.34	85	1067 Lunaria	16.00	2.99	65.04	95	6 19.25	+28 09.1	47	17	29
aug 21	12 54.7	108.69	267	357 Ninina	13.71	3.86	18.45	217	420 Bertholda	14.09	3.20	12.24	255	19 05.69	-15 35.1	137	126	1
sep 4	0 2.7	60.96	60	1200 Imperatrix	15.74	3.77	16.27	242	139 Juewa	12.92	3.69	18.70	270	1 10.46	+ 9 25.6	140	53	99
sep 24	6 57.4	95.39	192	119 Althaea	12.73	4.60	23.15	102	755 Quintilla	15.90	2.75	7.94	103	4 48.10	+19 11.3	107	164	25
oct 2	11 56.3	26.81	28	352 Gisela	14.99	2.90	69.79	113	190 Ismene	14.20	2.03	46.49	110	10 25.32	+ 7 15.6	33	173	95
oct 6	3 46.2	20.05	24	1132 Hollandia	15.69	3.46	78.56	103	1306 Scythia	15.97	2.19	43.10	94	15 50.16	-24 48.8	48	154	96
oct 6	19 22.2	11.92	149	488 Kreusa	13.33	2.76	61.05	103	399 Persephone	14.95	2.55	53.13	112	9 57.82	+19 27.3	48	100	92
oct 14	5 45.5	16.94	222	512 Taurinensis	15.57	2.99	71.34	108	798 Ruth	15.39	2.41	57.07	102	15 34.39	-15 11.8	35	87	19
oct 14	10 24.5	54.19	30	43 Ariadne	13.15	2.84	64.04	114	190 Ismene	14.24	2.07	44.30	111	10 38.97	+ 6 00.1	41	8	17
oct 25	9 42.3	35.37	188	155 Scylla	15.53	4.63	64.81	94	70 Panopaea	13.83	2.86	31.29	89	9 02.21	+27 46.4	81	154	36
nov 1	11 54.7	45.07	13	533 Sara	15.43	2.67	47.18	111	168 Sibylla	14.41	2.26	37.62	113	10 33.41	+ 5 06.9	60	140	97
nov 7	20 41.0	98.81	207	449 Hamburga	14.51	3.16	74.33	112	103 Hera	13.47	2.48	53.50	110	12 09.77	+ 1 32.5	43	68	68
nov 19	9 14.7	68.93	225	30 Urania	12.51	3.38	50.72	115	542 Susanna	15.20	2.58	35.85	106	11 10.18	+ 4 44.5	69	91	4
nov 24	5 53.4	30.27	80	46 Hestia	11.13	6.90	33.19	253	886 Washingtonia	12.01	5.49	36.45	285	3 09.74	+14 16.7	167	93	37
dec 17	5 24.1	53.20	347	670 Ottegebe	15.59	2.45	35.36	107	175 Andromache	15.22	2.13	30.15	113	13 05.45	- 6 00.5	67	68	0
dec 21	20 56.3	15.70	170	625 Xenia	15.04	3.13	83.34	82	472 Roma	14.49	2.61	62.66	83	20 18.54	-21 11.8	32	19	19
1991 jan 1	4 52.3	10.31	344	476 Hedwig	14.10	2.77	63.41	105	134 Sophrosyne	14.51	2.54	55.11	110	15 29.46	-27 09.9	43	131	100
jan 2	18 18.4	55.53	158	1018 Arnolda	15.42	3.31	89.87	69	327 Columbia	15.68	2.60	64.55	69	21 11.62	-18 56.0	33	173	94
jan 4	7 59.5	15.32	82	941 Murray	15.11	5.73	21.75	270	401 Ottilia	14.62	3.46	21.55	263	4 51.33	+28 25.0	151	77	83
jan 5	23 40.8	20.92	310	30 Urania	12.04	4.32	18.66	121	172 Baucis	13.53	4.00	18.69	138	11 51.82	- 0 27.8	106	6	68
jan 6	20 9.1	8.00	206	628 Christine	14.50	2.81	60.53	100	633 Zelima	15.90	2.40	50.24	97	15 49.56	-10 52.2	48	55	59

PHOTOELECTRIC PHOTOMETRY OPPORTUNITIES NOVEMBER-JANUARY

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The table below lists asteroids which come to opposition during the months of November through January that represent useful targets for photoelectric photometry observations. Observations are needed because the asteroid has either an unknown or ambiguous rotational period or because the asteroid will be observable at a very low phase angle. The table also includes asteroids which are candidates for pole determinations (see the article by Di Martino and Zappalá in issue 12, No. 1), are targets for radar observations (see the article by Ostro in *MPB* 10, No. 4), or are subjects for shape modelling (see the article by Davis and Binzel in *MPB* 14, No. 3). The table gives (in order of opposition dates) the asteroid number and name, opposition date, opposition V magnitude, the rotational period (in hours), the estimated lightcurve amplitude (in magnitudes), and the designation PER if observations are needed to determine the rotational period. AMB implies that previous period determinations have given ambiguous results and these alternate periods are listed in the table. PHA indicates observations of the phase curve are desired because the asteroid will be at an unusually low phase angle, POL indicates the asteroid is a pole position candidate, RAD indicates the asteroid is a planned radar target, and MOD denotes an asteroid at a critical longitude for shape modelling. Question marks are used to denote uncertain or unknown values. An outline of recommended observing procedures in given in *MPB* 11, No. 1, page 7. Also recommended is the book Solar System Photometry Handbook (see the review by Tholen in *MPB* 11, No. 4).

Asteroid	Opp'n Date	Opp'n V Mag	Per	Amp	
201 Penelope	Nov 1	11.4	3.747	0.4	MOD
43 Ariadne	Dec 5	11.2	5.751	0.3	MOD
122 Gerda	Dec 10	12.0	?		PER+PHA
240 Vanadis	Dec 11	11.1	?		PER
758 Mancunia	Dec 14	11.9	?		PER

Photoelectric Photometry Opportunities

DATE	R.A. (1950) HR MIN	DEC. DEG MIN	MAG V	PHASE ANGLE
Minor Planet	43 Ariadne			
1989 Oct 26	5 24.39	+24 56.3	11.98	17.9
Nov 5	5 19.70	+24 45.5	11.78	14.5
15	5 11.80	+24 28.7	11.57	10.4
25	5 1.39	+24 4.9	11.35	5.7
Dec 5	4 49.61	+23 34.2	11.06	0.8
15	4 37.90	+22 59.1	11.32	4.4
25	4 27.67	+22 23.6	11.59	9.0
1990 Jan 4	4 19.97	+21 52.0	11.83	13.1
14	4 15.37	+21 27.8	12.07	16.5
Minor Planet	122 Gerda			
1989 Nov 5	5 36.06	+21 13.5	12.71	12.1
15	5 31.44	+21 4.8	12.53	9.3
25	5 24.84	+20 55.1	12.34	6.0
Dec 5	5 16.84	+20 44.4	12.12	2.5
15	5 8.24	+20 33.5	12.05	1.6
25	4 59.98	+20 23.3	12.27	5.2
1990 Jan 4	4 52.90	+20 15.3	12.45	8.6
14	4 47.67	+20 10.8	12.63	11.6
24	4 44.71	+20 10.9	12.79	14.1
Minor Planet	201 Penelope			
1989 Sep 26	2 49.29	+ 8 59.9	12.04	16.4
Oct 6	2 45.25	+ 8 3.3	11.83	12.4
16	2 38.74	+ 7 0.7	11.62	8.0
26	2 30.60	+ 5 58.3	11.44	4.1
Nov 5	2 21.98	+ 5 3.7	11.51	4.6
15	2 14.10	+ 4 23.1	11.79	8.5
25	2 7.97	+ 4 0.8	12.07	12.5
Dec 5	2 4.23	+ 3 58.3	12.34	15.9
15	2 3.16	+ 4 14.5	12.59	18.6
Minor Planet	240 Vanadis			
1989 Nov 5	5 42.73	+20 49.6	12.16	19.0
15	5 39.88	+20 49.2	11.91	14.8
25	5 33.67	+20 49.7	11.65	9.9
Dec 5	5 24.96	+20 50.8	11.36	4.5
15	5 15.15	+20 52.5	11.19	1.7
25	5 5.87	+20 55.5	11.57	6.9
1990 Jan 4	4 58.61	+21 1.1	11.89	12.0
14	4 54.37	+21 10.8	12.19	16.2
24	4 53.58	+21 25.1	12.46	19.7
Minor Planet	758 Mancunia			
1989 Nov 5	5 53.87	+19 11.8	12.85	15.4
15	5 50.72	+19 16.8	12.64	12.3
25	5 45.03	+19 24.4	12.43	8.7
Dec 5	5 37.35	+19 34.6	12.19	4.6
15	5 28.57	+19 46.7	11.96	1.2
25	5 19.79	+20 0.6	12.20	4.5
1990 Jan 4	5 12.10	+20 16.3	12.45	8.5
14	5 6.40	+20 34.1	12.68	12.0
24	5 3.23	+20 54.4	12.90	15.0