PHOTOMETRIC OBSERVATIONS OF LONG-PERIOD COMETS AT LARGE HELIOCENTRIC DISTANCES IN THE YEARS 1861 TO 1925

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ABSTRACT. The paper contains a list of photometric observations of 20 long-period comets which passed through perihelion in the years 1861 to 1925. In selecting the objects, two basic criteria were adopted. The first condition was that the comet had been observed at large distances from the Sun and over a sufficient range of heliocentric distances. The second was the availability of well determined orbits which would allow to distinguish between old and new comets in Oort's sense, and to classify the photometric development according to the dynamical type of orbit. The paper contains 721 estimates and brightness measurements of comets together with time, data on the magnitude type, type, diameter of objective and light-gathering power of the instrument used, references to literature and calculated values of heliocentric and geocentric distances, as well as the phase angles for the dates of observation.

ФОТОМЕТРИЧЕСКИЕ НАБЛЮДЕНИЯ ДОЛГО-ПЕРИОДИЧЕСКИХ КОМЕТ НА БОЛЬШИХ РАССТОЯНИЯХ ОТ СОЛНЦА В 1861-1925 ГГ. Работа приводит список фотометрических наблюдений 20 долго-периодических комет, проходивших через перигелий в 1861-1925 гг. Выбор объектов был сделан применением двух точек зрения. Во-первых, за кометой должно было наблюдать на больших расстояниях от Солнца в достаточном диапазоне гелиоцентрических расстояний. Вторым критерием выло знание хорошо известных данных об орбитах предоставляющих возможность различить старые и новые кометы в смысле Оорта и тоже возможную классификацию фото-

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метрического развития в зависимости от типа орбиты. Работа содержит 721 оценку и измерение блеска комет вместе с данными о времени, с данными о типе звездной величины, о типе, диаметре объектива и светосиле употребленного телескопа, с точными ссылками на литературу и с исчисленными гелиоцентрическими расстояниями и углами фазы для моментов наблюдений.

FOTOMETRICKÉ POZOROVANIA DLHOPERIODICKÝCH KOMÉT VO VEĽKÝCH VZDIALENOSTIACH OD SLNKA V OBDOBÍ ROKOV 1861 - 1925. Práca obsahuje zoznam fotometrických pozorovaní 20 dlhoperiodických komét, ktoré prešli perihéliom v rokoch 1861-1925. Pri výbere objektov boli uplatnené dve základné hľadiská. Prvou podmienkou bolo, aby kométa bola pozorovaná vo veľkých vzdialenostiach od Slnka v dostatočnom rozsahu heliocentrických vzdialeností. Druhým kritériom bola znalosť dobre zaručených dráh, ktoré by umožnili rozlíšenie komét na staré a nové v zmysle Oorta a prípadnú klasifikáciu fotometrického vývoja podľa typu dráhy. Práca obsahuje 721 odhadov a meraní jasnosti komét spolu s časovými údajmi, s údajmi o type magnitúdy, o type, priemere objektívu a svetelnosti použitého prístroja, s presnými odkazmi na literatúru a vypočítanými hodnotami heliocentrických vzdialeností, geocentrických vzdialeností a fázových uhlov pre dátumy pozorovaní.

1. INTRODUCTION

Our knowledge of the various physical parameters of comets has been increasing thanks to extensive spectroscopic and photometric research, and, during the last decade, also thanks to satellite observations. However, nearly all the physical characteristics we know concern either objects with a small perihelion distance or, in the case of objects whose perihelion distance is larger, a narrow interval of heliocentric distances close to the perihelion. The reason for this is that observations of the fine structure of the head or tail, as well as obtaining spectra with a higher resolution require sufficient light; this condition is satisfied by comets which are close to the Sun and the Earth. Since the brightness of a comet depends considerably on its heliocentric distance - ranging from a change with r^{-2} for inactive comets to a change with r^{-10} - we are clearly able to observe small objects only at small distances from the Sun, whereas large objects can also be exceptionally observed at large distances (e.g., observations of comet P/Schwassmann-Wachmann 1 which revolves permanently beyond Jupiter's orbit, or the observations of comet 1927 IV Stearns at distance of 11.5 AU). As already pointed out by Roemer (1962), bright comets are the basic source of our knowledge; the fact that mostly small objects are involved, which have become bright only due to their favourable configuration relative to the Sun and Earth, is responsible for the typical properties derived for them not being necessarily identical with the properties of larger objects observed at larger distances. The whole problem is the more serious since the differences between the individual objects are large even under similar

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geometric conditions. The differences are manifest particularly in brightness (even after being reduced to uniform distances from the Sun and Earth), in the degree of condensation of the cometary image, in the relative abundance of gas and dust particles, as well as in the activity of the individual comets.

This clearly indicates that observational data obtained at larger heliocentric distances may substantially expand our knowledge, improve its accuracy, as well as change our insight into the properties and activity of comets. Physical observations at large distances are complicated by the apparent brightness of comets being mostly between 14 and 20^m at distances over 2.5 AU, which is quite insufficient for obtaining any spectral observations whatsoever. The only source of physical observations we are then left with, are estimates of apparent brightness. Under the assumption that the cometary nucleus is observed in purely reflected light, at the time of absence of the coma, these observations can be used to determine the dimensions of cometary nuclei (Kresák, 1973; Svoreň, 1983).

Although most of the active processes in comets take place at small heliocentric distances - in the region of the perihelion - cases in which comets were active at considerable distances from the Sun are known. An example of this is the disintegration of the nucleus of comet 1957 VI Wirtanen at a distance of 4.9 AU from the Sun, other examples being the presence of the plasma tail and exceptionally large activity of comet 1962 VIII Humason and the presence of dust tails of comets 1955 VI Baade and 1956 I Haro - Chavira at distances of 4 - 5 AU. Comet 1927 IV Stearns had a diffuse appearance even during the last observation made at a distance of 11.5 AU. We may assume that longer series of observations of comet brightness made at large heliocentric distances would enable us to make a better assessment of the relation between cometary and solar activity thanks to the extension of the time interval.

Collected brightness data formed the basis for studying systematic corrections for various observers, instruments and methods, for constructing photometric curves, perihelion asymmetry of photometric parameters at large heliocentric distances and for calculating the dimensions of cometary nuclei. Some of these analyses have already been published (Svoreň, 1982; 1983), the remainder being prepared for the press shortly. The extensive set of observational data (including data on heliocentric and geocentric distances and phase angles) will facilitate further study of these problems and, therefore, it is presented complete below.

2. MATERIAL USED

Two criteria were applied to selecting the objects. First, there is the endeavour to observe the comet at large distances from the Sun and over a sufficient range of heliocentric distances, which is necessary if the calculated photometric parameters are to be reliable. The second criterion was

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the knowledge of well-determined orbits which would enable us to distinguish between old and new comets in Oort's sense (1950), and to attempt a classification of the photometric development with regard to the type of orbit. The selection was restricted to comets with orbits close to a parabola, because the activity of short-period comets at large heliocentric distances has already been dealt with in detail by Kresák (1973).

The preliminary selection, with the first criterion in view, was made according to Vsekhsvyatskij's catalogue (1958) and supplements thereto (Vsekhsvyatskij, 1966; 1967; 1979; Vsekhsvyatskij, Il'yichishina, 1974). Basing on the annotations of individual comets, we selected those for which Vsekhsvyatskij quotes observations at heliocentric distances larger than 3.5 AU and a range of heliocentric distances of at least 2 AU. Of these objects only those were processed for which reliable „original" values of 1/a were available; the values given in the paper of Marsden et al. (1978) were considered as such. All the available data from the literature concerning photometric observations were then collected for these selected objects. In the first stage, attention was only given to the data obtained at heliocentric distances in excess of 2.5 AU; in the interval from 1861 to 1976 this represents 2 842 estimates and measurements of brightness. The principal reason for the restriction was the abrupt decrease of efficiency of water ice evaporation (Delsemme and Miller, 1971) beyond $r = 2.5$ AU, where we encounter the insufficiently studied regime of comet radiation (dust, contributions of CO_2, CH_4, N_2, H_2, He ?) at large heliocentric distances.

To each photometric value were added all the data recorded by the author, which could prove useful in further treatment: the time with an accuracy of one day, type of magnitude (total brightness or brightness of the nuclear condensation), method and instrument type used, diameter of the objective and the light-gathering power of the instrument. At this point it should be mentioned that these data are considerably incomplete. Data on the magnitude type are often missing, no type being given for 933 data, i.e. nearly 33%. Some of the data can be complemented with relatively high reliability on the basis of the method, instrument, etc. used, nevertheless, the percentage of data of which we do not know to which part of the comet they refer, is large. Least data in the literature is given on the methods and insruments used. Apart from the lack of data, there is the problem of reliability of the information about the instrument used in cases when positional observations and brightness estimates are published simultaneously. The authors usually give the instrument used to take the photograph for determining the position, no mention being made of whether the magnitude was also determined photographically or, for example, with the aid of the finder at the time of the exposure.

The list of excerpted photometric data is presented in Section 3 of this paper. The list shows that the number of usable data for the separate objects varies substantially (from 1 for comets 1895 IV Perrine and 1898 VII Coddington-Pauly to 324 for comet 1904 I Brooks). Clearly, the small number of observations of some comets will eliminate them from further processing;

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however, they have not been omitted for the sake of completeness and to enable the historical development of extreme observations to be analysed. The intervals covered by photometric data are not identical with the intervals of positional observations used for calculating orbits, as given in Marsden's catalogue (1979). In most cases they are shorter because not every position has a corresponding photometric observation. The situation is reversed only around the perihelion; at larger heliocentric distances, brightness estimates without position practically do not occur.

Corresponding geocentric and heliocentric distances were determined for the individual photometric data. The orbital elements from Marsden's catalogue (1979) were used for all comets. r, Δ and the phase angle φ, for which

$$\varphi = \arccos \frac{r^2 + \Delta^2 - 1}{2r\Delta} \qquad (1)$$

were computed using an ephemeris program written by Pittich (1975).

In order to be able to analyse any differences in the development of the comet brightness prior to and after perihelion passage, as pointed out by Whipple (1978), the pre- and post-perihelion data are treated as if they referred to separate comets.

This paper only contains part of the collected material concerning long-period comets; other parts will be published elsewhere.

3. LIST OF PHOTOMETRIC OBSERVATIONS

The list contains exclusively data from the referenced literature which have not been supplemented in any way (e.g., with the indication of the instrument or method probably used).

The data have been arranged according to individual comets in the order of their definitive designation, the individual columns of the tables containing the following:

N - ordinal number of observation,
t - date of observation, the first two digits representing the last two digits of the year, the next two the month and the last two the day,
m - apparent brightness of the comet in magnitudes,
k - type of magnitude according to the observer's data: C - total brightness, J - brightness of photometric nucleus (central condensation). If the observer has omitted to give the type, there is no symbol in this column,
v - method: 1 - visual, 2 - photographic,
d - diameter of objective of telescope used in metres,
f - inverse value of the light-gathering power of the telescope used,
b - type of instrument: A - refractor, B - binoculars, C - Coudé system, D - comet-seeker, H - finder, K - short-focus camera, M - Maksutov's camera, O - naked eye, R - reflector, S - Schmidt camera,
observer,

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l - reference. Since references to individual observations rather than to individual papers are involved, the observer and the relevant page of the paper are given in case that the author of the paper is not the same as the observer. If the observer is also the author of the paper, the reference has the usual form, i.e. the first page of the relevant paper is given. Other exceptions, such as adopting data from the extensive works of Vsekhsvyatskij (1958) and Bobrovnikoff (1941) are given in notes,
r - heliocentric distance in AU,
Δ - geocentric distance in AU,
φ - Sun-comet-Earth phase angle in degrees.

N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
	Comet 1861 II Tebbutt - after perihelion											
1	611222	11.0	J					Schönfeld	1862	3.03	3.21	18
2	620203	11.5						Schmidt		3.52	3.66	16
3	620206	11.5						Schmidt		3.56	3.69	15
4	620320	11.5						Winnecke		4.01	4.19	14
5	620430	10.5						Winnecke,Struve		4.44	4.70	12
6	620501	10.5						Winnecke,Struve		4.45	4.71	12
notes: N = 2-6 - in Vsekhsvyatskij's (1958) paper, approximate brightness values.												
	Comet 1881 III Tebbutt - after perihelion											
1	811122	12.6	J	1	0.38			Searle		2.67	2.31	22
2	811122	12.8	J	1	0.38			Pickering		2.67	2.31	22
3	811122	11.5		1	0.38			Pickering		2.67	2.31	22
notes: N = 1-2 - in Searle's, Pickering's, Wendell's paper (1900), N = 3 - in Vsekhsvyatskij's paper (1958), approximate brightness value.												
	Great September Comet 1882 II Cruls - after perihelion											
1	830129	11.5	J					Schmidt	1883a	2.85	2.17	16
2	830130	11.7	J					Schmidt	1883a	2.87	2.19	16
3	830308	12.5	J					Schmidt	1883b	3.37	3.09	17
notes: N = 1 - approximate brightness value, N = 3 - brighter nucleus.												
	Comet 1889 I Barnard - before perihelion											
1	880903	11.0	J		0.30			Barnard	1889	2.60	2.98	19
2	880904	11.0	J		0.47		A	Kobold		2.59	2.95	20
3	880905	11.5	J					Boss	1888	2.58	2.92	20
4	880906	13.0	J					Boss	1888	2.57	2.90	20
5	880913	11.0	J					Millosevich	1888	2.51	2.70	22
6	880913	11.0	J		0.25		A	Luther	1891	2.51	2.70	22
7	880914	10.5	J		0.25		A	Luther	1891	2.51	2.68	22
note: N = 2 - in Kobold's and Becker's paper (1889).												

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
	Comet 1889 I Barnard - after perihelion											
1	890625	9.0	J		0.71		A	Spitaler		2.54	1.89	20
2	890625	8.0	C		0.71		A	Spitaler		2.54	1.89	20
3	890626	9.5	J		0.16		A	Holetschek		2.55	1.88	20
4	890626	9.0			0.19			Abetti	1890	2.55	1.88	20
5	890702	11.0	J		0.47		A	Becker	1890	2.60	1.82	17
6	890704	10.5			0.19			Abetti	1890	2.62	1.81	16
7	890705	10.0	J		0.28		A	Bauschinger	1889	2.63	1.80	16
8	890707	10.5			0.19			Abetti	1890	2.64	1.80	15
9	890721	10.0	J		0.16		A	Holetschek		2.76	1.79	7
10	890730	10.0	J		0.16		A	Holetschek		2.84	1.86	6
11	890803	10.5	J		0.16		A	Holetschek		2.87	1.90	7
12	890805	10.0	J		0.47		A	Becker	1890	2.89	1.93	8
13	890817	11.0	J		0.47		A	Becker	1890	3.00	2.14	12
14	890817	11.0	J		0.16		A	Holetschek		3.00	2.14	12
15	890824	11.5	J		0.16		A	Holetschek		3.06	2.30	14
16	890828	11.0	J		0.47		A	Becker	1890	3.09	2.39	15
17	890923	12.0	J		0.30			Engelhardt	1889	3.33	3.09	17
18	891023	12.0	J		0.71		A	Spitaler		3.60	3.92	14
19	891024	12.0	J					Bauschinger	1890	3.61	3.94	14
20	900525	14.0	C					Spitaler		5.49	4.61	6
21	900611	13.8	J					Charlois	1890	5.63	4.66	3
22	900707	14.0	C					Spitaler		5.85	4.94	5
23	900817	13.8	J		0.90		A	Barnard	1891	6.19	5.79	9

notes: N = 1-3, 9-11, 14-15, 18 - in Holetschek's and Spitaler's paper (1890), N = 12 - approximate brightness value, N = 20, 22 - in Vsekhsvyatskij paper (1958).

	Comet 1889 II Barnard - after perihelion											
1	891015	12.0	J		0.47		A	Becker	1890	2.66	1.74	10
2	891019	10.5	J		0.47		A	Becker	1890	2.69	1.75	9
3	891023	12.0	J		0.19			Abetti	1890	2.71	1.78	9
4	891023	11.0	J		0.71		A	Spitaler		2.71	1.78	9
5	891121	14.0	J		0.71		A	Spitaler		2.90	2.28	17
6	900823	14.8	C		0.90		A	Barnard	1891	5.05	4.06	3

notes: N = 4-5 - in Holetschek's and Spitaler's paper (1890).

	Comet 1890 II Brooks - after perihelion											
1	901113	10.5			0.16		A	Holetschek	1891	2.74	3.22	17
2	901116	10.2	C		0.16		A	Holetschek	1891	2.77	3.21	17
3	901209	9.5			0.16		A	Holetschek		2.96	3.05	19
4	910117	10.7			0.16		A	Holetschek		3.29	2.71	15
5	910204	12.0	J					Luther	1892	3.45	2.64	11
6	910207	11.6	J					Luther	1892	3.47	2.64	10

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
7	910214	10.5	C		0.16		A	Holetschek	1892	3.54	2.66	9
8	910225	11.0	J		0.40			Renz	1892	3.63	2.73	7
9	910226	12.5	J					Luther	1892	3.64	2.74	7
10	910227	11.0	J		0.40			Renz	1892	3.65	2.75	7
11	910228	12.0	J		0.30			Engelhardt	1891	3.66	2.76	7
12	910306	10.5	J		0.16		A	Holetschek	1892	3.71	2.83	8
13	910312	12.0	J					Luther	1892	3.76	2.91	9
14	910312	11.0	J		0.47		A	Kobold	1893	3.76	2.91	9
15	910313	13.0	J		0.65			Stone	1891	3.77	2.93	9
16	910328	11.2			0.16		A	Holetschek	1892	3.91	3.20	11
17	910406	11.2			0.16		A	Holetschek	1892	3.98	3.40	13
18	910426	12.5	J					Luther	1892	4.16	3.89	14
19	910508	12.5	J		0.40			Renz	1892	4.27	4.20	14
20	910529	15.0	J		0.71		A	Spitaler	1892	4.45	4.73	12

notes: N = 3-4 - in Bobrovnikoff's paper (1941), N = 7 - approximate brightness value.

Comet 1892 I Swift - after perihelion

1	920911	8.5			0.16		A	Holetschek	1893	2.56	1.88	19
2	920918	12.5			0.30			Bigourdan	1910	2.64	1.91	18
3	920919	11.0	J		0.40		A	Wilson	1893	2.66	1.92	17
4	920919	9.0			0.16		A	Holetschek	1893	2.66	1.92	17
5	920926	12.0			0.30			Bigourdan	1910	2.74	1.96	16
6	920927	12.0			0.30			Bigourdan	1910	2.75	1.97	15
7	920927	10.3						Wendell		2.75	1.97	15
8	921014	11.5			0.30			Bigourdan	1910	2.94	2.11	13
9	921014	9.5			0.16		A	Holetschek	1893	2.94	2.11	13
10	921019	10.5	J		0.40		A	Wilson	1893	3.00	2.17	12
11	921019	13.0	J					Renz	1893	3.00	2.17	12
12	921023	10.0			0.16		A	Holetschek	1893	3.05	2.22	12
13	921108	10.3			0.16		A	Holetschek	1893	3.23	2.46	13
14	921211	11.0			0.16		A	Holetschek	1893	3.59	3.14	15
15	921223	11.5			0.16		A	Holetschek	1893	3.72	3.43	15
16	930216	15.2						Kobold	1894	4.29	4.77	11

notes: N = 3 - approximate brightness value, N = 7 - in paper of Searle, Pickering and Wendell (1900).

Comet 1895 IV Perrine - after perihelion

1	960809	16.7						Perrine		4.00	3.68	14

note: N = 1 - in Schmidt's paper (1951).

Comet 1898 VII Coddington-Pauly - after perihelion

1	991201	16.7								5.22	4.27	4

note: N = 1 - in Schmidt's paper (1951), observer not given.

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
	Comet 1904 I Brooks - after perihelion											
1	040416	8.0	C					Brooks	1904	2.74	2.24	20
		9.0	C					Brooks	1905			
2	040416	10.0	J					Brooks	1905	2.74	2.24	20
3	040417	9.0	C		0.30			Aitken	1904	2.74	2.24	20
4	040417	10.0	J		0.30			Aitken	1904	2.74	2.24	20
5	040417	10.0	C		0.19			Seares	1904	2.74	2.24	20
6	040417	11.0	J		0.19			Seares	1904	2.74	2.24	20
7	040417	8.5	C					Kobold	1904a	2.74	2.24	20
8	040417	9.5	J					Kobold	1904a	2.74	2.24	20
9	040417	9.0						Weiss	1904	2.74	2.24	20
10	040417	9.0						Graff,Schorr	1904a	2.74	2.24	20
11	040417	10.0						see notes	1904	2.74	2.24	20
12	040417	9.0	C					Hartwig	1904b	2.74	2.24	20
13	040417	10.0	J					Hartwig	1904b	2.74	2.24	20
14	040417	10.0	J					Millosevich	1904	2.74	2.24	20
15	040418	11.5	J		0.30	17		Bigourdan	1908	2.74	2.24	20
16	040418	10.8	J		1.02		A	see notes	1931	2.74	2.24	20
17	040418	9.2	C		0.16		A	Holetschek	1912	2.74	2.24	20
18	040418	9.3	J		0.16		A	Holetschek	1912	2.74	2.24	20
19	040418	9.0						Hartwig	1904a	2.74	2.24	20
20	040418	9.3						see notes	1904	2.74	2.24	20
21	040418	9.0						Knapp	1904a	2.74	2.24	20
22	040418	9.0						Halm	1904	2.74	2.24	20
23	040418	8.9					H	Van der Bilt	1904	2.74	2.24	20
24	040419	10.5	J		0.30	17		Bigourdan	1908	2.74	2.24	20
25	040419	9.0	C		0.16		A	Holetschek	1912	2.74	2.24	20
26	040419	8.0						Knapp	1904b	2.74	2.24	20
27	040419	8.9						Abetti	1904a	2.74	2.24	20
28	040419	9.5			0.26			Iwanowski	1904	2.74	2.24	20
29	040419	8.0					B	Nijland	1904	2.74	2.24	20
30	040419	10.8	J		0.47		A	Wirtz	1905a	2.74	2.24	20
31	040419	9.2	C		0.12		H	Wirtz	1905a	2.74	2.24	20
32	040419	9.3	C		0.47		A	Wirtz	1905a	2.74	2.24	20
33	040419	10.0	J		0.26			Iwanowski	1904	2.74	2.24	20
34	040420	10.0	J		0.26			Iwanowski	1904	2.75	2.24	20
35	040420	8.8	J		0.76			Javelle	1910	2.75	2.24	20
36	040420	10.8	J		0.47		A	Wirtz	1905a	2.75	2.24	20
37	040420	9.3	C		0.12		H	Wirtz	1905a	2.75	2.24	20
38	040420	9.0	J					Millosevich	1904	2.75	2.24	20
39	040420	9.5						Götz	1904	2.75	2.24	20
40	040421	9.0	C		0.16		A	Holetschek	1912	2.75	2.24	20
41	040421	10.9	J		0.47		A	Wirtz	1905a	2.75	2.24	20
42	040421	8.8	C		0.12		H	Wirtz	1905a	2.75	2.24	20

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
43	040421	9.2	C		0.47		A	Wirtz	1905a	2.75	2.24	20
44	040421	9.0			0.71		A	Palisa	1905	2.75	2.24	20
45	040421	10.0	J		0.26			Iwanowski	1904	2.75	2.24	20
46	040422	11.5	J		0.34			Struve	1904	2.75	2.24	20
47	040422	9.5	C		0.34			Struve	1904	2.75	2.24	20
48	040423	9.0	C		0.32			Baranow	1908	2.75	2.24	20
49	040423	10.0	J		0.32			Baranow	1908	2.75	2.24	20
50	040424	9.0						Graff,Schorr	1904b	2.75	2.24	20
51	040424	9.4	C		0.47		A	Wirtz	1905a	2.75	2.24	20
52	040424	9.4	C		0.12		H	Wirtz	1905a	2.75	2.24	20
53	040425	9.5	C				A	Kobold	1904b	2.75	2.24	20
54	040425	10.0	J				A	Kobold	1904b	2.75	2.24	20
55	040425	9.0						Graff,Schorr	1904b	2.75	2.24	20
56	040426	9.8	C		0.47		A	Wirtz	1905a	2.76	2.24	20
57	040426	10.8	J		0.47		A	Wirtz	1905a	2.76	2.24	20
58	040427	10.5	C		0.47		A	Wirtz	1905a	2.76	2.25	20
59	040428	10.8	C		0.47		A	Wirtz	1905a	2.76	2.25	20
60	040428	11.5	J		0.34			Struve	1904	2.76	2.25	20
61	040429	9.0			0.28			Abetti	1904b	2.76	2.25	20
62	040429	9.5	C		0.32		C	see notes	1905a	2.76	2.25	20
63	040429	12.0	J		0.32		C	see notes	1905a	2.76	2.25	20
64	040430	9.0			0.28			Abetti	1904b	2.76	2.26	20
65	040430	9.8	C		0.12		H	Wirtz	1905a	2.76	2.26	20
66	040430	9.7	C		0.47		A	Wirtz	1905a	2.76	2.26	20
67	040501	9.3	C		0.16		A	Holetschek	1912	2.77	2.26	20
68	040501	10.0	J		0.16		A	Holetschek	1912	2.77	2.26	20
69	040502	9.0	C		0.16		A	Holetschek	1912	2.77	2.27	20
70	040502	9.4	J		0.16		A	Holetschek	1912	2.77	2.27	20
71	040502	10.0			0.26			Iwanowski	1904	2.77	2.27	20
72	040503	10.5	J		0.32			Baranow	1908	2.77	2.27	20
73	040503	9.0						Graff	1904	2.77	2.27	20
74	040503	8.5	C		0.34			Struve	1904	2.77	2.27	20
75	040503	9.5	J		0.34			Struve	1904	2.77	2.27	20
76	040503	9.8	C		0.12		H	Wirtz	1905a	2.77	2.27	20
77	040503	11.5	J		0.47		A	Wirtz	1905a	2.77	2.27	20
78	040504	9.5	C					Quénisset	1904	2.77	2.28	20
79	040504	10.0	J					Quénisset	1904	2.77	2.28	20
80	040504	9.8	C		0.12		H	Wirtz	1905a	2.77	2.28	20
81	040505	8.5	C		0.16		A	Holetschek	1912	2.78	2.29	20
82	040505	9.0	J		0.16		A	Holetschek	1912	2.78	2.29	20
83	040505	9.5						Ambronn	1904	2.78	2.29	20
84	040505	9.2	C		0.12		H	Wirtz	1905a	2.78	2.29	20
85	040505	11.2	J		0.47		A	Wirtz	1905a	2.78	2.29	20
86	040506	8.5	C		0.16		A	Holetschek	1912	2.78	2.29	20

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
87	040506	9.3	J		0.16		A	Holetschek	1912	2.78	2.29	20
88	040506	8.9					H	Van der Bilt	1904	2.78	2.29	20
89	040507	9.0	C		0.12		H	Wirtz	1905a	2.78	2.30	20
90	040507	10.5	J		0.47		A	Wirtz	1905a	2.78	2.30	20
91	040508	10.0	J					Quénisset	1904	2.78	2.31	20
92	040508	8.8	C		0.16		A	Holetschek	1912	2.78	2.31	20
93	040508	9.5	J		0.16		A	Holetschek	1912	2.78	2.31	20
94	040509	9.0						Abetti	1905	2.78	2.32	20
95	040509	10.5			0.26			Iwanowski	1904	2.78	2.32	20
96	040511	9.4	C		0.12		H	Wirtz	1905a	2.79	2.33	20
97	040511	11.5	J		0.47		A	Wirtz	1905a	2.79	2.33	20
98	040512	8.5	C		0.16		A	Holetschek	1912	2.79	2.34	20
99	040512	9.4	J		0.16		A	Holetschek	1912	2.79	2.34	20
100	040513	8.5	C		0.16		A	Holetschek	1912	2.79	2.35	20
101	040513	9.3	J		0.16		A	Holetschek	1912	2.79	2.35	20
102	040513	9.6	C		0.12		H	Wirtz	1905a	2.79	2.35	20
103	040513	9.6	C		0.47		A	Wirtz	1905a	2.79	2.35	20
104	040513	11.5	J		0.47		A	Wirtz	1905a	2.79	2.35	20
105	040514	9.4	C		0.12		H	Wirtz	1905a	2.80	2.36	20
106	040514	9.4	C		0.47		A	Wirtz	1905a	2.80	2.36	20
107	040514	11.5	J		0.47		A	Wirtz	1905a	2.80	2.36	20
108	040514	8.4	C		0.16		A	Holetschek	1912	2.80	2.36	20
109	040514	9.3	J		0.16		A	Holetschek	1912	2.80	2.36	20
110	040515	8.9					H	Nijland	1904	2.80	2.37	20
111	040516	8.8	C		0.16		A	Holetschek	1912	2.80	2.38	21
112	040516	9.5	J		0.16		A	Holetschek	1912	2.80	2.38	21
113	040516	9.1					H	Van der Bilt	1904	2.80	2.38	21
114	040516	10.5			0.26			Iwanowski	1904	2.80	2.38	21
115	040517	8.7	C		0.16		A	Holetschek	1912	2.81	2.40	21
116	040517	9.5	J		0.16		A	Holetschek	1912	2.81	2.40	21
117	040518	8.6	C		0.16		A	Holetschek	1912	2.81	2.41	21
118	040518	10.0			0.32			Baranow	1908	2.81	2.41	21
119	040518	9.1					H	Van der Bilt	1904	2.81	2.41	21
120	040519	9.0	J					Abetti	1905	2.81	2.42	21
121	040519	8.8	C		0.16		A	Holetschek	1912	2.81	2.42	21
122	040519	8.9					H	Van der Bilt	1904	2.81	2.42	21
123	040519	9.4					H	Nijland	1904	2.81	2.42	21
124	040519	9.6	C		0.12		H	Wirtz	1905a	2.81	2.42	21
125	040519	10.8	J		0.47		A	Wirtz	1905a	2.81	2.42	21
126	040520	10.5						Abetti	1905	2.81	2.43	21
127	040520	9.1	C		0.16		A	Holetschek	1912	2.81	2.43	21
128	040520	10.2	C		0.47		A	Wirtz	1905a	2.81	2.43	21
129	040520	10.3	C		0.12		H	Wirtz	1905a	2.81	2.43	21
130	040522	9.0	C		0.16		A	Holetschek	1912	2.82	2.46	21

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
131	040522	9.8	J		0.16		A	Holetschek	1912	2.82	2.46	21
132	040524	9.2	C		0.16		A	Holetschek	1912	2.83	2.48	21
133	040524	10.0	J		0.16		A	Holetschek	1912	2.83	2.48	21
134	040525	10.5						Abetti	1905	2.83	2.50	21
135	040525	9.2	C		0.16		A	Holetschek	1912	2.83	2.50	21
136	040530	9.6	C		0.47		A	Wirtz	1905a	2.84	2.57	21
137	040530	9.8	C		0.12		H	Wirtz	1905a	2.84	2.57	21
138	040531	9.2	C		0.25		A	Graff	1907	2.85	2.59	21
139	040531	9.8	J		0.25		A	Graff	1907	2.85	2.59	21
140	040601	10.0	J					Abetti	1905	2.85	2.60	21
141	040603	9.3	C		0.16		A	Holetschek	1912	2.86	2.63	21
142	040603	9.5	J		0.16		A	Holetschek	1912	2.86	2.63	21
143	040603	9.2					H	Van der Bilt	1904	2.86	2.63	21
144	040604	9.5	C		0.25		A	Graff	1907	2.86	2.65	21
145	040604	10.2	J		0.25		A	Graff	1907	2.86	2.65	21
146	040604	9.5					H	Van der Bilt	1904	2.86	2.65	21
147	040605	9.2	C		0.16		A	Holetschek	1912	2.86	2.67	21
148	040605	10.0	J		0.16		A	Holetschek	1912	2.86	2.67	21
149	040606	9.4	C		0.12		H	Wirtz	1905a	2.87	2.68	21
150	040606	9.8	C		0.47		A	Wirtz	1905a	2.87	2.68	21
151	040606	11.5	J		0.47		A	Wirtz	1905a	2.87	2.68	21
152	040607	9.5	C		0.12		H	Wirtz	1905a	2.87	2.70	21
153	040607	9.6	C		0.47		A	Wirtz	1905a	2.87	2.70	21
154	040608	9.3	C		0.16		A	Holetschek	1912	2.87	2.71	21
155	040608	9.8	J		0.16		A	Holetschek	1912	2.87	2.71	21
156	040608	9.2					H	Van der Bilt	1904	2.87	2.71	21
157	040611	9.2	C		0.12		H	Wirtz	1905a	2.88	2.77	21
158	040611	10.8	J		0.47		A	Wirtz	1905a	2.88	2.77	21
159	040612	9.2	C		0.16		A	Holetschek	1912	2.89	2.78	21
160	040612	10.0	J		0.16		A	Holetschek	1912	2.89	2.78	21
161	040612	9.3					H	Van der Bilt	1904	2.89	2.78	21
162	040613	9.2	C		0.16		A	Holetschek	1912	2.89	2.80	20
163	040613	10.0	J		0.16		A	Holetschek	1912	2.89	2.80	20
164	040613	9.5			0.25		A	Graff	1907	2.89	2.80	20
165	040613	9.3	C		0.12		H	Wirtz	1905a	2.89	2.80	20
166	040613	9.9	C		0.47		A	Wirtz	1905a	2.89	2.80	20
167	040613	11.7	J		0.47		A	Wirtz	1905a	2.89	2.80	20
168	040614	9.5	C		0.12		H	Wirtz	1905a	2.89	2.82	20
169	040614	9.3	C		0.47		A	Wirtz	1905a	2.89	2.82	20
170	040614	9.2	C		0.16		A	Holetschek	1912	2.89	2.82	20
171	040614	9.5	J		0.16		A	Holetschek	1912	2.89	2.82	20
172	040615	9.1	C		0.16		A	Holetschek	1912	2.90	2.83	20
173	040616	9.2	C		0.16		A	Holetschek	1912	2.90	2.85	20
174	040616	9.5	J		0.16		A	Holetschek	1912	2.90	2.85	20

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
175	040616	9.5					H	Van der Bilt	1904	2.90	2.85	20
176	040616	9.6	C		0.12		H	Wirtz	1905a	2.90	2.85	20
177	040616	9.4	C		0.47		A	Wirtz	1905a	2.90	2.85	20
178	040616	12.3	J		0.47		A	Wirtz	1905a	2.90	2.85	20
179	040617	9.6	C		0.12		H	Wirtz	1905a	2.91	2.87	20
180	040617	9.3	C		0.16		A	Holetschek	1912	2.91	2.87	20
181	040619	9.5	C		0.16		A	Holetschek	1912	2.91	2.90	20
182	040619	10.0	J		0.16		A	Holetschek	1912	2.91	2.90	20
183	040620	9.6	C		0.47		A	Wirtz	1905a	2.92	2.92	20
184	040621	9.0			0.26		A	Van der Bilt	1905	2.92	2.94	20
185	040621	9.5	C		0.47		A	Wirtz	1905a	2.92	2.94	20
186	040622	9.6	C		0.47		A	Wirtz	1905a	2.92	2.96	20
187	040628	9.5	C		0.47		A	Wirtz	1905a	2.95	3.06	19
188	040629	9.8	C		0.47		A	Wirtz	1905a	2.95	3.08	19
189	040629	9.5			0.25		A	Graff	1907	2.95	3.08	19
190	040630	9.6	C		0.16		A	Holetschek	1912	2.96	3.10	19
191	040630	10.0	J		0.16		A	Holetschek	1912	2.96	3.10	19
192	040701	9.7	C		0.16		A	Holetschek	1912	2.96	3.12	19
193	040701	10.0	J		0.16		A	Holetschek	1912	2.96	3.12	19
194	040701	9.5						Abetti		2.96	3.12	19
195	040704	10.0	C		0.25		A	Graff	1907	2.97	3.17	19
196	040704	10.3	J		0.25		A	Graff	1907	2.97	3.17	19
197	040704	9.1	C		0.12		H	Wirtz	1905a	2.97	3.17	19
198	040704	11.7	J		0.47		A	Wirtz	1905a	2.97	3.17	19
199	040706	9.5						Abetti	1905	2.98	3.20	18
200	040706	9.8	C		0.47		A	Wirtz	1905a	2.98	3.20	18
201	040707	9.7	C		0.16		A	Holetschek	1912	2.99	3.22	18
202	040707	10.0	J		0.16		A	Holetschek	1912	2.99	3.22	18
203	040708	9.5	C		0.16		A	Holetschek	1912	2.99	3.24	18
204	040708	9.8	C		0.25		A	Graff	1907	2.99	3.24	18
205	040708	10.2	J		0.25		A	Graff	1907	2.99	3.24	18
206	040708	9.9	C		0.47		A	Wirtz	1905a	2.99	3.24	18
207	040709	9.6	C		0.12		H	Wirtz	1905a	2.99	3.26	18
208	040709	9.8	C		0.47		A	Wirtz	1905a	2.99	3.26	18
209	040709	11.5	J		0.47		A	Wirtz	1905a	2.99	3.26	18
210	040709	11.0	C		0.34		A	Postelman	1906	2.99	3.26	18
211	040709	12.0	J		0.34		A	Postelman	1906	2.99	3.26	18
212	040709	9.5	C		0.16		A	Holetschek	1912	2.99	3.26	18
213	040710	9.5	C		0.16		A	Holetschek	1912	3.00	3.27	18
214	040710	9.5						Abetti	1905	3.00	3.27	18
215	040710	10.0	C		0.25		A	Graff	1907	3.00	3.27	18
216	040711	9.4	C		0.16		A	Holetschek	1912	3.00	3.29	18
217	040712	9.4	C		0.16		A	Holetschek	1912	3.01	3.31	18
218	040713	9.4	C		0.16		A	Holetschek	1912	3.01	3.32	18

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
219	040713	10.0	J		0.16		A	Holetschek	1912	3.01	3.32	18
220	040714	9.8			0.26		A	Nijland	1905	3.02	3.34	17
221	040714	9.5	C		0.16		A	Holetschek	1912	3.02	3.34	17
222	040714	10.0	J		0.16		A	Holetschek	1912	3.02	3.34	17
223	040714	9.7	C		0.47		A	Wirtz	1905a	3.02	3.34	17
224	040715	9.6	C		0.12		H	Wirtz	1905a	3.02	3.36	17
225	040715	9.5	C		0.16		A	Holetschek	1912	3.02	3.36	17
226	040715	10.0	J		0.16		A	Holetschek	1912	3.02	3.36	17
227	040716	9.7	C		0.16		A	Holetschek	1912	3.03	3.37	17
228	040716	10.2	J		0.16		A	Holetschek	1912	3.03	3.37	17
229	040716	9.5						Abetti	1905	3.03	3.37	17
230	040716	9.6	C		0.12		H	Wirtz	1905a	3.03	3.37	17
231	040716	12.5	J		0.47		A	Wirtz	1905a	3.03	3.37	17
232	040717	9.7			0.26		A	Nijland	1905	3.03	3.39	17
233	040717	9.6	C		0.16		A	Holetschek	1912	3.03	3.39	17
234	040718	10.0	C		0.25		A	Graff	1907	3.03	3.41	17
235	040718	10.6	J		0.25		A	Graff	1907	3.03	3.41	17
236	040718	10.0	C		0.12		H	Wirtz	1905a	3.03	3.41	17
237	040718	9.8	C		0.47		A	Wirtz	1905a	3.03	3.41	17
238	040719	9.8	C		0.47		A	Wirtz	1905a	3.04	3.42	17
239	040719	12.8	J		0.47		A	Wirtz	1905a	3.04	3.42	17
240	040719	9.8	C		0.16		A	Holetschek	1912	3.04	3.42	17
241	040720	10.0	C		0.16		A	Holetschek	1912	3.04	3.44	17
242	040720	10.0	C		0.25		A	Graff	1907	3.04	3.44	17
243	040720	10.6	J		0.25		A	Graff	1907	3.04	3.44	17
244	040721	10.0	C		0.12		H	Wirtz	1905a	3.05	3.45	17
245	040721	10.1	C		0.47		A	Wirtz	1905a	3.05	3.45	17
246	040731	10.0	C		0.16		A	Holetschek	1912	3.10	3.60	15
247	040731	10.5	J		0.16		A	Holetschek	1912	3.10	3.60	15
248	040801	10.0	C		0.16		A	Holetschek	1912	3.10	3.62	15
249	040802	10.5	C		0.25		A	Graff	1907	3.11	3.63	15
250	040802	11.0	J		0.25		A	Graff	1907	3.11	3.63	15
251	040802	9.9	C		0.12		H	Wirtz	1905a	3.11	3.63	15
252	040802	10.0	C		0.47		A	Wirtz	1905a	3.11	3.63	15
253	040802	11.5	J		0.47		A	Wirtz	1905a	3.11	3.63	15
254	040803	9.6	C		0.12		H	Wirtz	1905a	3.11	3.64	15
255	040803	9.8	C		0.47		A	Wirtz	1905a	3.11	3.64	15
256	040803	12.0	J		0.47		A	Wirtz	1905a	3.11	3.64	15
257	040803	9.5						Abetti	1905	3.11	3.64	15
258	040803	9.8	C		0.16		A	Holetschek	1912	3.11	3.64	15
259	040803	10.3	J		0.16		A	Holetschek	1912	3.11	3.64	15
260	040804	10.1	C		0.12		H	Wirtz	1905a	3.12	3.66	15
261	040804	12.5	J		0.47		A	Wirtz	1905a	3.12	3.66	15
262	040804	10.0	C		0.16		A	Holetschek	1912	3.12	3.66	15

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
263	040804	10.5	J		0.16		A	Holetschek	1912	3.12	3.66	15
264	040805	10.0	C		0.16		A	Holetschek	1912	3.12	3.67	14
265	040805	10.5	J		0.16		A	Holetschek	1912	3.12	3.67	14
266	040805	10.3	C		0.47		A	Wirtz	1905a	3.12	3.67	14
267	040806	10.0	C		0.16		A	Holetschek	1912	3.13	3.68	14
268	040806	10.5	J		0.16		A	Holetschek	1912	3.13	3.68	14
269	040808	9.5						Abetti	1905	3.14	3.71	14
270	040809	10.0	C		0.16		A	Holetschek	1912	3.14	3.72	14
271	040810	10.0	C		0.16		A	Holetschek	1912	3.15	3.73	14
272	040812	10.1	C		0.16		A	Holetschek	1912	3.16	3.76	14
273	040812	11.0						Abetti	1905	3.16	3.76	14
274	040812	10.1	C		0.47		A	Wirtz	1905a	3.16	3.76	14
275	040812	12.2	J		0.47		A	Wirtz	1905a	3.16	3.76	14
276	040813	10.0	C		0.12		H	Wirtz	1905a	3.16	3.77	13
277	040813	10.1	C		0.16		A	Holetschek	1912	3.16	3.77	13
278	040814	10.1	C		0.16		A	Holetschek	1912	3.17	3.78	13
279	040816	11.0						Abetti	1905	3.18	3.80	13
280	040818	11.0			0.16		C	see notes	1905b	3.19	3.82	13
281	040820	10.5						Abetti	1905	3.20	3.85	13
282	040829	10.7	C		0.47		A	Wirtz	1905a	3.25	3.93	12
283	040829	13.0	J		0.47		A	Wirtz	1905a	3.25	3.93	12
284	040829	10.1	C		0.16		A	Holetschek	1912	3.25	3.93	12
285	040829	10.5	J		0.16		A	Holetschek	1912	3.25	3.93	12
286	040831	10.0	C		0.16		A	Holetschek	1912	3.26	3.94	12
287	040901	11.0						Abetti	1905	3.26	3.95	12
288	040903	11.0						Abetti	1905	3.28	3.96	12
289	040905	7.8			0.34		A	Postelman	1906	3.29	3.98	12
290	040905	11.5	C		0.47		A	Wirtz	1905a	3.29	3.98	12
291	040905	14.0	J		0.47		A	Wirtz	1905a	3.29	3.98	12
292	040906	11.7	C		0.47		A	Wirtz	1905a	3.29	3.98	12
293	040906	14.0	J		0.47		A	Wirtz	1905a	3.29	3.98	12
294	040906	10.2	C		0.16		A	Holetschek	1912	3.29	3.98	12
295	040907	10.4	C		0.16		A	Holetschek	1912	3.30	3.99	12
296	040912	10.5	C		0.16		A	Holetschek	1912	3.33	4.02	11
297	040917	11.5	C		0.47		A	Wirtz	1905a	3.36	4.04	12
298	041013	12.5						Abetti	1905	3.51	4.05	13
299	041113	11.0			0.71		A	Palisa	1905	3.71	3.90	15
300	041113	10.4	C		0.16		A	Holetschek	1912	3.71	3.90	15
301	041113	10.7	J		0.16		A	Holetschek	1912	3.71	3.90	15
302	041116	10.7	C		0.16		A	Holetschek	1912	3.73	3.88	15
303	041204	10.5	C		0.16		A	Holetschek	1912	3.85	3.74	15
304	041204	10.8	J		0.16		A	Holetschek	1912	3.85	3.74	15
305	041208	10.0			0.36		A	Pechüle	1906	3.88	3.71	15
306	041214	12.0	C		0.47		A	Wirtz	1905b	3.92	3.66	14

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
307	041216	10.8	C		0.16		A	Holetschek	1912	3.93	3.65	14
308	041216	11.3	J		0.16		A	Holetschek	1912	3.93	3.65	14
309	050108	11.0	C		0.47		A	Becker	1905	4.09	3.53	12
310	050111	11.0	C		0.47		A	Becker	1905	4.11	3.53	12
311	050111	11.0						Guillaume	1909	4.11	3.53	12
312	050111	11.2	C		0.16		A	Holetschek	1912	4.11	3.53	12
313	050114	11.0			0.36		A	Pechüle	1906	4.13	3.52	12
314	050125	12.0	C		0.47		A	Wirtz	1905b	4.21	3.54	11
315	050126	12.7	C		0.47		A	Wirtz	1905b	4.22	3.54	11
316	050203	12.0			0.36		A	Pechüle	1906	4.27	3.58	10
317	050207	11.0			0.36		A	Pechüle	1906	4.30	3.61	10
318	050212	11.5	C		0.47		A	Wirtz	1905b	4.34	3.64	10
319	050329	12.0	C		0.16		A	Holetschek	1912	4.67	4.38	12
320	050401	12.7	C		0.47		A	Wirtz	1905b	4.69	4.44	12
321	050403	13.5	C		0.47		A	Wirtz	1905b	4.70	4.48	12
322	050503	12.5	C		0.47		A	Wirtz	1905b	4.92	5.15	11
323	050507	14.0	C		0.47		A	Wirtz	1905b	4.95	5.23	11
324	050509	13.5	C		0.47		A	Wirtz	1905b	4.97	5.28	11

notes: N = 11, 20 - observers: Van der Bilt and Nijland, N = 16 - observers: Barnard and Van Biesbroeck, N = 62-63, 280 - observers: Guillaume and Lagrula, N = 194 - in Bobrovnikoff's paper (1941), N = 210, 211, 283, 291, 293 - approximate brightness values.

Comet 1907 I Giacobini - after perihelion

1	071204	14.0	J	1	0.40		C	Javelle	1909a	3.57	2.70	8
2	071204	12.5		2			A	Wolf	1908d	3.57	2.70	8
3	071204	14.0		1			A	Wolf	1908c	3.57	2.70	8
4	071206	13.0	J		0.76			Javelle	1908a	3.59	2.72	9
5	071207	13.5	J		0.76			Javelle	1908a	3.60	2.73	9
6	071207	14.0	J		0.65			Hammond	1911	3.60	2.73	9
7	071224	13.0		2				Wolf	1908a	3.74	3.01	11
8	071224	14.0		1				Wolf	1908a	3.74	3.01	11
9	080103	14.2		2				Kopff	1908	3.82	3.22	13
10	080103	14.5						Metcalf	1908	3.82	3.22	13
11	080122	15.0		2				Wolf	1908b	3.99	3.68	14
12	080129	14.5	J		0.76			Javelle	1908b	4.05	3.86	14
13	080226	14.2		1				Giacobini	1909	4.29	4.56	12

Comet 1907 IV Daniel - after perihelion

1	080205	11.0			0.28			Abetti	1909	2.73	2.59	21
2	080206	11.0			0.28			Abetti	1909	2.74	2.59	21
3	080210	12.0			0.28			Abetti	1909	2.80	2.58	21
4	080211	12.0			0.28			Abetti	1909	2.81	2.57	21
5	080212	10.0						Zappa		2.82	2.57	20

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
6	080229	11.0	C		0.71		A	Palisa	1908	3.04	2.53	18
7	080304	10.5	C	1	0.38		A	Van Biesbroeck	1914a	3.09	2.52	17
8	080304	13.0	J	1	0.38		A	Van Biesbroeck	1914a	3.09	2.52	17
9	080307	12.0						Knopf	1909	3.13	2.52	16
10	080309	12.5	J		0.32		C	Rambaud	1909	3.16	2.51	15
11	080326	12.0						Millosevich		3.37	2.52	11
12	080329	12.0						Zappa		3.40	2.53	10
13	080402	12.0						Bianchi		3.45	2.55	8
14	080402	12.0					C	Chofardet	1909	3.45	2.55	8
15	080407	11.0	C	1	0.38		A	Van Biesbroeck	1914a	3.51	2.57	7
16	080408	11.0	C	1	0.38		A	Van Biesbroeck	1914a	3.52	2.58	6
17	080408	12.8			0.29		A	Schiller	1909	3.52	2.58	6
18	080420	11.0	C	1	0.38		A	Van Biesbroeck	1914a	3.67	2.68	3
19	080420	13.0	J	1	0.38		A	Van Biesbroeck	1914a	3.67	2.68	3
20	080421	12.0			0.29		A	Schiller	1909	3.68	2.69	3
21	080421	12.0						Zappa		3.68	2.69	3
22	080424	13.0	J		0.71		A	Palisa	1908	3.71	2.72	3
23	080426	12.0						Millosevich		3.74	2.74	3
24	080428	12.0						Bianchi		3.76	2.77	3
25	080502	12.0						Zappa		3.81	2.82	4
26	080624	15.0	J		0.76			Javelle	1909b	4.40	3.91	12
27	090419	16.5		2				Wolf	1909	7.27	6.34	3

notes: N = 5, 11-13, 21, 23-25 - in paper of Bianchi, Millosevich and Zappa (1910), N = 22 - approximate brightness value.

Comet 1912 II Gale - after perihelion

1	130301	11.0	C		0.38		A	Van Biesbroeck	1914a	2.53	2.21	23
2	130301	12.0	J		0.38			Millosevich	1913	2.53	2.21	23
3	130301	12.0			0.40		C	Schaumasse	1914	2.53	2.21	23
4	130308	11.5	C		0.38		A	Van Biesbroeck	1914a	2.62	2.37	22
5	130312	11.5	J					Kritzinger	1913a	2.68	2.47	22
6	130328	13.0	C		0.32		C	Baldet	1913	2.88	2.86	20
7	130402	12.6	C		0.38		A	Van Biesbroeck	1914a	2.94	2.98	19
8	130404	13.5	C		0.32		C	Baldet	1913	2.96	3.03	19
9	130405	13.0	C					Graff	1914b	2.98	3.06	19
10	130409	12.8	C		0.38		A	Van Biesbroeck	1914a	3.03	3.16	18
11	130426	12.5	C					Kritzinger	1913b	3.23	3.58	16
12	130426	12.8	J					Kritzinger	1913b	3.23	3.58	16
13	130426	13.0	C		0.38		A	Van Biesbroeck	1914a	3.23	3.58	16
14	130428	13.5	C		0.38		A	Van Biesbroeck	1914a	3.25	3.63	16
15	130506	14.0	C		0.32		C	Sy	1913	3.35	3.82	14
16	130526	14.0	C		0.32		C	Baldet	1913	3.58	4.27	11

note: N = 9 - approximate brightness value.

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
	Comet 1914 V Delavan - before perihelion											
1	131217	11.0						Delavan	1914	4.25	3.53	10
2	131218	11.0						Graff	1913	4.24	3.53	10
3	131219	11.0						Hartwig	1913	4.23	3.53	10
4	131219	11.0						Wolf	1913	4.23	3.53	10
5	131219	10.0						Gonnessiat	1913	4.23	3.53	10
6	131219	11.0						Esclangon	1914	4.23	3.53	10
7	131219	13.0	J					Guillaume	1914	4.23	3.53	10
8	131219	11.0	C					Guillaume	1914	4.23	3.53	10
9	131219	13.0	J					Giacobini	1914	4.23	3.53	10
10	131219	11.2			0.33		C	Chofardet	1914	4.23	3.53	10
11	131219	10.5						Abetti	1914	4.23	3.53	10
12	131219	11.2	C					Van Biesbroeck	1914b	4.23	3.53	10
13	131219	11.0	J					Millosevich	1914	4.23	3.53	10
14	131219	11.0			0.27		A	Silbernagel	1914	4.23	3.53	10
15	131219	10.6	C		0.30		A	see notes	1914	4.23	3.53	10
16	131220	13.0	J					Giacobini	1914	4.22	3.53	10
17	131220	11.2						Chofardet	1914	4.22	3.53	10
18	131220	10.5						Renaux	1913	4.22	3.53	10
19	131220	11.0	C					Van Biesbroeck	1914b	4.22	3.53	10
20	131221	10.5			0.40		C	Schaumasse	1916	4.21	3.53	11
21	131223	10.5			0.40		C	Schaumasse	1916	4.19	3.53	11
22	131225	11.0			0.40		C	Schaumasse	1916	4.17	3.54	11
23	131226	10.5			0.40		C	Schaumasse	1916	4.16	3.54	11
24	131226	11.0	J					Millosevich	1914	4.16	3.54	11
25	131226	10.5						Abetti	1914	4.16	3.54	11
26	131229	10.0	C					Van Biesbroeck	1914b	4.13	3.55	12
27	131230	10.0			1.02		A	see notes	1932	4.12	3.55	12
28	131231	10.7						Graff,Messow	1914	4.11	3.55	12
29	140102	10.8	J					see notes	1914	4.09	3.56	13
30	140102	10.5			0.40		C	Schaumasse	1916	4.09	3.56	13
31	140107	10.0			0.40		C	Schaumasse	1916	4.03	3.58	13
32	140114	11.8	C		0.38		A	Van Biesbroeck	1914c	3.96	3.61	14
33	140114	11.0	C		0.26			Graff	1914a	3.96	3.61	14
34	140118	10.5	C		0.26			Graff	1914a	3.92	3.63	14
35	140120	9.7			0.26			Graff		3.90	3.65	14
36	140121	10.0			0.40		C	Schaumasse	1916	3.89	3.65	15
37	140122	9.5						Phillips	1914	3.88	3.66	15
38	140122	10.8	J					see notes	1914	3.88	3.66	15
39	140122	10.0			0.19			Viaro	1914	3.88	3.66	15
40	140122	10.5			0.33		C	Chofardet	1918	3.88	3.66	15
41	140123	10.0	C		0.26			Graff	1914a	3.87	3.66	15
42	140126	9.4	C	1	0.10		A	Dziewulski	1921	3.84	3.68	15
43	140126	9.7	J		0.10		A	Dziewulski	1921	3.84	3.68	15

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
44	140128	9.2	C	1	0.10		A	Dziewulski	1921	3.82	3.69	15
45	140128	9.7	J		0.10		A	Dziewulski	1921	3.82	3.69	15
46	140128	10.0			0.40		C	Schaumasse	1916	3.82	3.69	15
47	140130	11.0						Abetti	1915	3.79	3.70	15
48	140131	11.0						Abetti	1915	3.78	3.71	15
49	140131	10.7	C		0.26			Graff	1914a	3.78	3.71	15
50	140201	8.9	C	1	0.10		A	Dziewulski	1921	3.77	3.71	15
51	140201	9.2	J		0.10		A	Dziewulski	1921	3.77	3.71	15
52	140201	10.0			0.19			Viaro	1914	3.77	3.71	15
53	140201	9.4						Van Biesbroeck		3.77	3.71	15
54	140202	11.0			0.24			Castro,Osses	1914	3.76	3.72	15
55	140205	9.5			0.33		C	Chofardet	1918	3.73	3.74	15
56	140205	12.0	J		0.26			Graff	1914a	3.73	3.74	15
57	140212	10.0	J		0.19		A	Luther	1919	3.66	3.78	15
58	140212	9.5	C		0.19		A	Luther	1919	3.66	3.78	15
59	140212	9.7	C	1	0.10		A	Dziewulski	1921	3.66	3.78	15
60	140212	9.5	J		0.10		A	Dziewulski	1921	3.66	3.78	15
61	140213	9.2	C	1	0.10		A	Dziewulski	1921	3.65	3.78	15
62	140213	9.5	J		0.10		A	Dziewulski	1921	3.65	3.78	15
63	140213	9.4						Van Biesbroeck		3.65	3.78	15
64	140217	9.4						Van Biesbroeck		3.60	3.80	15
65	140217	10.8	C					see notes	1914	3.60	3.80	15
66	140217	12.0	J					see notes	1914	3.60	3.80	15
67	140218	9.2	C		0.26			Graff	1914a	3.59	3.81	15
68	140218	9.2	C	1	0.10		A	Dziewulski	1921	3.59	3.81	15
69	140218	9.5	J		0.10		A	Dziewulski	1921	3.59	3.81	15
70	140218	11.5			0.24			Castro,Osses	1914	3.59	3.81	15
71	140219	11.5			0.24			Castro,Osses	1914	3.58	3.81	15
72	140220	9.0			0.33		C	Chofardet	1918	3.57	3.82	15
73	140221	9.2	C	1	0.10		A	Dziewulski	1921	3.56	3.82	15
74	140221	9.6	J		0.10		A	Dziewulski	1921	3.56	3.82	15
75	140221	9.2						Van Biesbroeck		3.56	3.82	15
76	140224	9.1						Van Biesbroeck		3.53	3.84	15
77	140224	10.5			1.02		A	see notes	1932	3.53	3.84	15
78	140228	9.0						Van Biesbroeck		3.49	3.85	14
79	140301	9.5			0.40		C	Schaumasse	1916	3.47	3.86	14
80	140304	9.5						Abetti	1915	3.44	3.87	14
81	140307	9.5	C		0.26			Graff	1914a	3.41	3.88	14
82	140307	11.0	J		0.26			Graff	1914a	3.41	3.88	14
83	140313	9.0						Abetti	1915	3.34	3.89	13
84	140314	9.0						Abetti	1915	3.33	3.89	13
85	140314	9.1						Van Biesbroeck		3.33	3.89	13
86	140317	8.8						Van Biesbroeck		3.30	3.90	13
87	140317	9.3	C		0.26			Graff	1914a	3.30	3.90	13

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
88	140317	8.4	C					Kritzinger	1914	3.30	3.90	13
89	140323	9.0						Abetti	1915	3.24	3.90	12
90	140328	9.0						Abetti	1915	3.18	3.90	11
91	140331	9.0			0.33		C	Chofardet	1918	3.15	3.90	11

notes: N = 15 - observers: Palisa and Krumpholz, N = 27, 77 - observers: Barnard and Van Biesbroeck, N = 29, 38 - observers: Millosevich and Bianchi, N = 35, 53, 63-64, 75-76, 78, 85-86 - in Bobrovnikoff's paper (1941), N = 57 - brighter nucleus, N = 65-66 - observer: Rosetti Balanesco, N = 81-82, 87 - approximate brightness values.

Comet 1914 V Delavan - after perihelion

1	150401	10.0	J		0.33		C	Gonnessiat	1916	2.54	2.15	23
2	150409	8.2						Gonnessiat		2.64	2.13	21
3	150412	10.0	J					Baldwin	1917	2.67	2.12	20
4	150416	9.5	J					Baldwin	1917	2.72	2.11	19
5	150420	10.0	J					Baldwin	1917	2.76	2.11	18
6	150427	10.0	J		0.24			Castro	1915	2.84	2.11	16
7	150507	9.5	J		0.24			Castro	1915	2.95	2.14	14
8	150521	9.0	C		0.22		A	Wood	1915	3.11	2.23	11
9	150622	10.5			0.30			Glancy	1918	3.46	2.65	12
10	150625	11.0	C		0.22		A	Wood	1915	3.49	2.70	12
11	150630	10.5			0.30			Glancy	1918	3.54	2.80	13
12	150727	12.0	C		0.22		A	Wood	1915	3.83	3.38	14
13	150826	11.0			0.30			Glancy	1918	4.14	4.08	14
14	150830	9.4			0.22		A	Wood	1916	4.18	4.18	14
15	150830	10.5			0.24			Castro	1919	4.18	4.18	14

note: N = 2 - in Bobrovnikoff's paper (1941).

Comet 1915 II Mellish - before perihelion

1	150210	9.0						Mellish	1916a	2.58	2.76	21
		10.0						Mellish	1916b			
2	150215	9.2						Van Biesbroeck		2.52	2.65	22
3	150216	11.0			0.33		C	Gonnessiat	1915	2.51	2.62	22
4	150216	9.0		2				Thiele	1915	2.51	2.62	22

note: N = 2 - in Bobrovnikoff's paper (1941).

Comet 1915 II Mellish - after perihelion

1	151226	10.0	C		0.16		A	Holetschek	1916	2.62	1.80	14
2	151229	11.0					A	Coggia	1916a	2.66	1.86	15
3	151230	9.7						Vanderlinden		2.67	1.88	15
4	160103	11.0					A	Coggia	1916b	2.72	1.97	16
5	160104	12.0						Abetti	1916	2.73	2.00	16
6	160105	12.0	J		0.30			Van Biesbroeck	1916	2.74	2.02	16
7	160124	12.0	J		0.26			Schorr	1919	2.96	2.49	18

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N	t	m	k	v	d	f	b	observer	l	r	Δ	ϕ
8	160202	11.5	C		0.30			Van Biesbroeck	1916	3.06	2.72	18
9	160227	13.0	C		1.02		A	Van Biesbroeck	1916	3.34	3.39	17
10	160227	14.0	J		1.02		A	Van Biesbroeck	1916	3.34	3.39	17

notes: N = 1, 8 - approximate brightness values, N = 3 - in Bobrovnikoff's paper (1941).

Comet 1917 III Wolf - before perihelion

1	160403	13.0						Wolf	1917	5.20	4.20	1
2	160406	13.3						Wolf	1916a	5.17	4.17	1
3	160427	13.3						Wolf	1916b	4.98	4.08	6
		12.8						Wolf	1916e			
4	160427	13.3						Palisa	1917	4.98	4.08	6
5	160429	13.2						Schwassmann	1916	4.97	4.07	6
6	160430	13.0						Wolf	1916c	4.96	4.07	6
7	160506	12.5	C					Barnard	1916	4.90	4.07	7
8	160506	16.0	J					Barnard	1916	4.90	4.07	7
9	160511	14.0	C	1	0.30			Van Biesbroeck	1916	4.86	4.08	8
10	160518	14.0	C	1	0.30			Van Biesbroeck	1916	4.80	4.10	9
11	160518	13.2						Wolf	1916d	4.80	4.10	9
12	160519	13.5			0.38			Millosevich	1918	4.79	4.10	10
13	160522	13.5	C					Barnard	1916	4.76	4.11	10
14	160522	14.2	J					Barnard	1916	4.76	4.11	10
15	160523	14.0	C	1	0.30			Van Biesbroeck	1916	4.75	4.12	10
16	160527	13.8	C					Barnard	1916	4.72	4.13	11
17	160528	13.0	C	1	0.30			Van Biesbroeck	1916	4.71	4.14	11
18	160530	13.0	C	1	0.30			Van Biesbroeck	1916	4.69	4.15	11
19	160624	14.0	C					Barnard	1916	4.46	4.30	13
20	160628	14.5	C					Barnard	1916	4.43	4.32	13
21	160705	14.5	C					Barnard	1916	4.36	4.37	13
22	161231	11.5	C		1.02		A	Barnard	1930	2.70	3.36	14
23	170120	11.0			0.26		A	Van Biesbroeck	1917	2.53	3.01	18

Comet 1917 III Wolf - after perihelion

1	171117	13.5	C		1.02		A	Barnard	1930	2.57	1.92	19
2	171117	15.0	J		1.02		A	Barnard	1930	2.57	1.92	19
3	171201	14.5	C		1.02		A	Barnard	1930	2.69	2.21	20
4	171208	15.0	C		1.02		A	Barnard	1930	2.76	2.36	20
5	171208	16.0	J		1.02		A	Barnard	1930	2.76	2.36	20
6	171229	15.5	C		1.02		A	Barnard	1930	2.95	2.83	19
7	180108	16.0	C		1.02		A	Barnard	1930	3.04	3.06	19
8	180129	15.0	C					Wolf	1919	3.24	3.53	16

Comet 1922 II Baade - after perihelion

1	230202	11.8			0.65		A	Struve	1923	2.52	2.95	19

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
2	230203	11.7			0.65		A	Dick	1923	2.52	2.97	19
3	230204	11.5	C		1.02		A	Van Biesbroeck	1925	2.53	2.98	18
4	230206	11.5			0.33		C	Chofardet	1923	2.54	3.01	18
5	230206	11.5			0.65		A	Struve	1923	2.54	3.01	18
6	230212	11.8			0.65		A	Dick	1923	2.57	3.11	17
7	230220	11.5			0.40		C	Schaumasse	1924	2.61	3.23	15
8	230304	12.0	C		1.02		A	Van Biesbroeck	1925	2.68	3.41	13
9	230310	12.0	C		1.02		A	Van Biesbroeck	1925	2.72	3.49	12
10	230313	12.0	C		1.02		A	Van Biesbroeck	1925	2.74	3.54	11
11	230315	12.7						Baade	1924e	2.75	3.56	10
12	230315	12.5			0.65		A	Struve	1923	2.75	3.56	10
13	230318	12.7						Baade	1923a	2.77	3.60	10
14	230319	12.7						Baade	1923a	2.77	3.62	10
15	230816	14.0	C		1.02		A	Van Biesbroeck	1925	3.88	4.02	15
16	230909	14.5						Baade	1923b	4.08	3.86	14
17	230912	14.5	C		1.02		A	Van Biesbroeck	1925	4.10	3.84	14
18	230913	14.5	C		1.02		A	Van Biesbroeck	1925	4.11	3.83	14
19	230913	15.0	J		1.02		A	Van Biesbroeck	1925	4.11	3.83	14
20	231009	15.0	C		1.02		A	Van Biesbroeck	1925	4.32	3.70	11
21	231009	16.0	J		1.02		A	Van Biesbroeck	1925	4.32	3.70	11
22	231010	14.8	C		1.02		A	Van Biesbroeck	1925	4.33	3.69	11
23	231106	14.7						Baade	1924e	4.55	3.69	7
24	231106	15.0	C		1.02		A	Van Biesbroeck	1925	4.55	3.69	7
25	231106	15.5	J		1.02		A	Van Biesbroeck	1925	4.55	3.69	7
26	231109	13.5			0.66		A	Bower	1924	4.57	3.71	7
27	231201	14.0			0.66		A	Bower	1924	4.75	3.87	6
28	231210	15.3						Baade	1924c	4.82	3.98	7
29	231210	15.0	C		1.02		A	Van Biesbroeck	1925	4.82	3.98	7
30	231231	15.7						Baade	1924d	4.99	4.32	9
31	240107	15.5	C		1.02		A	Van Biesbroeck	1925	5.05	4.45	9
32	240107	16.0	J		1.02		A	Van Biesbroeck	1925	5.05	4.45	9
33	240107	16.0						Baade	1924a	5.05	4.45	9
34	240124	16.5						Baade	1924e	5.18	4.80	10
35	240126	15.8			1.02		A	Van Biesbroeck	1925	5.20	4.84	10
36	240128	16.5						Baade	1924b	5.22	4.89	11
	Comet 1925 I Orkisz - after perihelion											
1	251025	13.0						Beljawsky	1926	3.11	3.57	15
2	251112	13.0						Baade	1925	3.31	3.53	16
3	251124	14.0	C		1.02		A	Van Biesbroeck	1926	3.44	3.48	16
4	251208	14.0	C		1.02		A	Van Biesbroeck	1926	3.59	3.41	16
5	251208	14.5	J		1.02		A	Van Biesbroeck	1926	3.59	3.41	16
6	260112	14.0		2	0.91	5.8	R	Jeffers	1926	3.96	3.28	11
7	260115	14.0	C		1.02		A	Van Biesbroeck	1926	3.99	3.28	11

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
8	260115	15.0	J		1.02		A	Van Biesbroeck	1926	3.99	3.28	11
9	260119	14.5	C		1.02		A	Van Biesbroeck	1926	4.03	3.28	10
10	260119	15.0	J		1.02		A	Van Biesbroeck	1926	4.03	3.28	10
11	260305	15.5	C		1.02		A	Van Biesbroeck	1926	4.49	3.67	8
12	260311	14.5						Schorr	1926a	4.55	3.78	9
13	260316	15.5	C		1.02		A	Van Biesbroeck	1926	4.60	3.87	9
14	260404	14.0						Schorr	1926b	4.78	4.28	11
15	260415	16.5		2	0.91	5.8	R	Jeffers	1926	4.89	4.54	11
16	260502	16.0						Schorr	1927	5.05	4.97	12
17	260502	16.5			0.61		R	Struve	1928	5.05	4.97	12
18	260512	16.5			0.61		R	Struve	1926	5.15	5.23	11
	Comet 1925 III Reid - after perihelion											
1	260107	12.0	C		0.61	4	R	Van Biesbroeck	1928	2.62	3.25	15
2	260112	12.0	C		0.61	4	R	Van Biesbroeck	1927	2.67	3.34	14
3	260717	15.5	C		0.61	4	R	Van Biesbroeck	1927	4.41	4.29	13
4	260801	15.5	C		0.61	4	R	Van Biesbroeck	1927	4.55	4.19	12
5	261102	16.0	C		0.61	4	R	Van Biesbroeck	1927	5.38	4.48	5
6	261127	16.5	C		0.61	4	R	Van Biesbroeck	1927	5.59	4.96	8
7	261206	16.5	C		0.61	4	R	Van Biesbroeck	1927	5.67	5.16	9
8	261225	17.0	C		0.61	4	R	Van Biesbroeck	1927	5.83	5.62	10
9	261231	17.0	C		0.61	4	R	Van Biesbroeck	1927	5.88	5.77	10
	Comet 1925 VII Van Biesbroeck - after perihelion											
1	260302	10.0			0.38			Simas	1927	2.51	1.52	3
2	260303	10.0			0.38			Simas	1927	2.52	1.54	4
3	260303	9.1	C		0.32			Krumpholz	1927	2.52	1.54	4
4	260304	11.0			0.38			Simas	1927	2.53	1.55	4
5	260305	11.0			0.38			Simas	1927	2.54	1.56	5
6	260305	10.0	C		1.02		A	Van Biesbroeck	1926	2.54	1.56	5
7	260309	10.8	C		1.02		A	Van Biesbroeck	1926	2.57	1.61	7
8	260309	12.0			0.38			Simas	1927	2.57	1.61	7
9	260309	10.5			0.24		A	Dubjago	1927	2.57	1.61	7
10	260310	14.0	J		1.02		A	Van Biesbroeck	1926	2.58	1.62	7
11	260310	9.5	C		0.24		A	Tscherny	1926	2.58	1.62	7
12	260310	12.0			0.38			Simas	1927	2.58	1.62	7
13	260311	8.0	J					Schorr	1926a	2.59	1.64	8
14	260311	12.5			0.38			Simas	1927	2.59	1.64	8
15	260315	10.0			0.24		A	Dubjago	1927	2.63	1.70	9
16	260315	10.0	C		0.24		A	Tscherny	1926	2.63	1.70	9
17	260315	12.0			0.38			Simas	1927	2.63	1.70	9
18	260316	12.5			0.38			Simas	1927	2.64	1.71	10
19	260316	11.5	C		1.02		A	Van Biesbroeck	1926	2.64	1.71	10
20	260317	11.0	C		1.02		A	Van Biesbroeck	1926	2.65	1.73	10

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N	t	m	k	v	d	f	b	observer	l	r	Δ	φ
21	260317	12.0			0.33		C	Chofardet	1926	2.65	1.73	10
22	260317	10.0	C		0.24		A	Tscherny	1926	2.65	1.73	10
23	260317	9.8			0.28		A	Silbernagel	1927	2.65	1.73	10
24	260401	11.5			0.33		C	Chofardet	1926	2.80	2.00	15
25	260401	13.0			0.38			Simas	1927	2.80	2.00	15
26	260404	9.0						Schorr	1926b	2.82	2.06	15
27	260407	13.0			0.38			Simas	1927	2.85	2.12	16
28	260410	12.3			0.09			see notes	1926	2.88	2.18	16
29	260411	12.6			0.09			see notes	1926	2.89	2.20	17
30	260412	12.5			0.09			see notes	1926	2.90	2.23	17
31	260413	11.5	C		0.91			Jeffers	1926	2.91	2.25	17
32	260416	11.5			0.24		A	Dubjago	1927	2.94	2.31	17
33	260505	13.5	C		1.02		A	Van Biesbroeck	1926	3.12	2.75	18
34	260510	13.0	C		0.91			Jeffers	1926	3.17	2.87	18
35	260513	13.0	C		0.91			Jeffers	1926	3.20	2.94	18
36	260531	14.0	C		1.02		A	Van Biesbroeck	1926	3.38	3.37	17
37	260609	14.5	C		0.61	4	R	Van Biesbroeck	1928	3.46	3.58	16
38	260610	14.5	C		0.61	4	R	Van Biesbroeck	1928	3.47	3.60	16

notes: N = 13 - brighter nucleus, N = 28-30 - observers: Hargreaves and Merton.

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