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SPIN VECTORS OF ASTEROIDS 21 LUTETIA, 196 PHILOMELA, 250 BETTINA, 337 DEVOSA AND 804 HISPANIA

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INTRODUCTION

Such parameters as shape, orientation of spin axis, prograde or retrograde rotation are important for understanding the collisional evolution of asteroids since the primordial epochs of solar system history. These parameters remain unknown for most asteroids and poorly constrained for all but a few. In this work I present results for five asteroids: 21, 196, 250, 337, and 804.

I have used epochs of lightcurve maxima, amplitudes and absolute magnitudes of the maxima. The method of calculation is described in *Michałowski 1988,1991* and *Michałowski and Velichko 1990*. This method allows me to obtain senses of rotation, sidereal periods, poles, and axial ratios of the ellipsoids which describe the shapes of asteroids.

RESULTS

Most of the lightcurves I have used were taken from the *Asteroid Photometric Catalogue* (hereafter *APC*) – *Lagerkvist et al. 1987, 1988*. Results of the calculations are presented in Table 1. When results by other authors exist, they are given in Table 1 for comparison.

21 Lutetia

Six lightcurves from the 1962, 1981, 1983 and 1985 oppositions are used in the analysis. All of them are taken from *APC*. My sidereal period is shorter then the one by *Lupishko and Velichko 1987*. From a comparison between their results and results of independent determinations for a few additional asteroids (cf *Magnusson 1989*) I conclude that their method of determining the sidereal periods does not work very well.

196 Philomela

I can use only three lightcurves from the 1964, 1981 and 1989 oppositions (*APC* and *Erikson et al. 1991*). This maybe the cause of my inability to determine the sidereal period and sense of rotation. There are a few sets of synodic cycles which give different P_{sid} for both prograde and retrograde rotation. I think the next observation will allow me to calculate these values. There are no previous results for this asteroid.

Table 1. Results

Pole λ_p	Pole β_p	Axial ratios $\frac{a}{b}$	Axial ratios $\frac{b}{c}$	Sidereal period(days)	Sense of rot.	Ref.
			21 Lutetia			
55±8	**+44±5**	**1.32±0.04**	**2.01±0.28**	**0.3400261±3**	**P**	**PW**
241±9	**+40±8**	**1.28±0.05**	**1.36±0.30**	**0.3400260±5**	**P**	**PW**
				0.3402774	P	LV
42	+40	1.25	1.09			L
223	+48					L
			196 Philomela			
78±15	**26±12**	**1.57±0.04**	**1.05±0.05**	**see text**		**PW**
266±15	**24±12**	**1.59±0.04**	**1.06±0.05**	**see text**		**PW**
			250 Bettina			
85±9	**-9±7**	**1.33±0.05**	**1.70±0.09**	**0.2106219±5**	**R**	**PW**
260±12	**-35±10**	**1.33±0.07**	**1.61±0.10**	**0.2106218±7**	**R**	**PW**
104	-16	1.318	1.375	0.210622248	R	D
			337 Devosa			
199±7	**-51±8**	**1.24±0.04**	**1.34±0.07**	**0.1938078±5**	**R**	**PW**
			804 Hispania			
90±12	**28±10**	**1.17±0.05**	**1.92±0.15**	**see text**		**PW**

Sense of rotation: P–prograde, R–retrograde
References: PW–present work, LV–Lupishko and Velichko 1987, D–Drummond et al. 1991, L–Lupishko et al. 1989

250 Bettina

There are nine lightcurves from the 1980, 1983, 1984 and 1989 apparitions (*APC* and *Weidenschilling et al. 1990*). My results are in good agreement with those by *Drummond et al. 1991.*

337 Devosa

I have used ten lightcurves from the 1977, 1983, 1984–85, 1986, 1987 and 1988 oppositions (*APC* and *Weidenschilling et al. 1990*), obtaining one solution only. There are no previous results for this asteroid.

804 Hispania

There are six lightcurves from the 1979, 1982 and 1987 oppositions. I have been able to use only three epochs of the primary maxima and probably this is the reason of my inability to obtain the sidereal period and sense of rotation. New observations are required.

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