

Ogólnopolskie Seminarium Mechaników Niebieskich

**Czy komety Oorta były
faktycznie z obłoku
Oorta?**

Piotr A. Dybczyński
Obserwatorium Astronomiczne UAM

Ciążeń, 18 maja 2006

Microsoft free presentation



Ogólnopolskie Seminarium Mechaników Niebieskich

**Jak uwzględnienie efektów
niegrawitacyjnych zmienia
naszą wiedzę o przeszłości
i przyszłości komet
bliskoparabolicznych**

**Piotr A. Dybczyński
Obserwatorium Astronomiczne UAM**

Ciechocinek, 27 września 2007

Microsoft free presentation

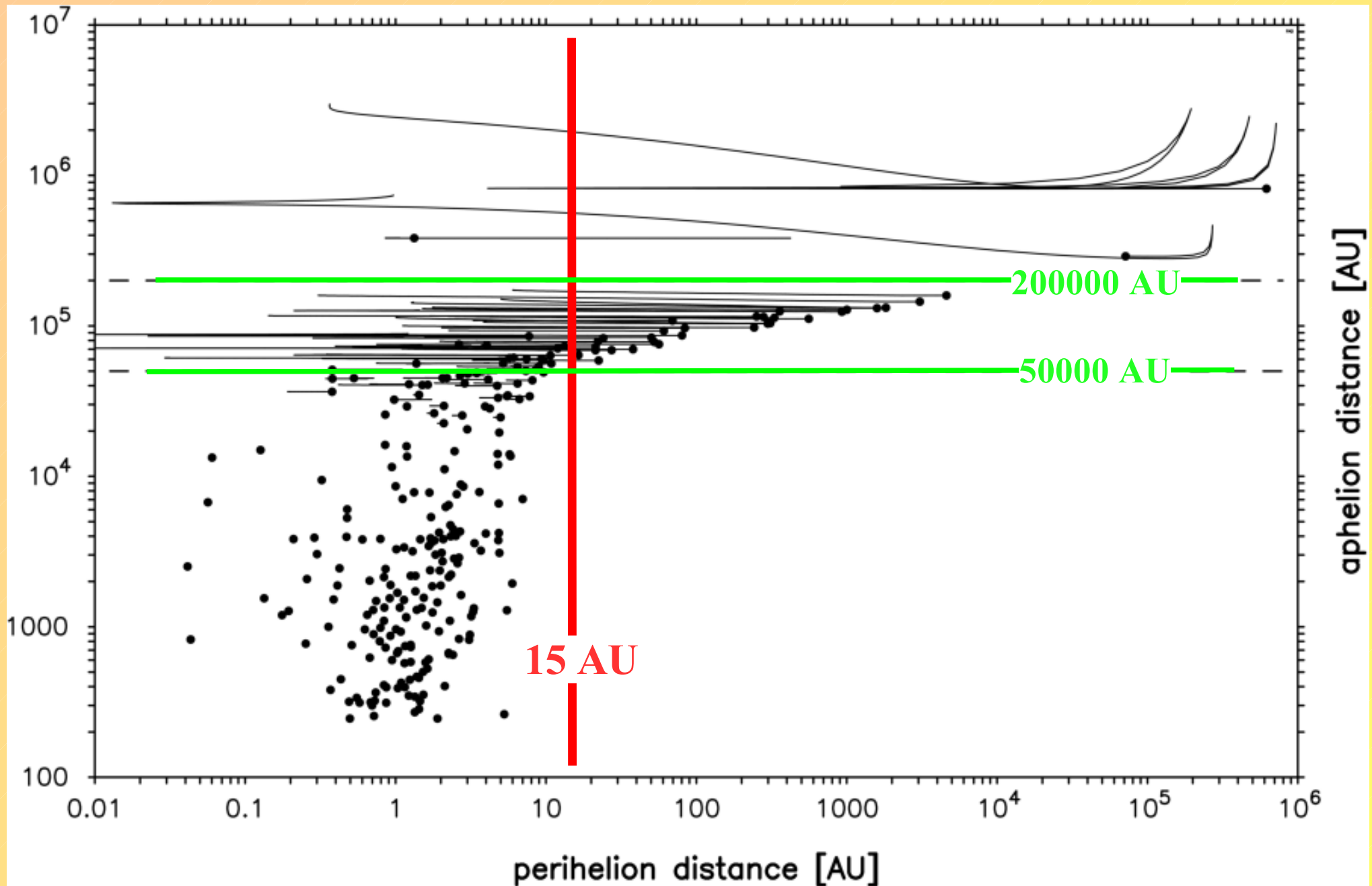
19 komet Oorta

TABLE I

Distribution of original semi-major axes
(a in Astronomical Units)

$1/a$	n
< .000 05	10
.000 05 —	4
10	1
15	1
20	1
25	1
.000 50	1
> .000 75	0

Historia dynamiczna 255 komet długookresowych - wpływ Galaktyki

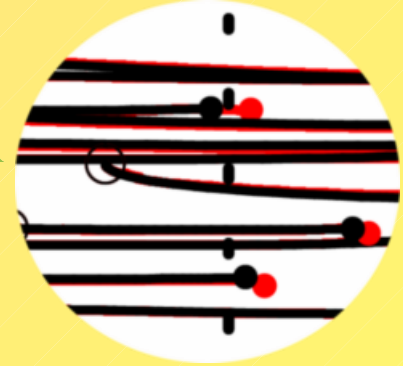
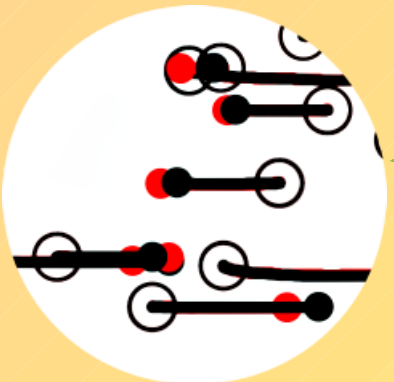
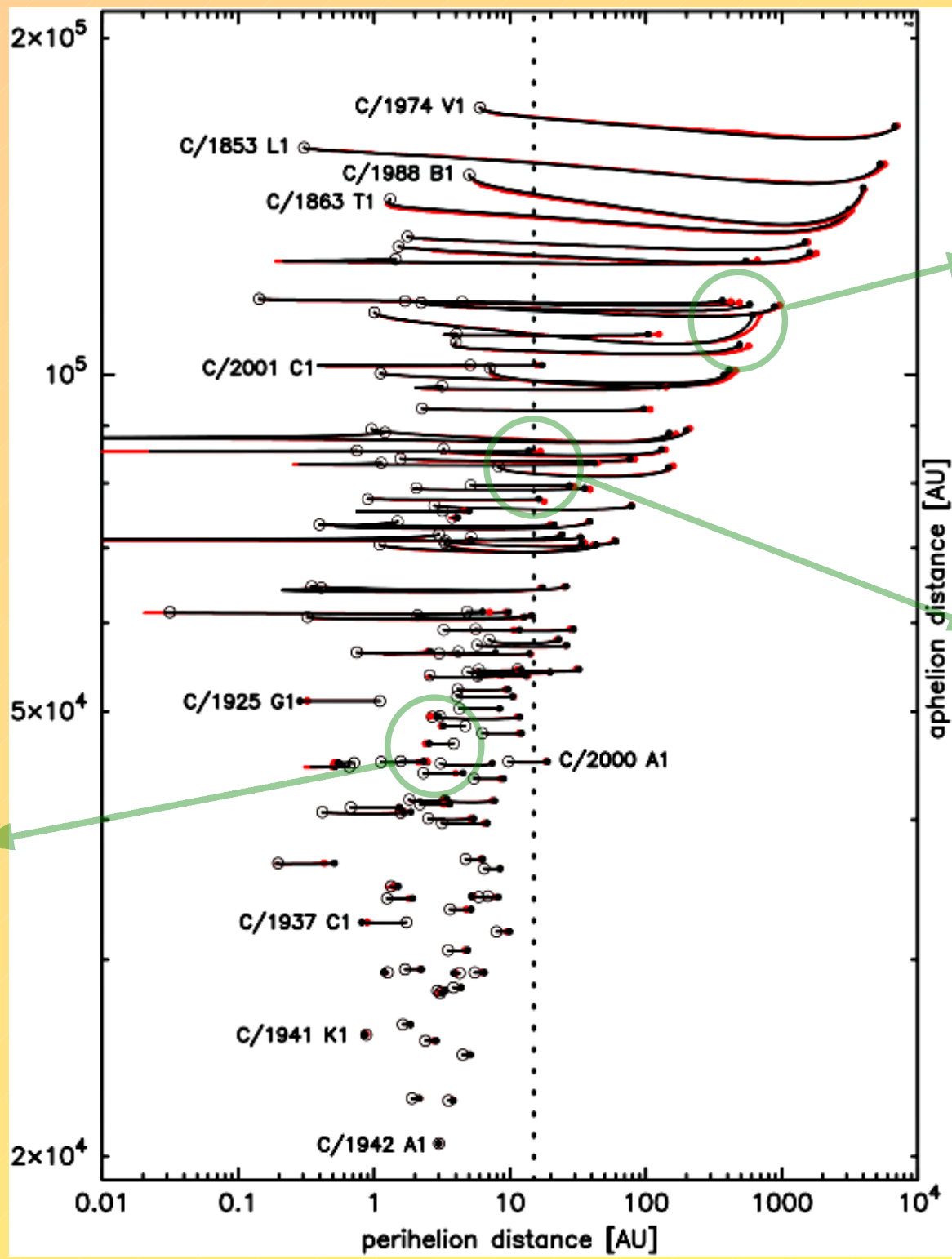


Czy 'nowe' są faktycznie nowe ?

Previous q	“restricted” set	all comets
0–2 AU	3	10
2–15 AU	24	31
15–40 AU	6	12
>40 AU	20	32

Rozkład “poprzedniej” odległości peryhelium 85 eliptycznych komet długookresowych, nowych w sensie Oorta ($a > 10000$ AU)

Ewolucja orbit 108 komet jeden obieg wstecz pod wpływem 21 gwiazd i Galaktyki.



19 komet Oorta

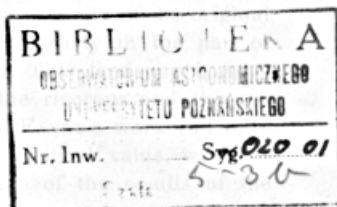
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(a in Astronomical Units)

$1/a$		n
	< .000 05	10
.000 05	—	4
	10	1
	15	1
	20	1
	25	1
	50	1
.000 50	75	1
	> .000 75	0

ON THE SYSTEMATIC CHANGES OF
 THE ECCENTRICITIES OF NEARLY
 PARABOLIC ORBITS

BY
 ERIK SINDING



KØBENHAVN
 I KOMMISSION HOS EJNAR MUNKSGAARD
 1948

were found through numerical calculations of the perturbations by Jupiter and Saturn (in some cases by other planets, too) which covered a period extending so far back in time that the further perturbations were negligible. The original $\frac{1}{a}$ -values refer to the motion of the comet with regard to the centre of gravity of the sun, Jupiter, and Saturn.

No.	Comet	Osculating $\frac{1}{a}$	Original $\frac{1}{a}$	$\Delta\left(\frac{1}{a}\right)$
1...	1853 III	-0.0008193	+0.0000829	+0.0009022
2...	1863 VI	-0.0004949	+0.0000166	+0.0005115
3...	1882 II	+0.0118963	+0.0121488	+0.0002525
4...	1886 I	-0.0006944	-0.0000071	+0.0006873
5...	1886 II	-0.0004770	+0.0003166	+0.0007936
6...	1886 IX	-0.0005765	+0.0000630	+0.0006395
7...	1889 I	-0.0006915	+0.000042	+0.0007335
8...	1890 II	-0.0002151	+0.0000718	+0.0002869
9...	1897 I	-0.0008722	+0.0000396	+0.0009118
10...	1898 VII	-0.0006074	-0.0000157	+0.0005917
11...	1902 III	+0.0000810	+0.0000054	-0.0000756
12...	1904 I	-0.0005040	+0.0002165	+0.0007205
13...	1905 VI	-0.0001424	+0.0006210	+0.0007634
14...	1907 I	-0.0004991	+0.0000252	+0.0005243
15...	1910 I	+0.0002143	(+0.0033021)	(+0.0030878)
16...	1914 V	-0.0001465	+0.0000119	+0.0001584
17...	1922 II	-0.0003806	+0.0000038	+0.0003844
18...	1925 I	-0.0005665	+0.0000540	+0.0006205
19...	1925 VII	-0.0002730	+0.0001150	+0.0003880
20...	1932 VI	-0.0005948	+0.0000441	+0.0006389
21...	1936 I	-0.000487	+0.000205	+0.000692

It appears from the table that for 20 out of 21 comets the orbits have shifted in the elliptical direction, when going back in time, i. e. $\Delta\left(\frac{1}{a}\right)$ is positive, while there is a slight shift in the hyperbolic direction for one comet. The order of magnitude of $\Delta\left(\frac{1}{a}\right)$ is +0.0005. Comet 1910 I is apparently an exception. An examination of the data given for this comet,¹ however, shows that the investigation contains an error in the derivation of the

¹ K. Lous, *Die ursprüngliche Bahn des Kometen 1910 I* (A. N. 220, 167, Kiel 1924).

Poprzednie perihelia

C/1853 L1	1B	+0.000013	●	5741.
C/1863 T1	2A	+0.000014		3239.
C/1882 R1-B	2B	+0.012265	●	0.00
C/1885 X1		-0.000423	●	
C/1885 X2	1B	+0.000331	●	0.476
C/1886 T1	1B	+0.000045	●	0.499
C/1888 R1	1A	+0.000048		3.281
C/1890 F1	1B	+0.000089	●	2.162
C/1896 V1	1B	+0.000005		112.100
C/1898 L1	1A	+0.000068	●	2.189
C/1902 R1	1B	+0.000027		19.940
C/1904 H1	1A	+0.000227	●	2.716
C/1906 B1	2B	+0.000630	●	1.296
C/1907 E1	1B	+0.000025		38.940
C/1910 A1	2A	+0.000134		0.126
C/1913 Y1	1A	+0.000028		41.070
C/1922 U1	1A	+0.000021		107.8
C/1925 G1	1A	+0.000039	●	0.324
C/1925 W1	1B	+0.000024	●	82.59
C/1932 M2	1A	+0.000045		3.984
C/1935 Q1	1A	+0.000018	●	124.8
C/1908 R1	1B	+0.000174	●	0.945

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2005/08/11

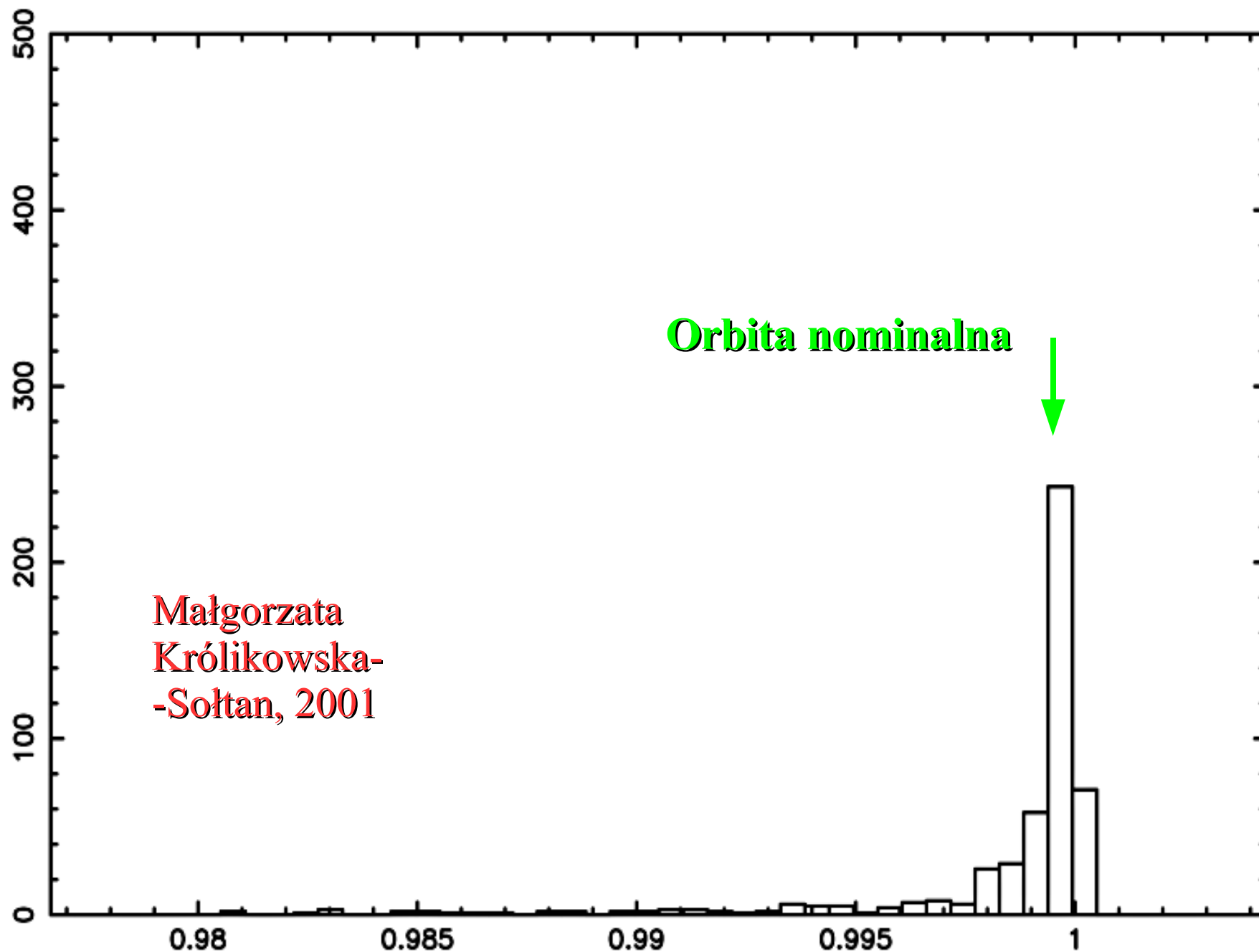
C/1885 X1 - Fabry

LICZBA OBSERWACJI:

228 (Z OKRESU: 1885 Dec. 1 - 1886 July 19)

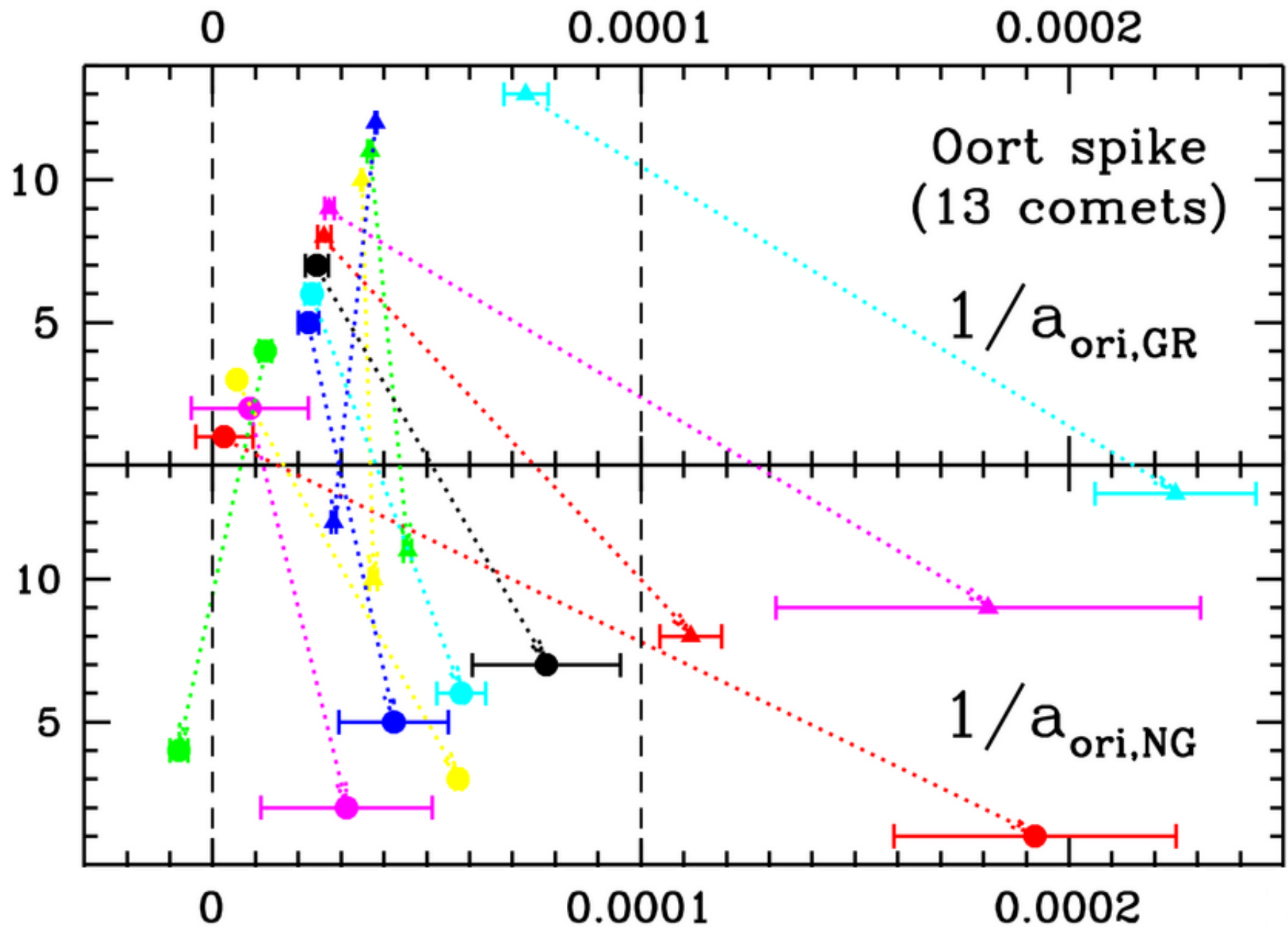
Grawitacyjna orbita przeszła: $1/a = +8.68 \cdot 10^{-06}$

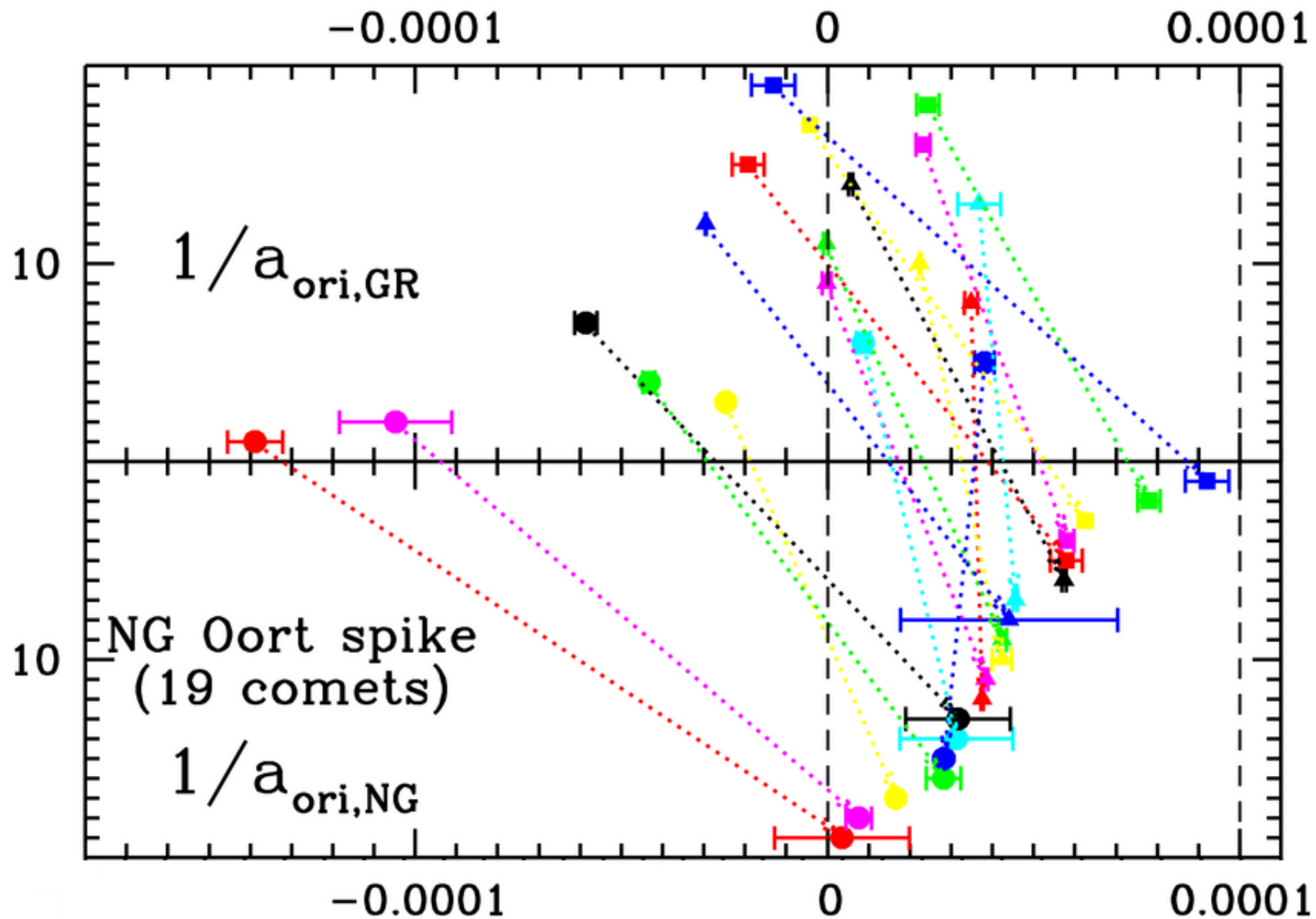
Niegrawitacyjna orbita przeszła: $1/a = +3.12 \cdot 10^{-05}$

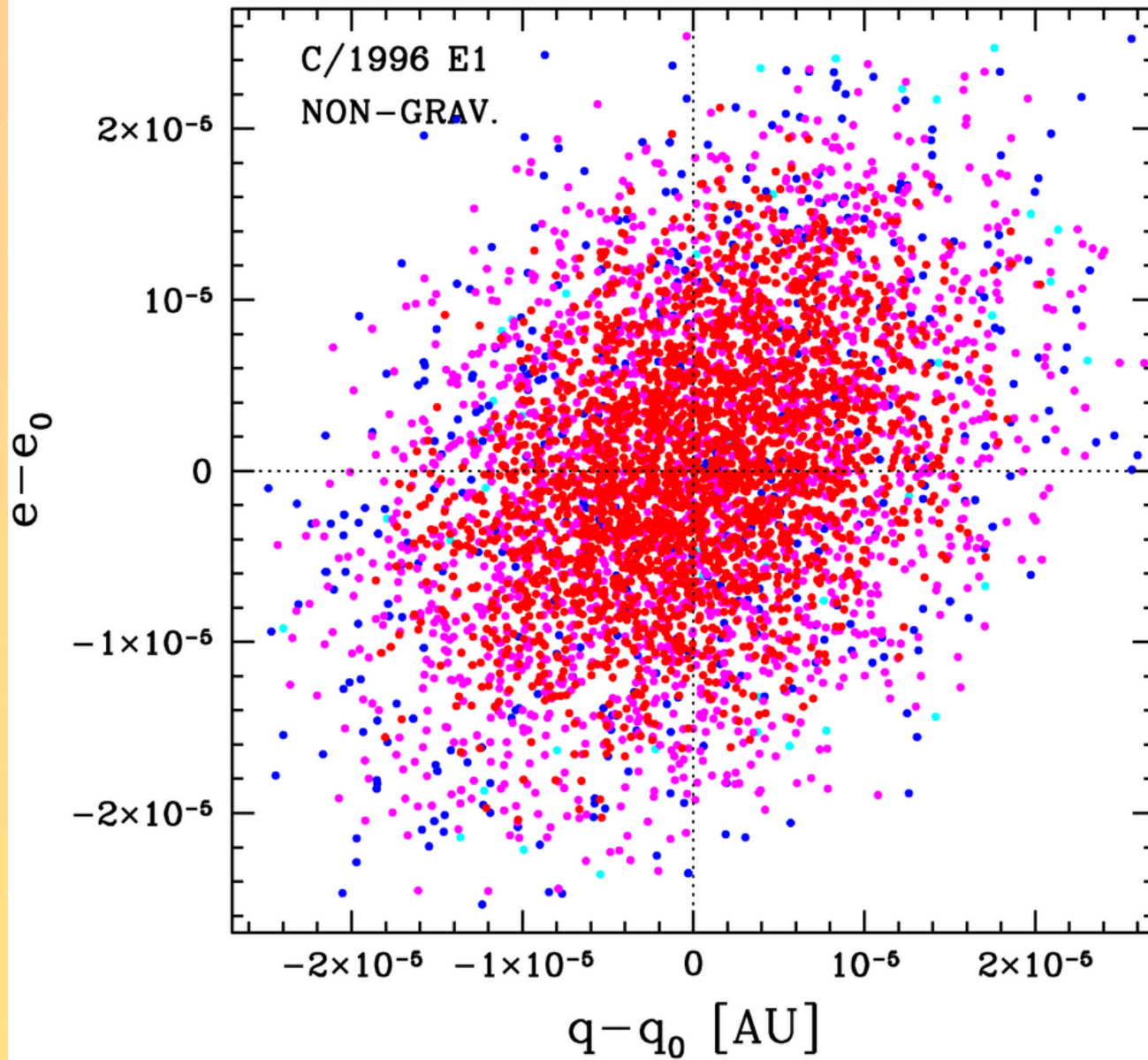


Małgorzata
Królikowska-
-Sołtan, 2001

C/1885 X1, histogram e dla 501 orbit



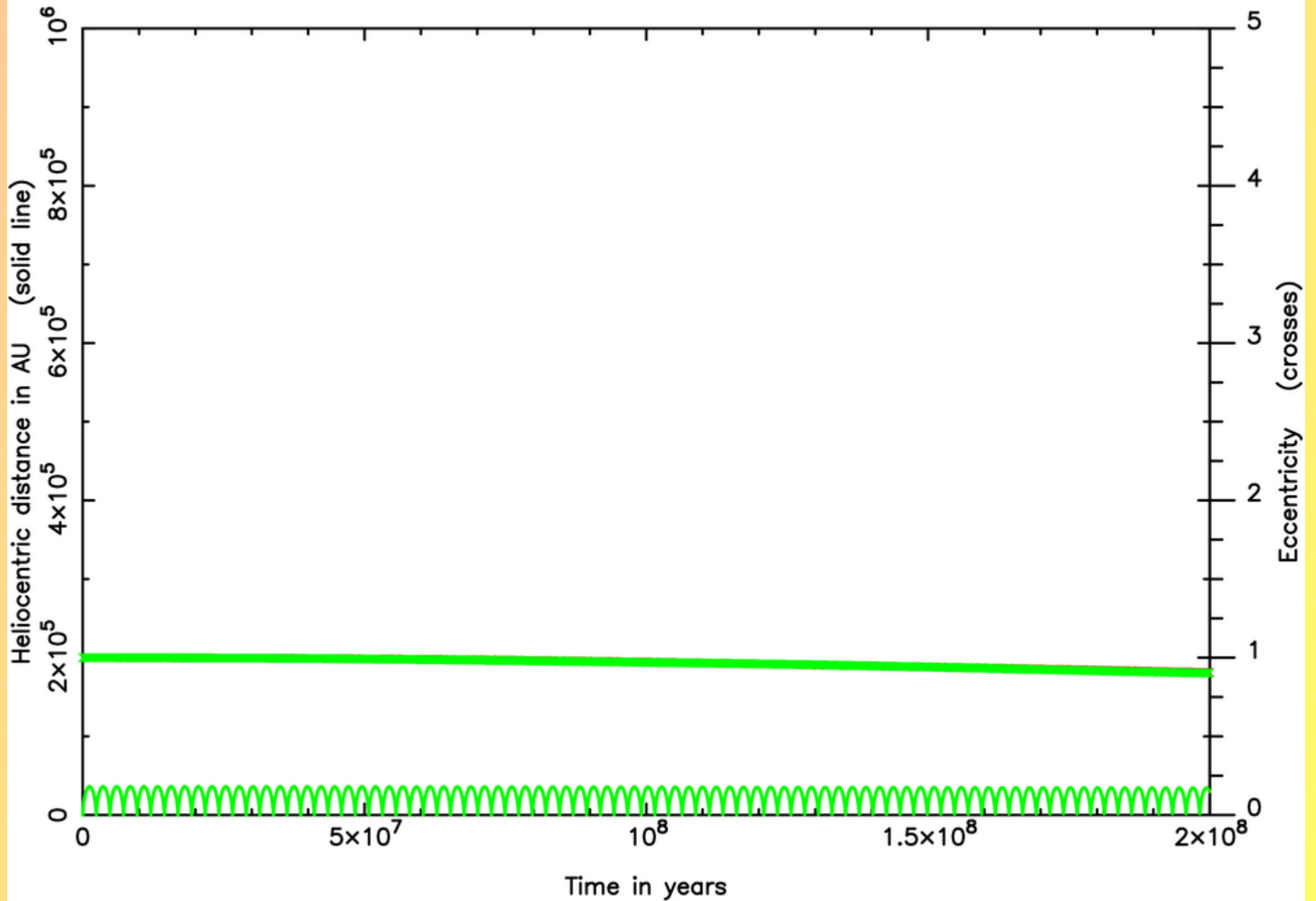




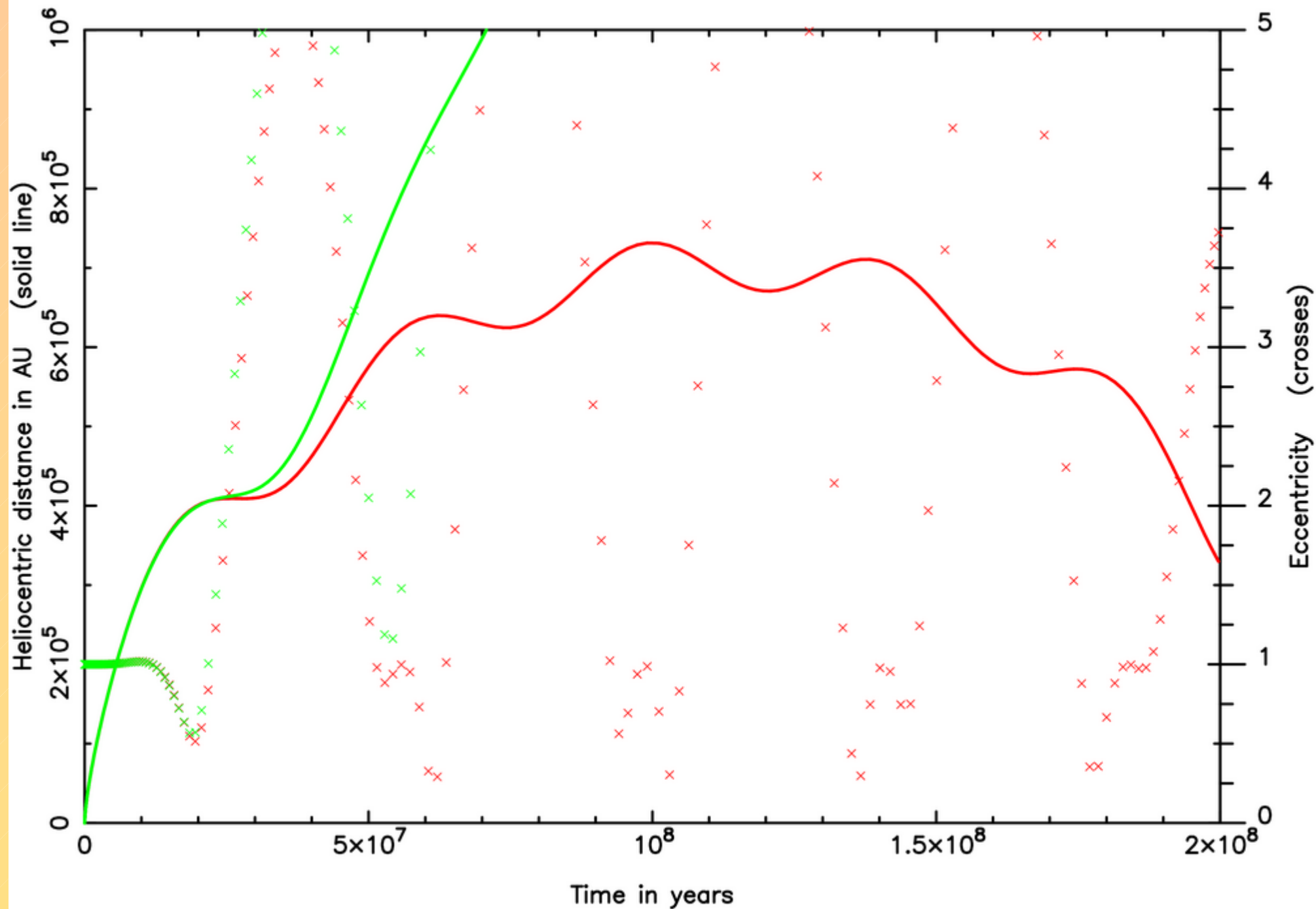
- $\alpha = 50\%$
- $\alpha > 90\%$
- $\alpha > 99\%$
- reszta

Metoda: Sitarski 2002

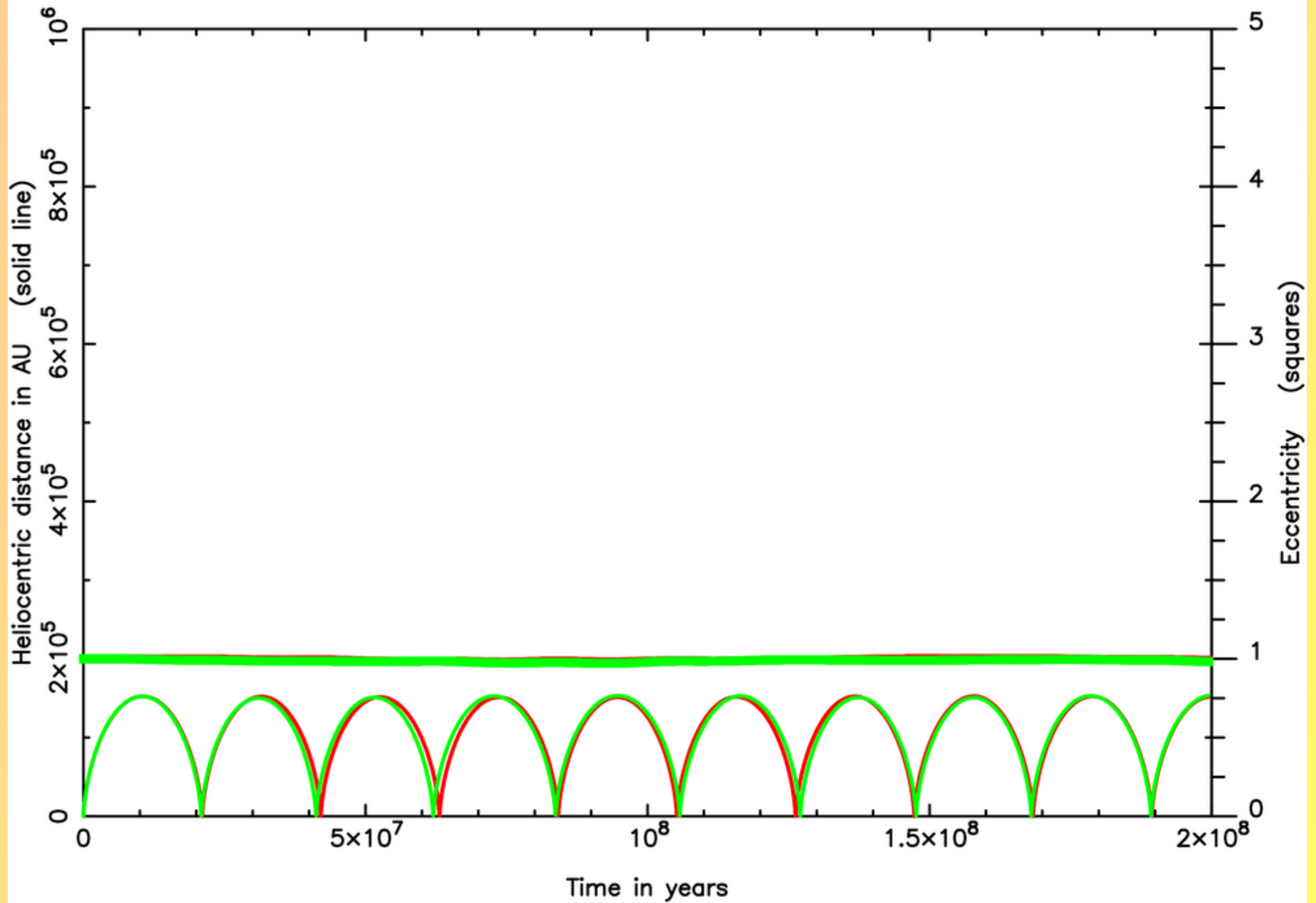
Klon 1 z paczki 1885x1m0.bmi (czerwone=tylko dysk, zielone=dysk+centrum)



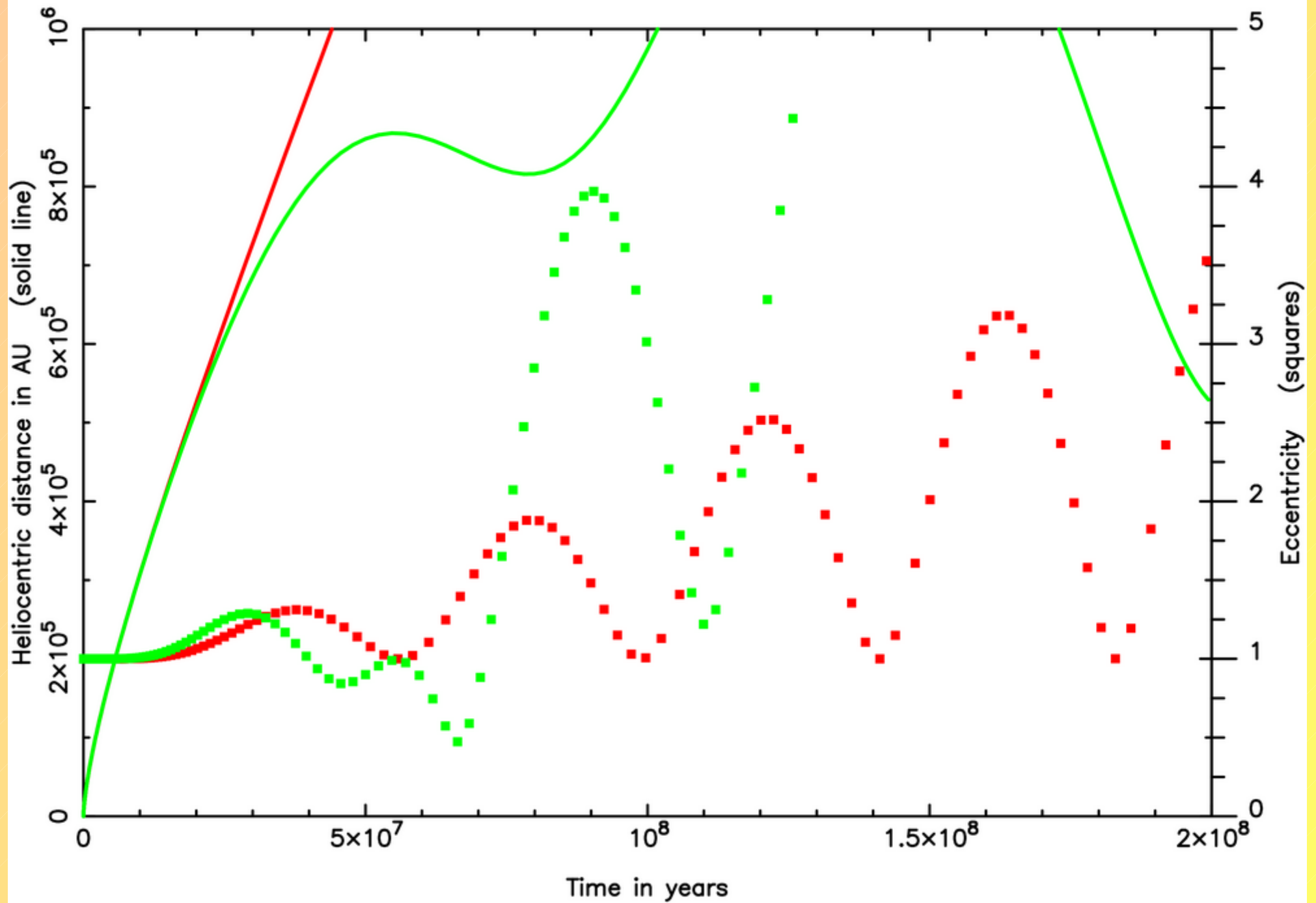
Klon 9 z paczki 1885x1m0.bmi (czerwone=tylko dysk, zielone=dysk+centrum)



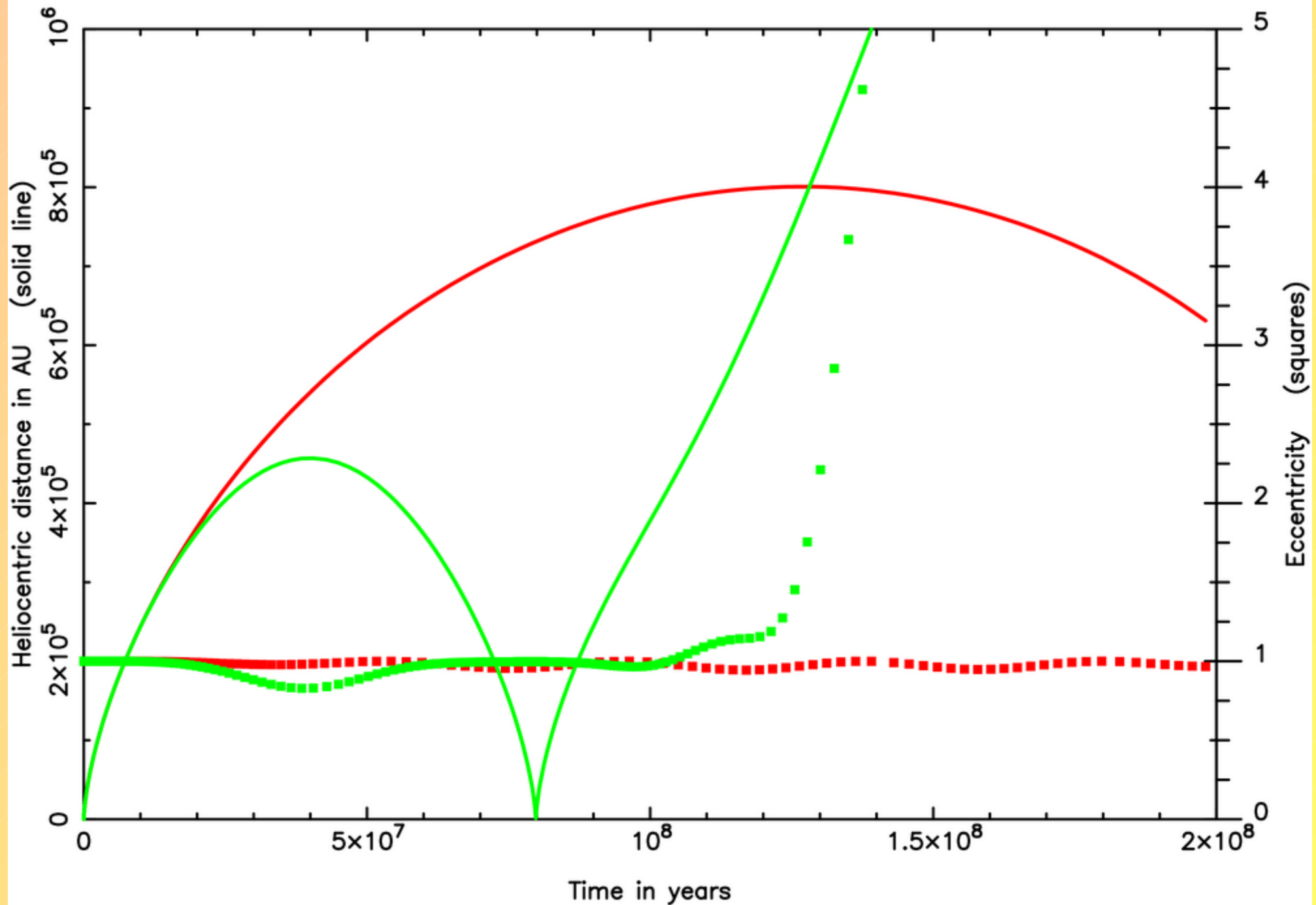
Klon 1 z paczki 1956r1n0.bmi (czerwone=tylko dysk, zielone=dysk+centrum)



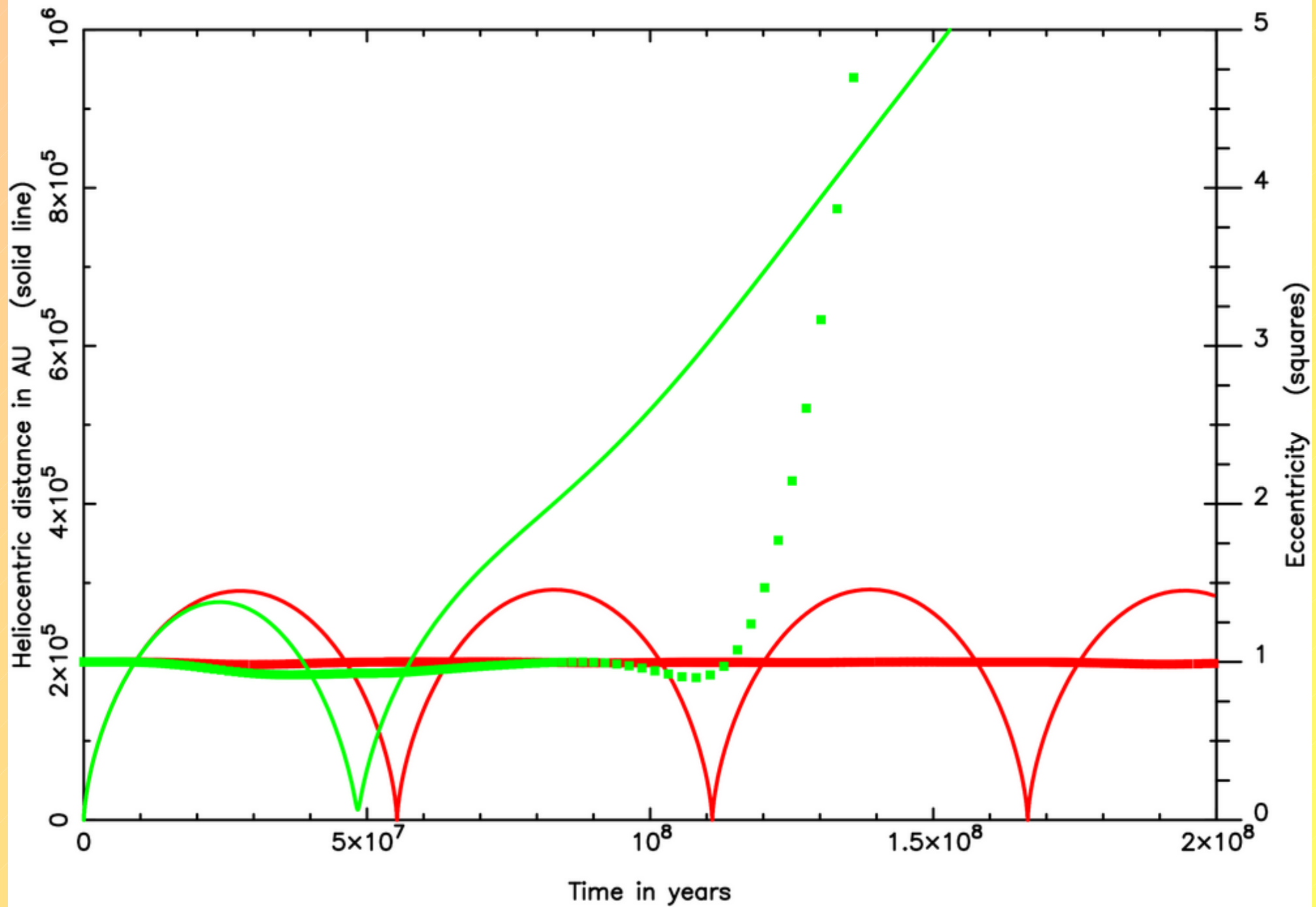
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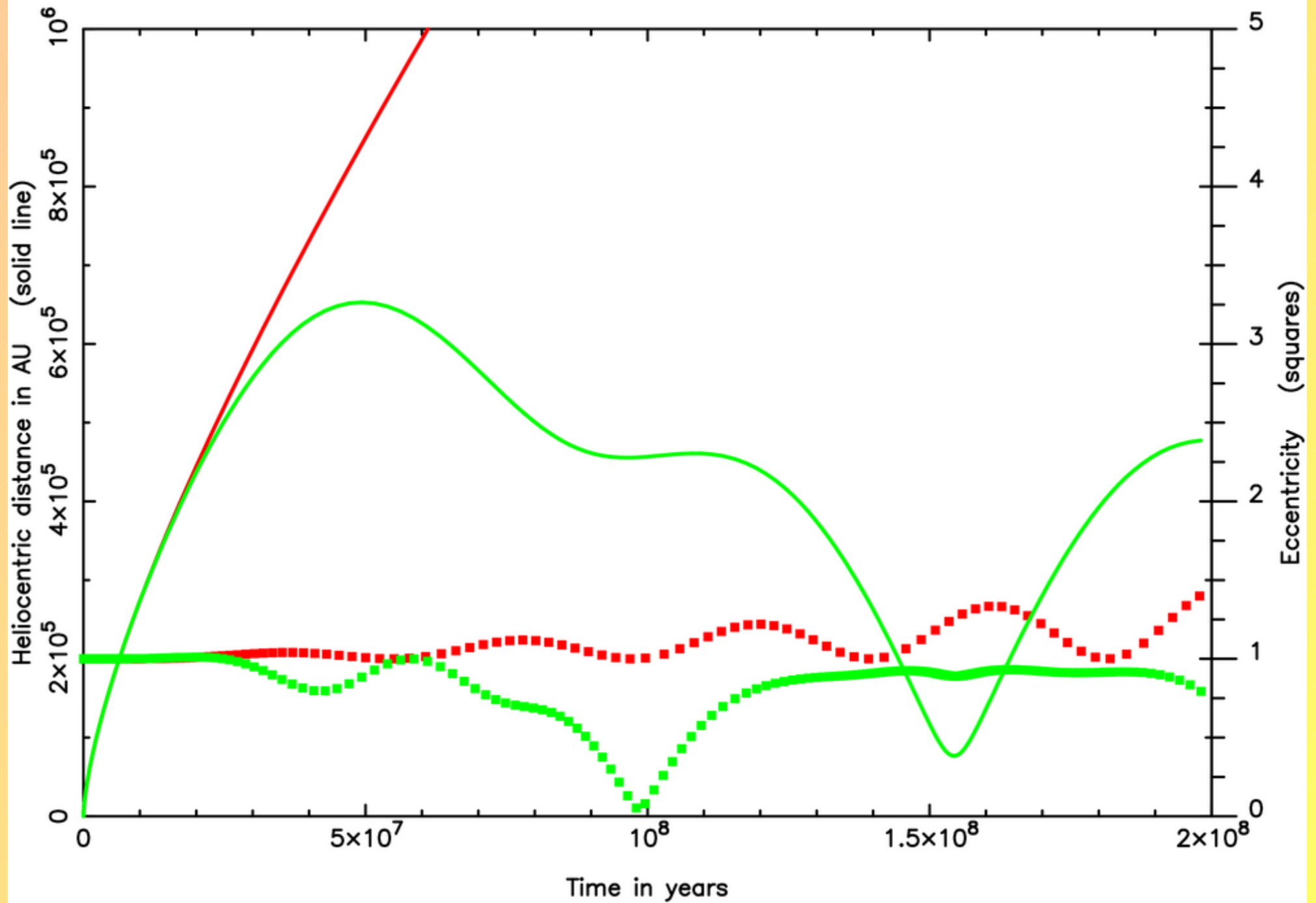
Klon 7 z paczki 1956r1n0.bmi (czerwone=tylko dysk, zielone=dysk+centrum)



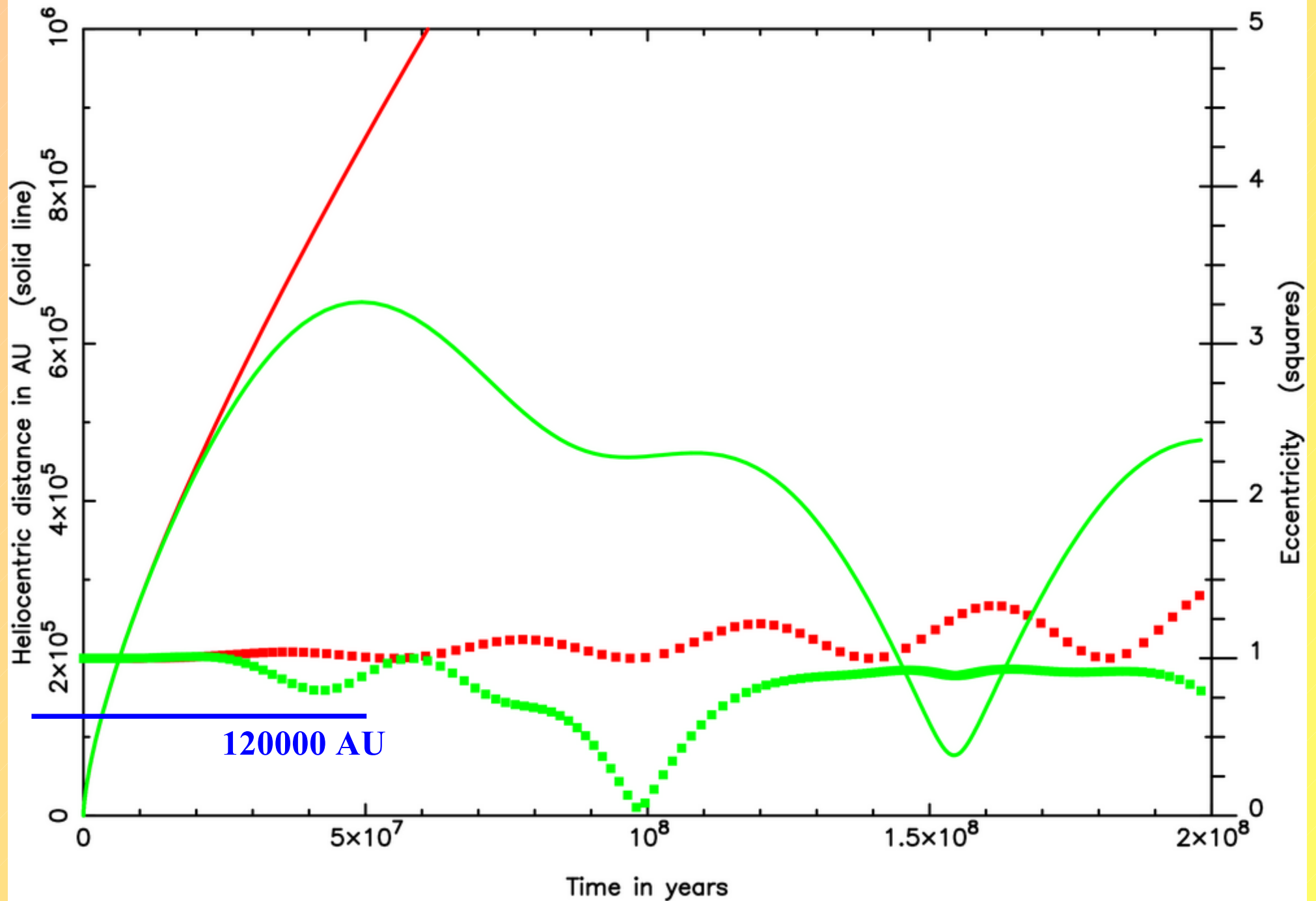
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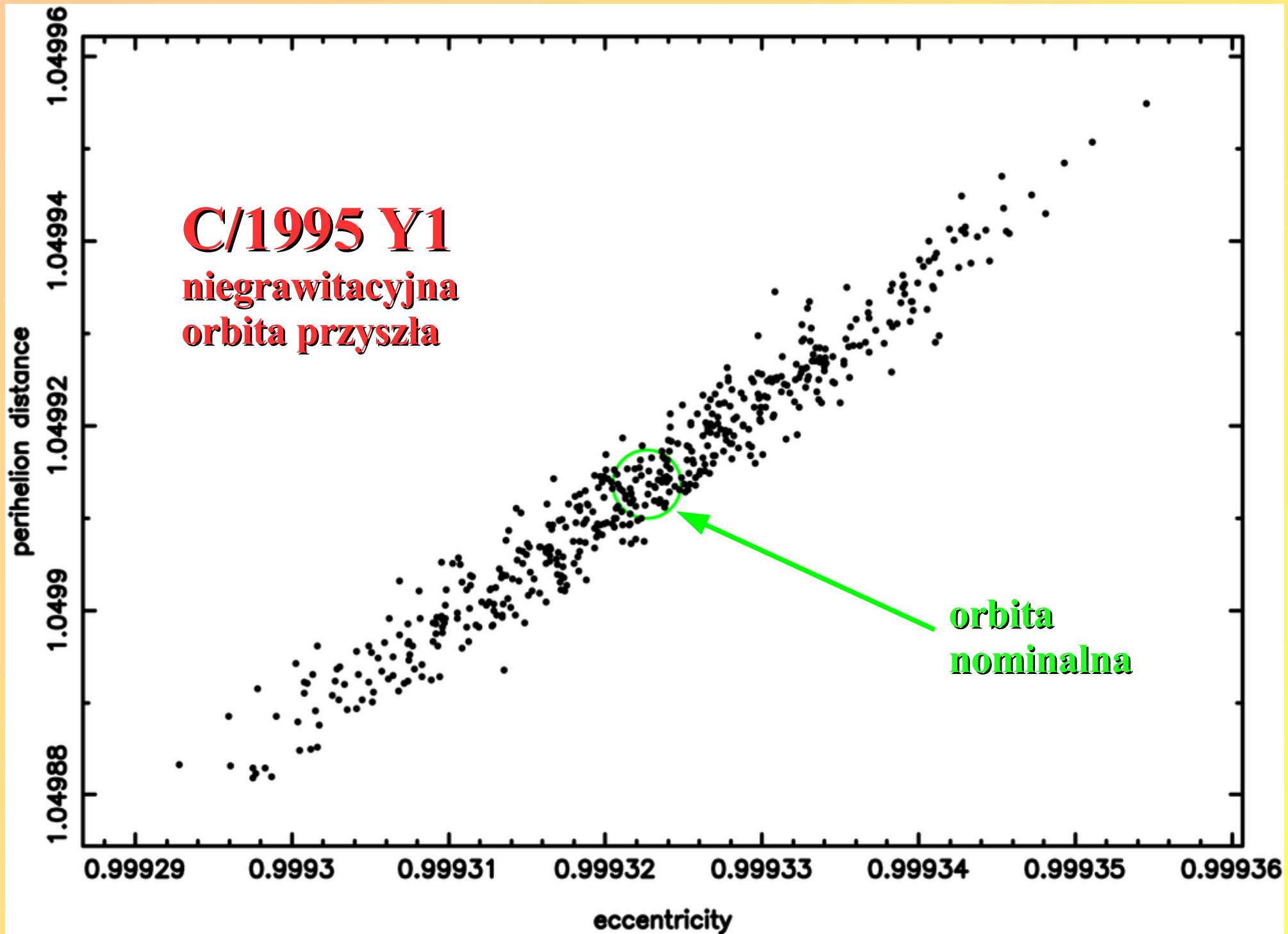


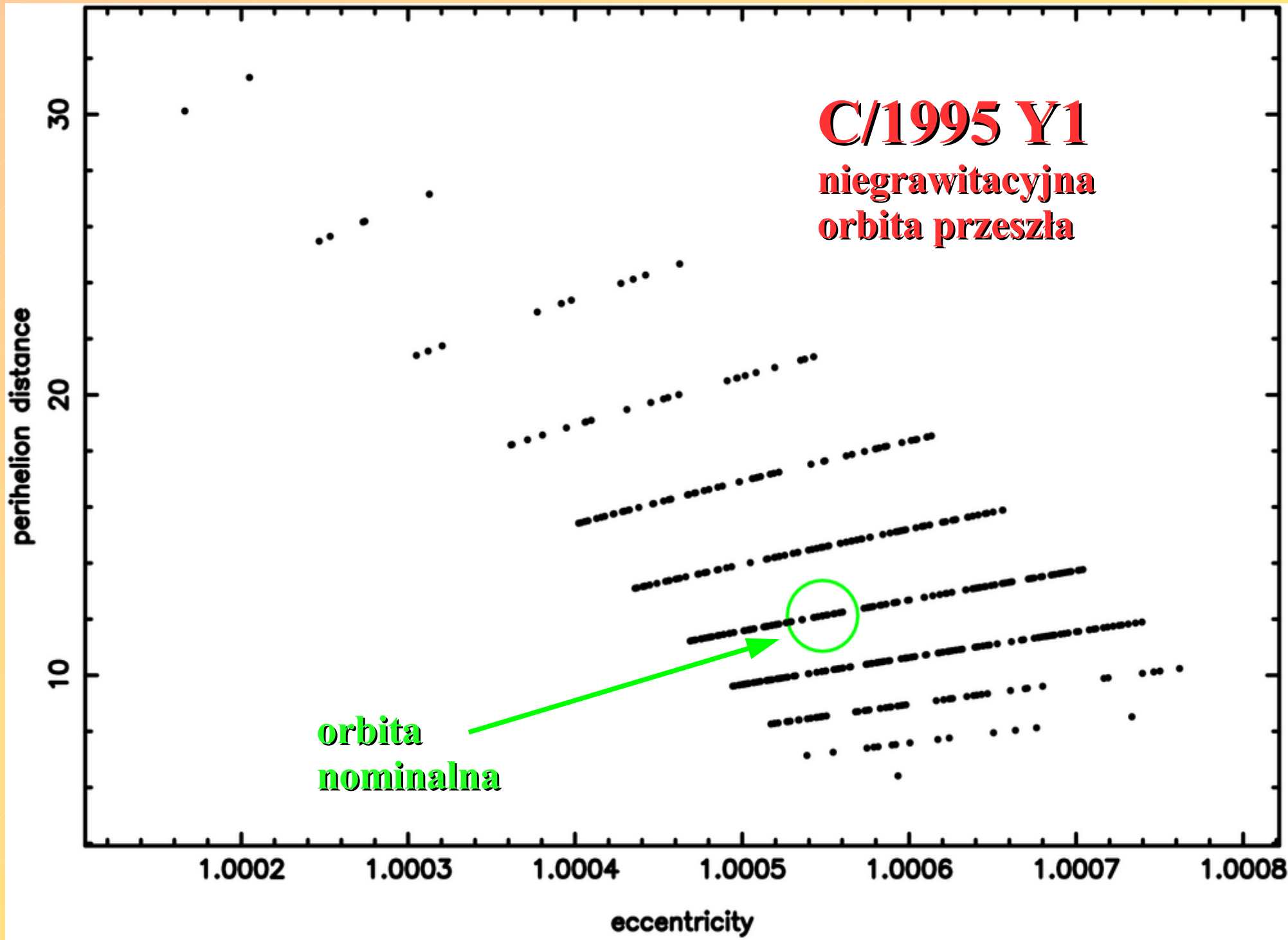
Klon 94 z paczki 1956r1n0.bmi (czerwone=tylko dysk, zielone=dysk+centrum)

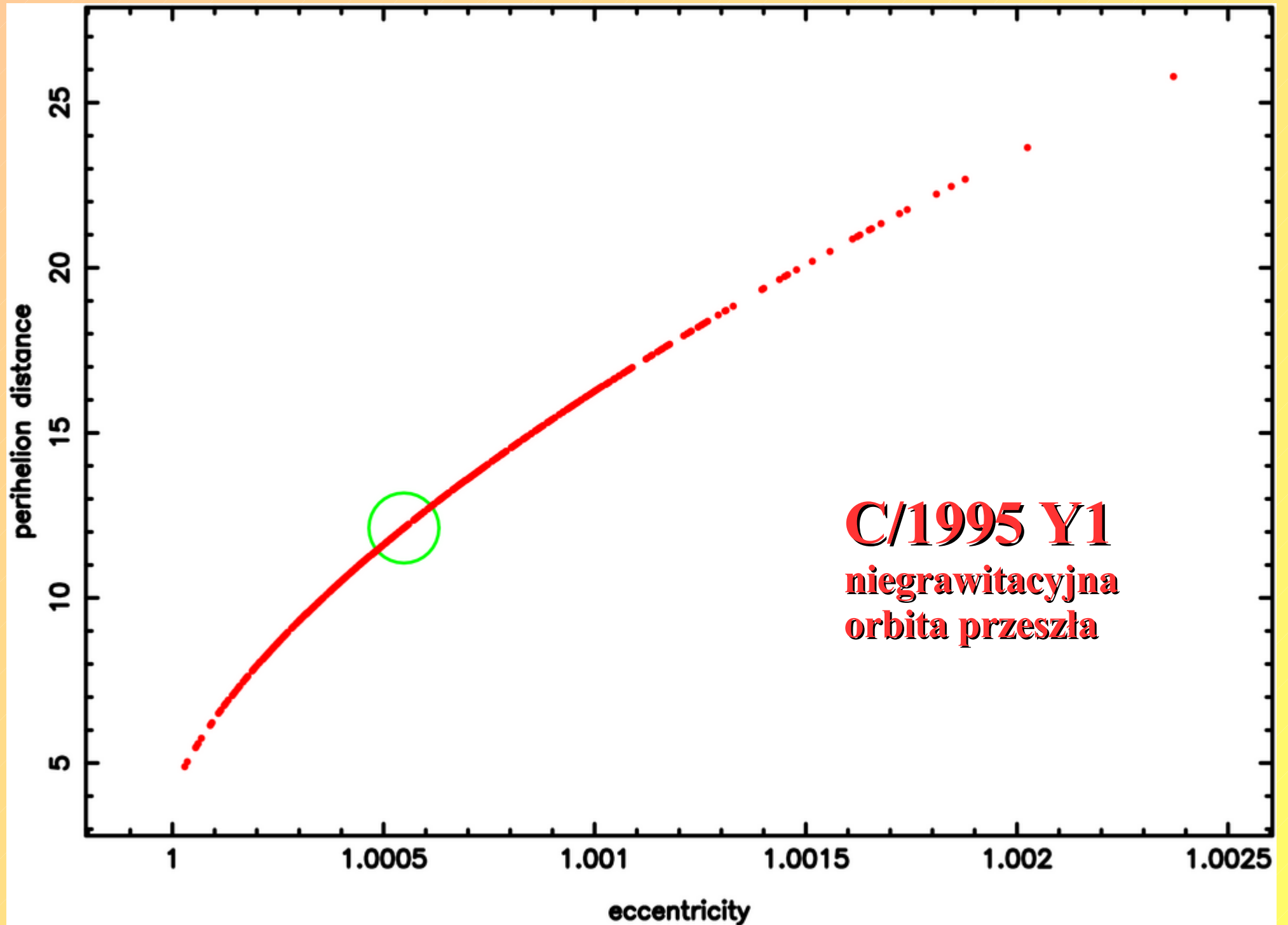


Klon 94 z paczki 1956r1n0.bmi (czerwone=tylko dysk, zielone=dysk+centrum)

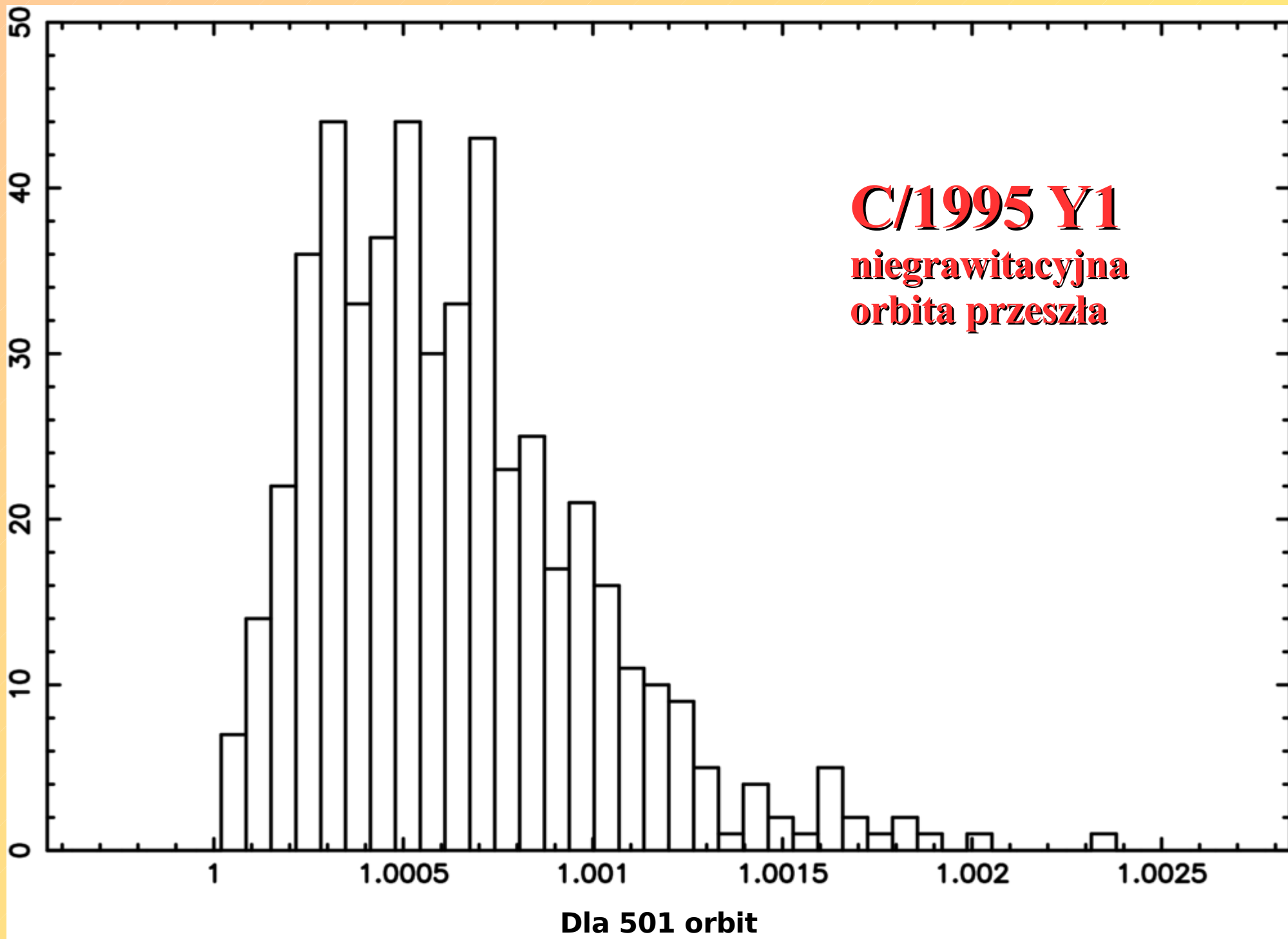


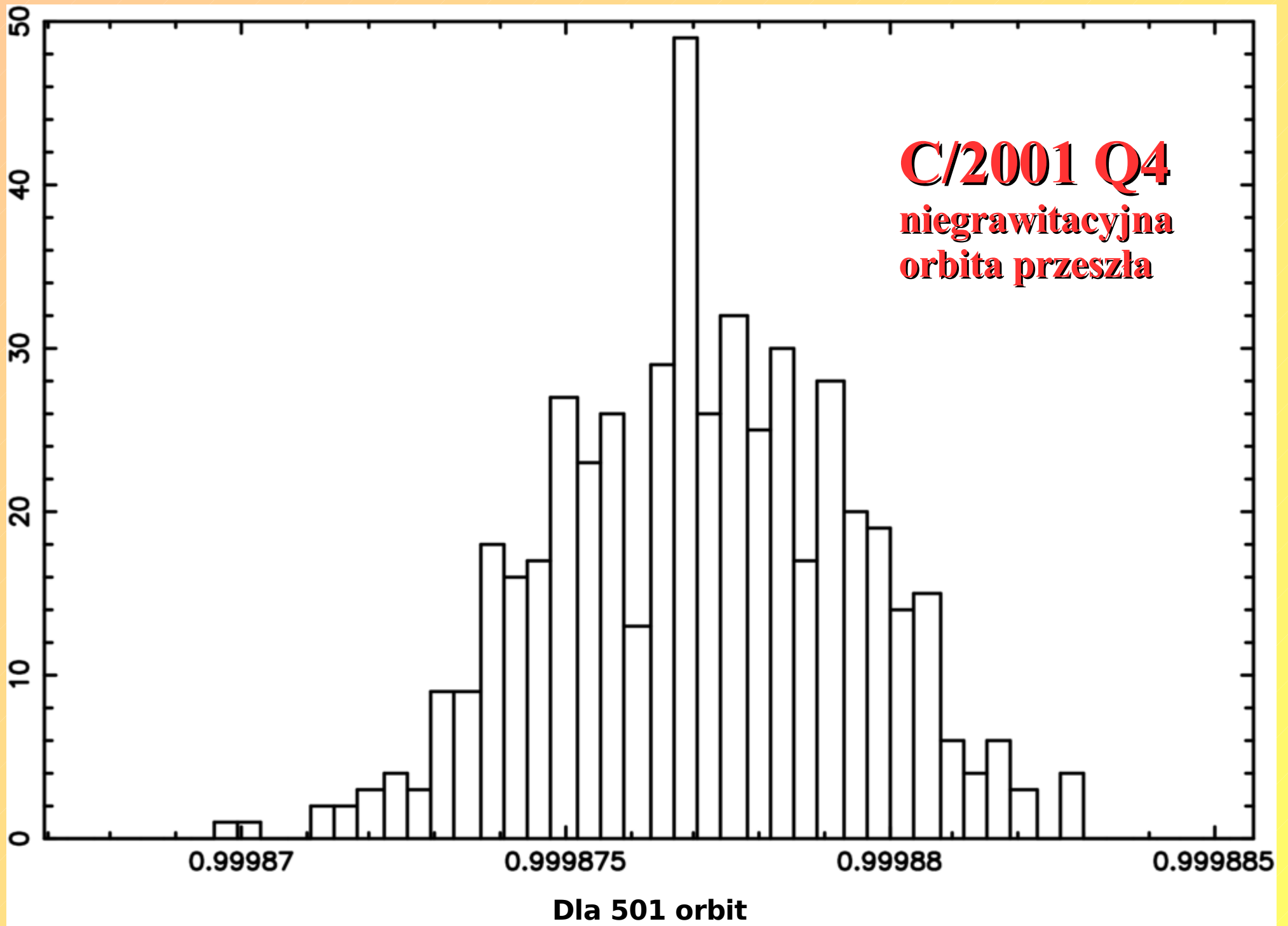


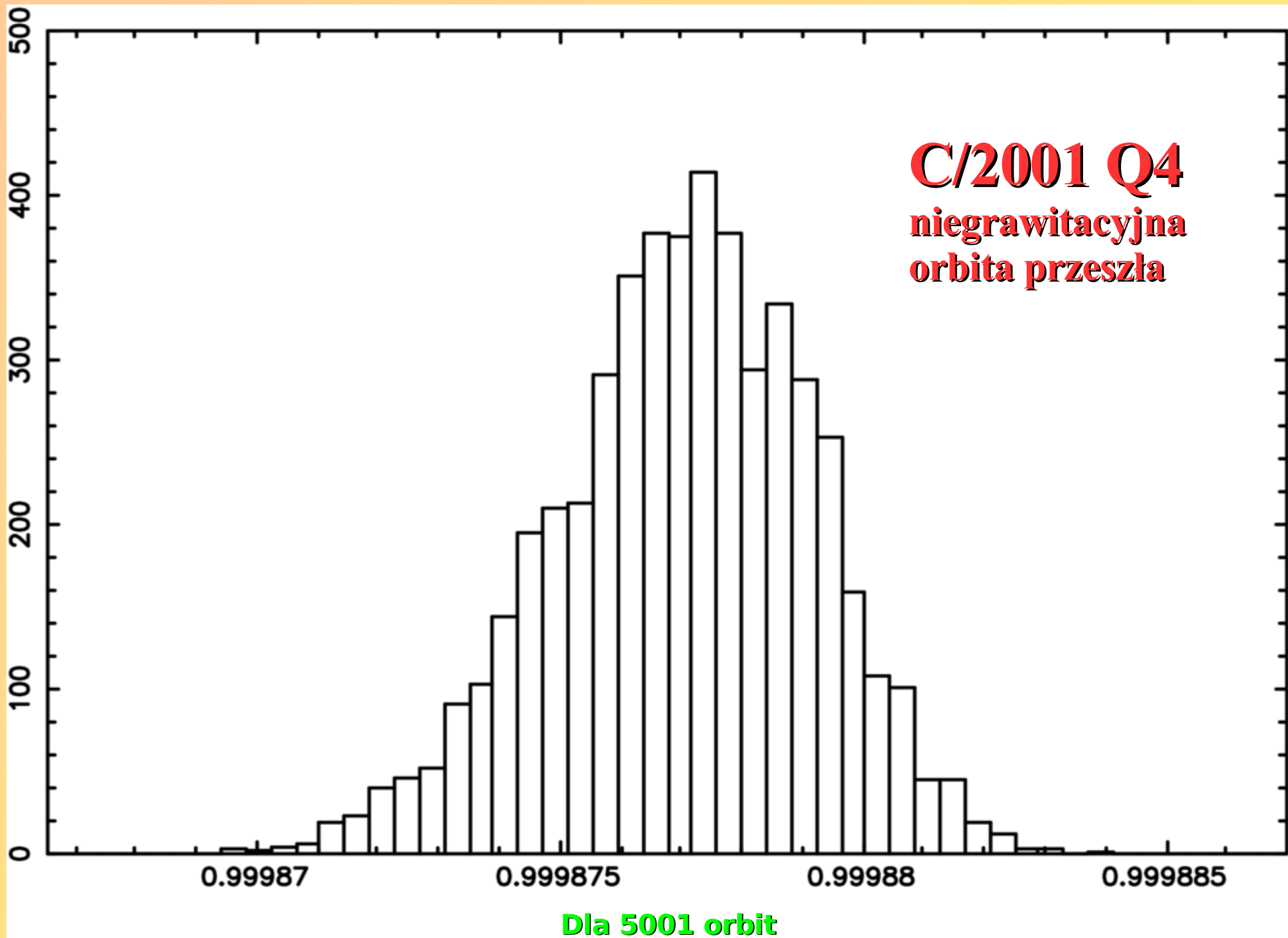




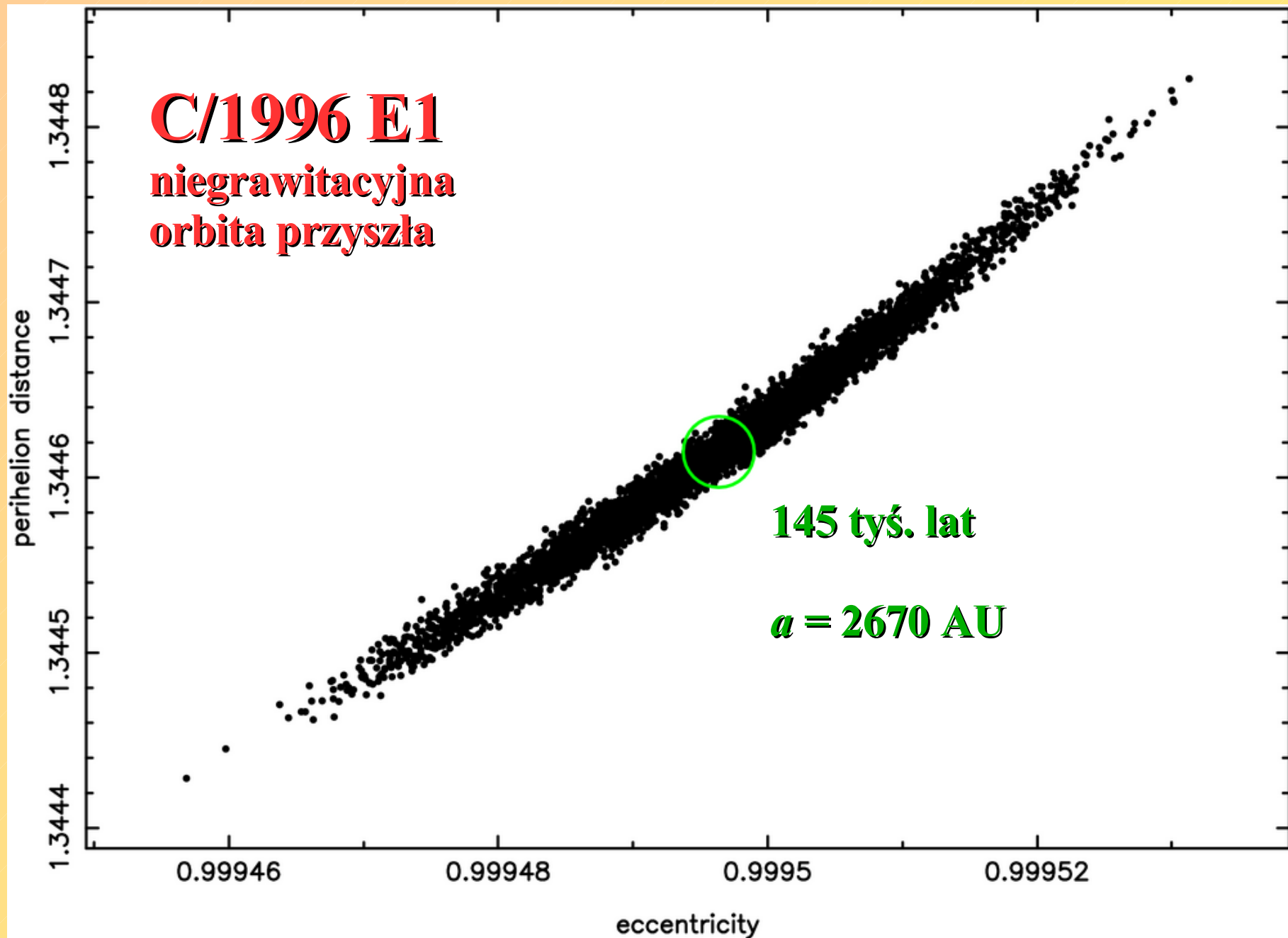
C/1995 Y1
niegrawitacyjna
orbita przeszła





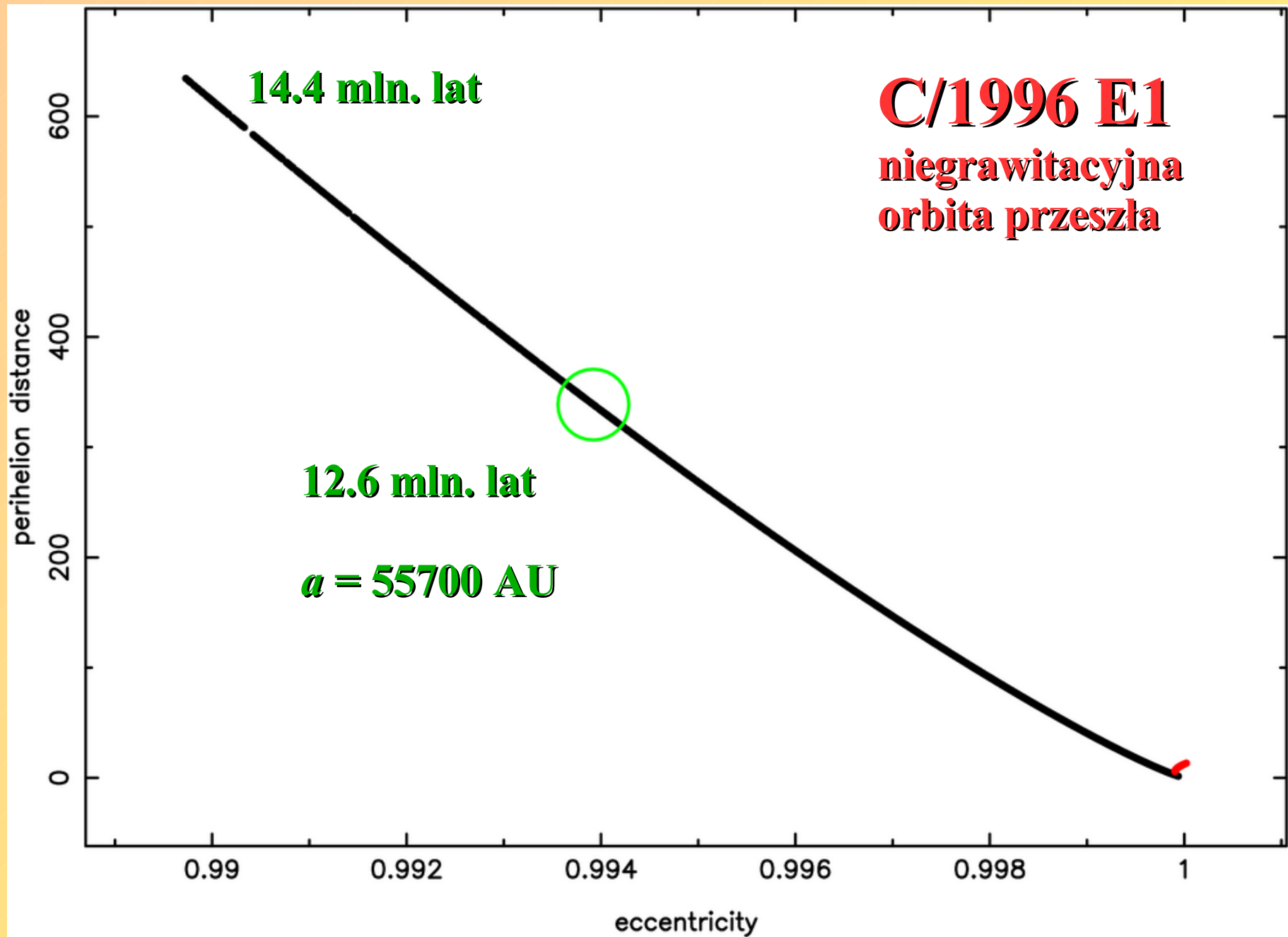


C/1996 E1
niegrawitacyjna
orbita przyszła



145 tyś. lat

$a = 2670$ AU



14.4 mln. lat

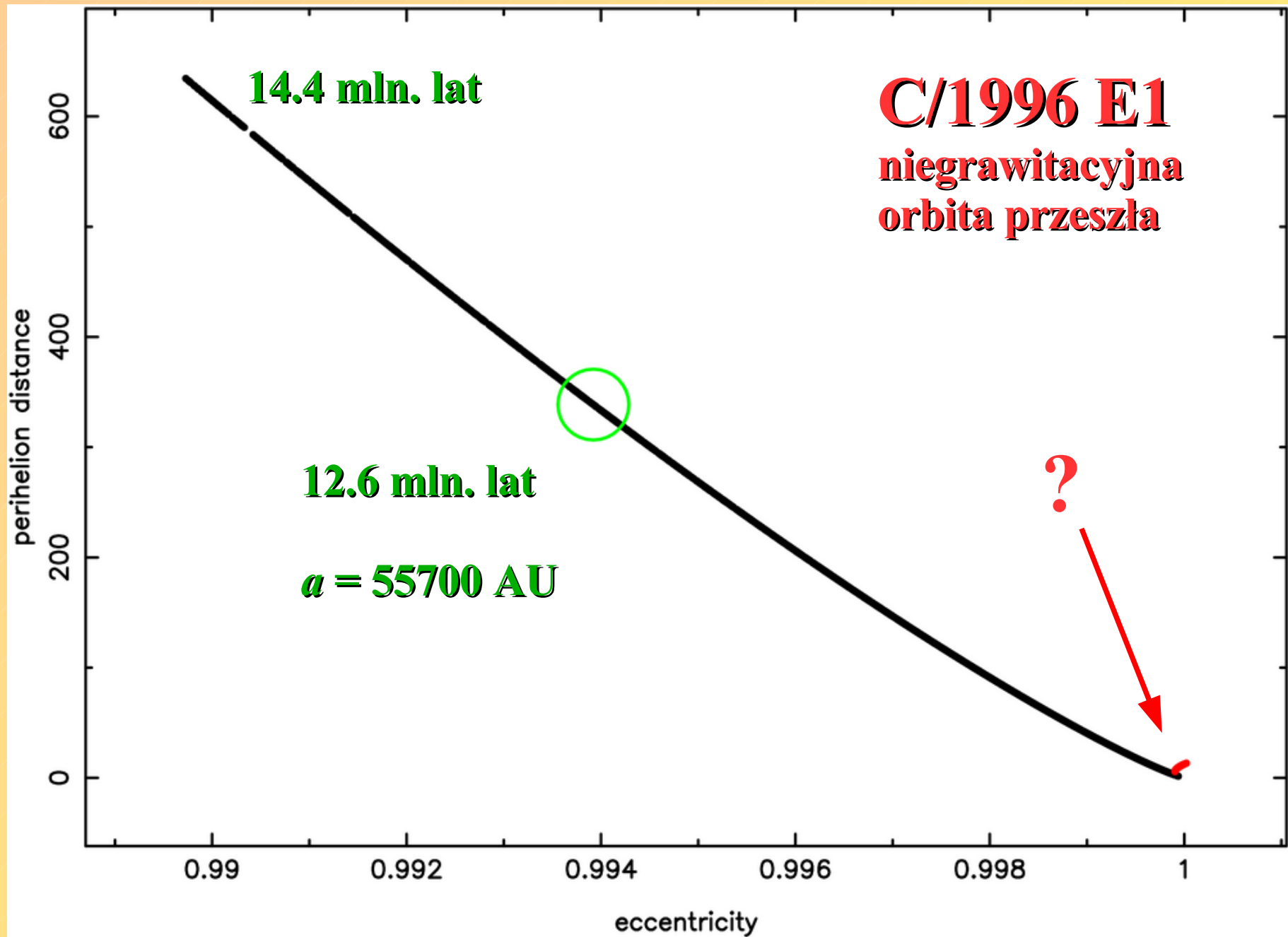
C/1996 E1
niegrawitacyjna
orbita przeszła

12.6 mln. lat

$a = 55700$ AU

perihelion distance

eccentricity



14.4 mln. lat

C/1996 E1
niegrawitacyjna
orbita przeszła

12.6 mln. lat

$a = 55700$ AU

?

C/1996 E1
niegrawitacyjna
orbita przeszła

perihelion distance

10
5

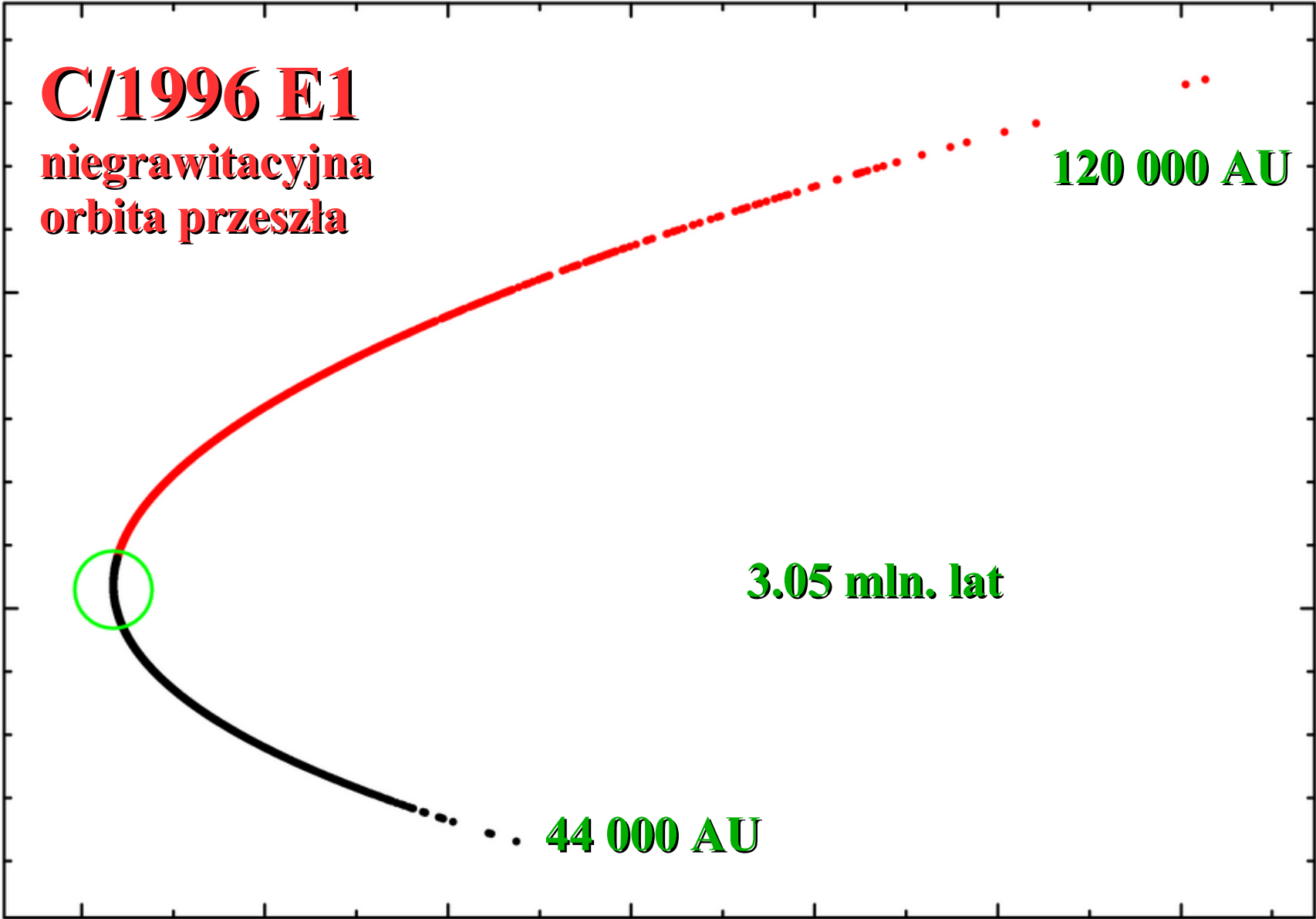
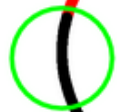
0.9999 0.99992 0.99994 0.99996 0.99998 1 1.00002

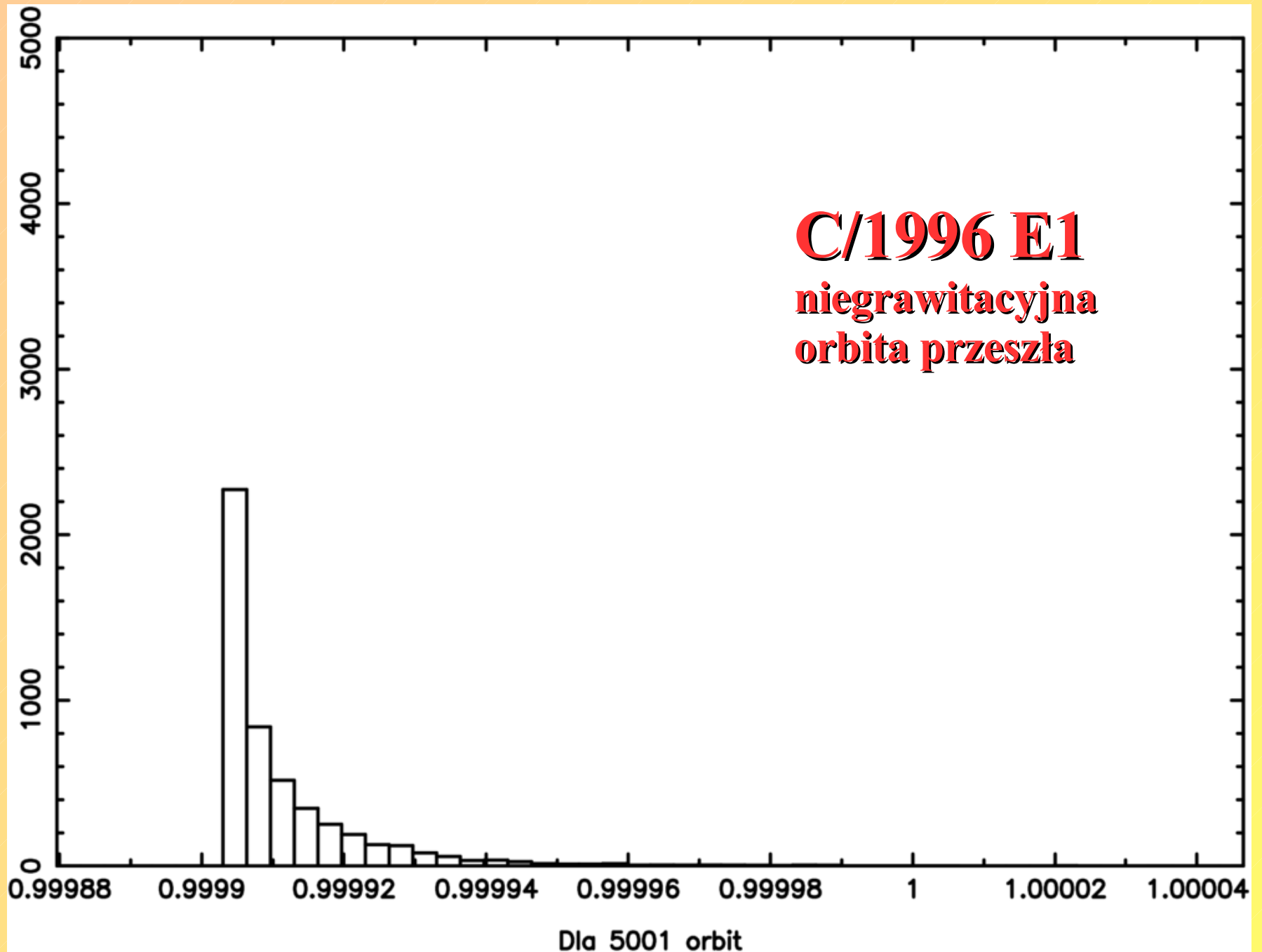
eccentricity

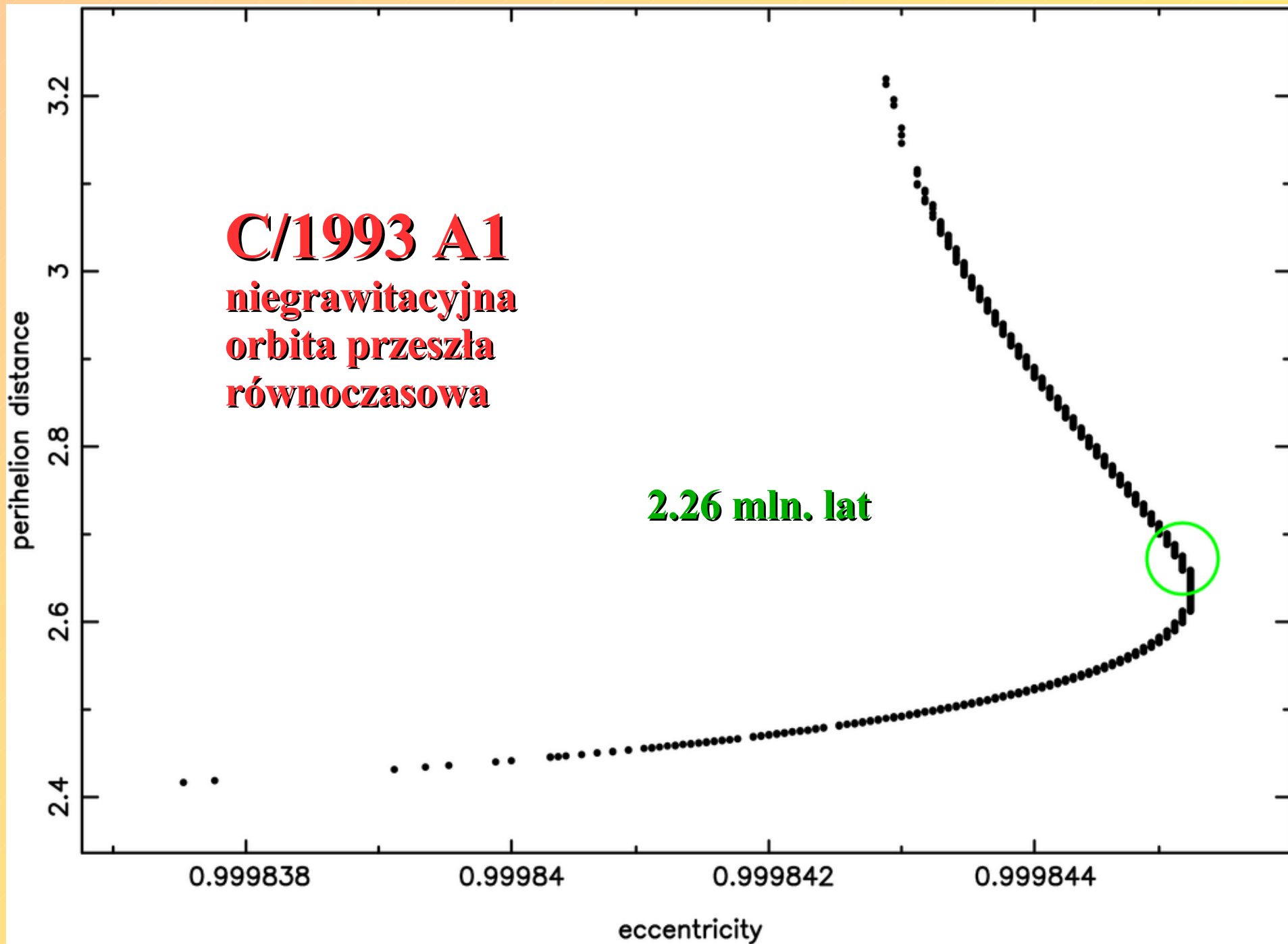
120 000 AU

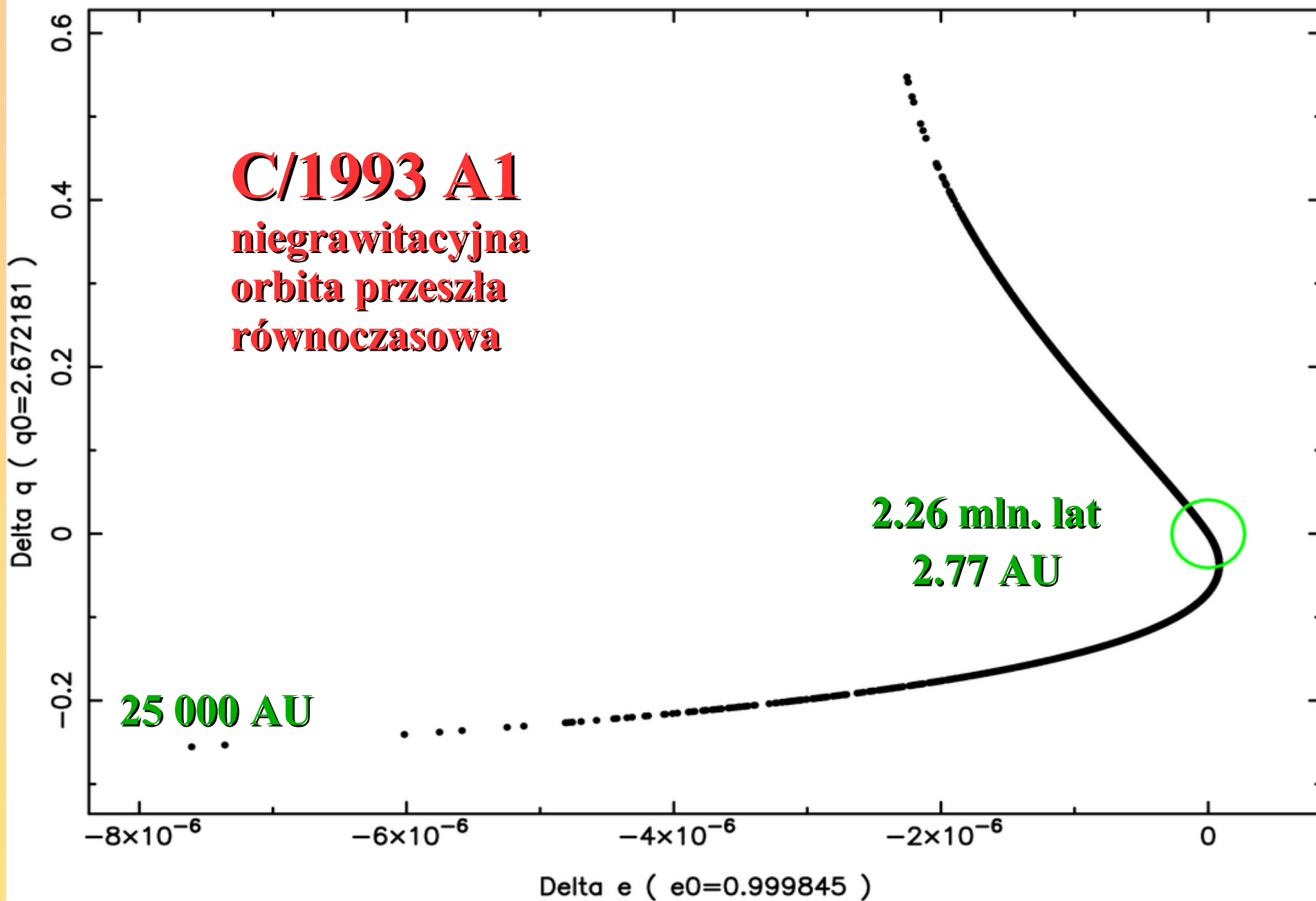
3.05 mln. lat

44 000 AU

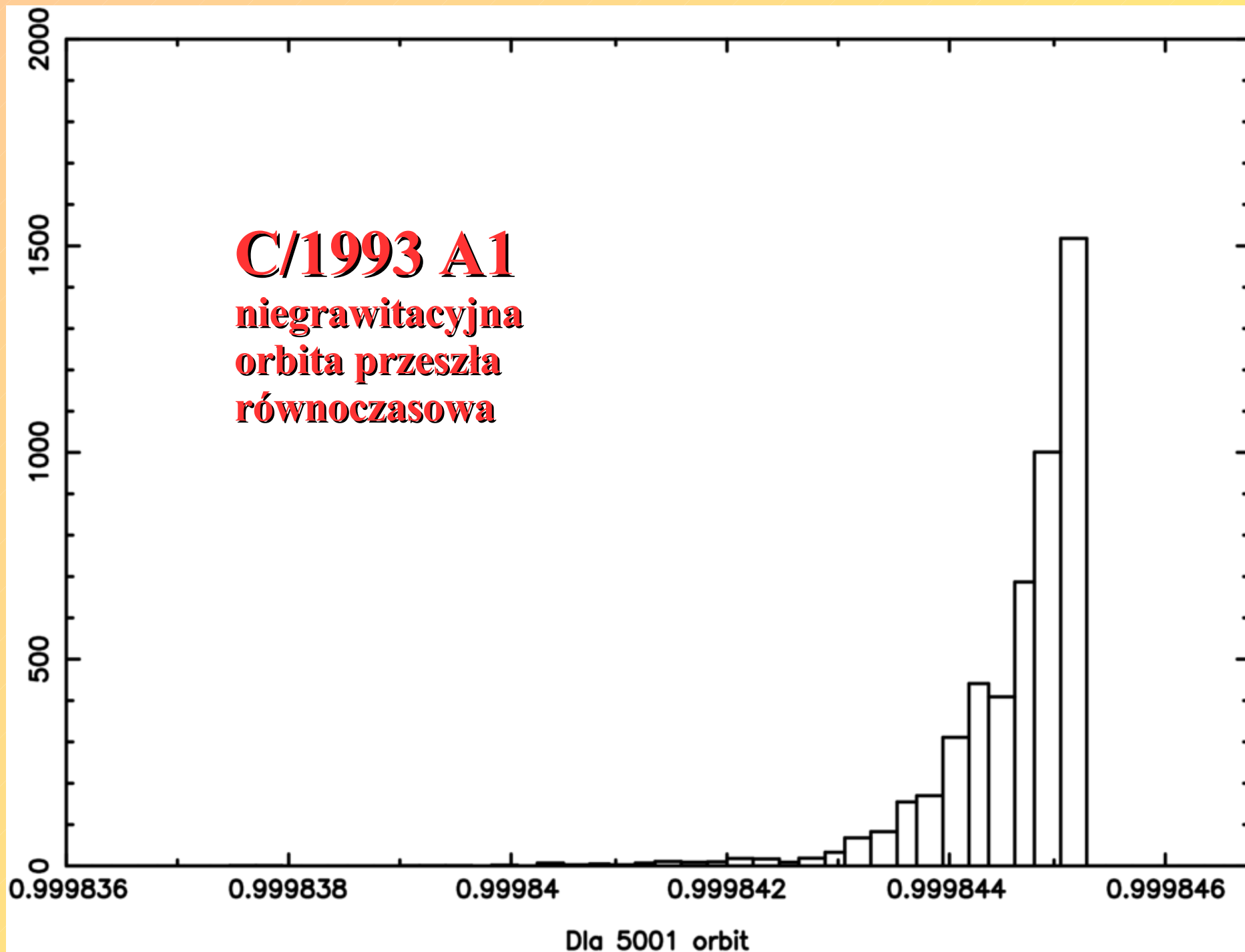


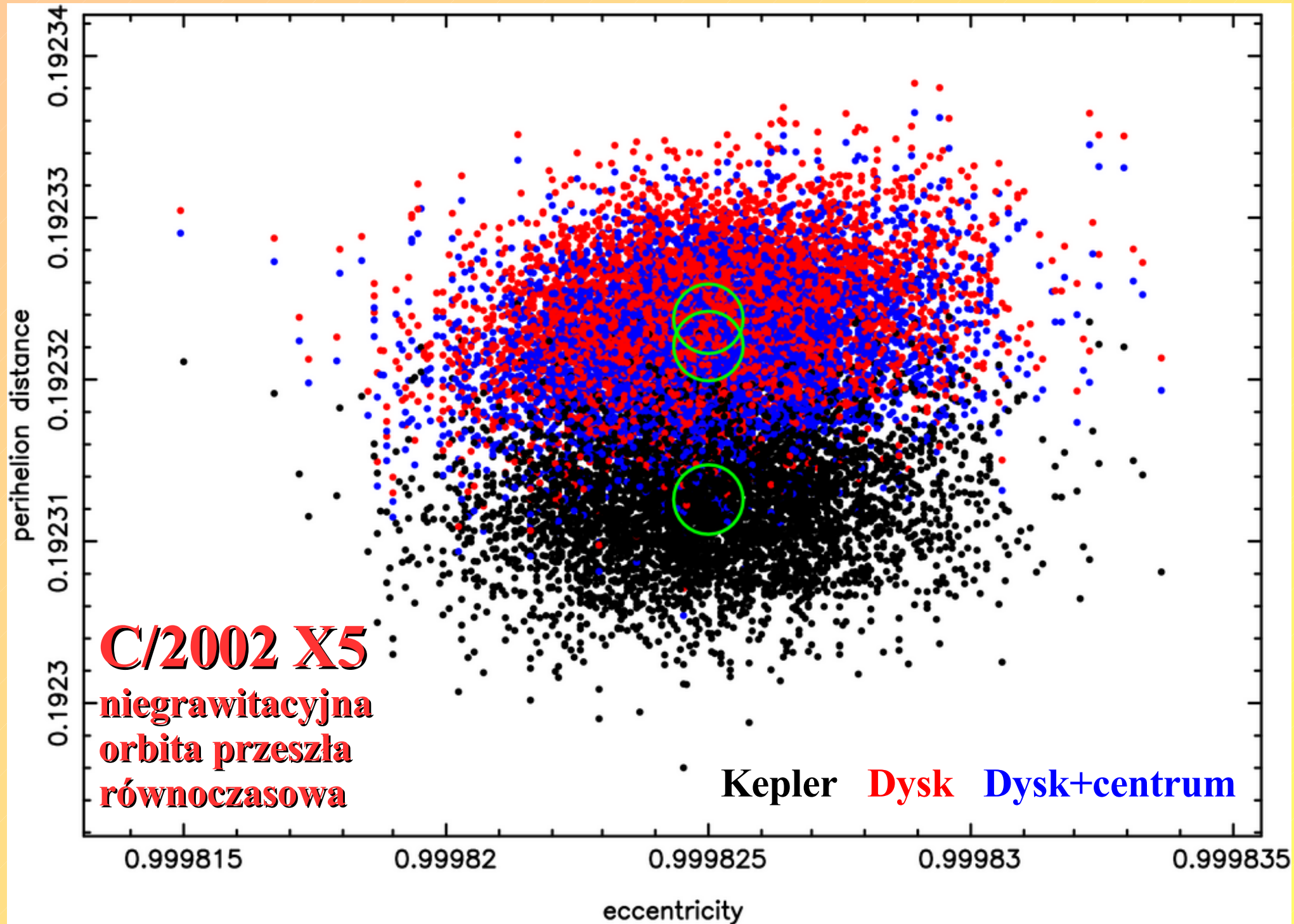






C/1993 A1
niegrawitacyjna
orbita przeszła
równoczesowa





C/2002 X5
niegrawitacyjna
orbita przyszła
równoczesowa

perihelion distance

10

5

0

0.9999

1

1.0001

1.0002

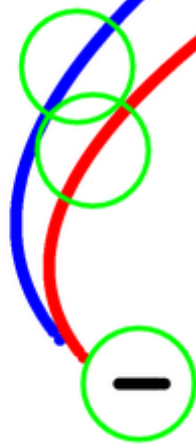
1.0003

1.0004

1.0005

eccentricity

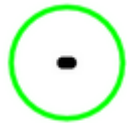
Kepler **Dysk** **Dysk+centrum**



C/2004 B1
niegravitacyjna
orbita przyszła
równoczesowa

perihelion distance

6
5
4
3
2



1.001

1.0015

1.002

1.0025

1.003

eccentricity

Kepler **Dysk** **Dysk+centrum**



Wnioski.....

Będa !

Dziękuję za uwagę.