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The orbits of five minor planets, discovered by H. van Gent (Errata: 6 184)

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Citation

Pels, G. (1931). The orbits of five minor planets, discovered by H. van Gent (Errata: 6 184). *Bulletin Of The Astronomical Institutes Of The Netherlands*, 6, 131. Retrieved from <https://hdl.handle.net/1887/6110>

Version: Not Applicable (or Unknown)

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Note: To cite this publication please use the final published version (if applicable).

BULLETIN OF THE ASTRONOMICAL INSTITUTES OF THE NETHERLANDS.

1931 July 1

Volume VI.

No. 220.

COMMUNICATION FROM THE OBSERVATORY AT LEIDEN.

The orbits of five minor planets, discovered by H. van Gent, by *G. Pels*.

The five minor planets mentioned in this bulletin were found by Mr. VAN GENT on plates taken at Johannesburg with the 10-inch Franklin Adams telescope.

The plates were sent to Leiden and measured in the Repsold measuring machine of this observatory in four positions differing 90°. The planets were referred to three comparison stars, sometimes for control to

two sets of three stars. The comparison stars were taken from the Carte du Ciel catalogues, as faint as could be found and if these were not available, from the A. G. zones.

The numbers and dates of the plates and the comparison stars used are given in the following tables.

Plates	Date Gr. M. Astr. T.	I	II	III	
6219/20	1930 Apr. 22'42102			CM 4812, 4825, 4827	
6226/7	» 23'42525	SF. $13^{\text{h}} 24^{\text{m}} - 9^{\circ} : 2, 10, 18$	CM. 4798, 4801, 4811	» 4796, 4812, 4820	
6270/1	» 26'36002	» $13^{\text{h}} 16^{\text{m}} - 9^{\circ} : 205, 213, 228$	» $4778^{\text{h}} 4798^{\text{m}} 4801^{\circ}$	» 4796, 4800, 4806	
6330/1	» 30'35122	» $13^{\text{h}} 12^{\text{m}} - 8^{\circ} : 126, 146, 150$	SF. $13^{\text{h}} 16^{\text{m}} - 9^{\circ} : 195, 219, 223$	» 4775, 4786, 4788	
6350/1	May 5'35524	» $13^{\text{h}} 8^{\text{m}} - 9^{\circ} : 153, 194, 198$	» $13^{\text{h}} 16^{\text{m}} - 9^{\circ} : 40, 61, 66$	» 4751, 4763, 4765	
6366/7	» 16'25040	» $13^{\text{h}} 4^{\text{m}} - 8^{\circ} : 49, 55, 56$			
6448/9	» 25'32416	» $12^{\text{h}} 56^{\text{m}} - 8^{\circ} : 119, 120, 130$	» $13^{\text{h}} 0^{\text{m}} - 9^{\circ} : 97, 102, 106$	» 4709, 4713, 4723	
Plates	Date Gr. M. Astr. T.	IV	Plates	Date Gr. M. Astr. T.	V
6219/20	1930 Apr. 22'42102	CM. 4870, 4879. W. 4907	6247/8	1930 Apr. 24'47495	CM. 5466, 5482, 5484
6270/1	» 26'36002	SF. $13^{\text{h}} 40^{\text{m}} - 9^{\circ} : 4, 16, 29$	6524/5	May 30'45455	SF. $15^{\text{h}} 16^{\text{m}} - 7^{\circ} : 1, 9, 24$
6330/1	» 30'35122	» $13^{\text{h}} 32^{\text{m}} - 9^{\circ} : 95, 105, 114$	6633	June 26'40595	» $15^{\text{h}} 4^{\text{m}} - 6^{\circ} : 17, 29, 30$
6350/1	May 5'35524	» $13^{\text{h}} 32^{\text{m}} - 9^{\circ} : 40, 54, 57$	6673/6	» 29'34980	» $15^{\text{h}} 4^{\text{m}} - 6^{\circ} : 19, 23, 26$
6366/7	» 16'25040	» $13^{\text{h}} 28^{\text{m}} - 8^{\circ} : 4, 23, 31$			
6448/9	» 25'32416	» $13^{\text{h}} 24^{\text{m}} - 7^{\circ} : 22, 26, 33$			

The abbreviations used are: SF. = San Fernando; CM. = A. G. Cambridge (Mass); W. = A. G. Wien-Ottakring.

When proper motions and other catalogue positions of the stars were available, these were used to obtain improved positions. The reductions were executed according to the method of COMRIE (*J. B. A. A.*, Vol. 39, p. 203).

The magnitudes were estimated by Mr. VAN GENT.

The orbit computations were made by the method GAUSS-ENCKE as modified for the use of calculating machines by VEITHEN-MERTON.

The places used are:

Date	I $\alpha(1930)$ $\delta(1930)$	II $\alpha(1930)$ $\delta(1930)$	III $\alpha(1930)$ $\delta(1930)$
1930 Apr. 23	$200^{\circ} 56' 20.3$ $-9^{\circ} 00' 21.7$	$201^{\circ} 41' 27.2$ $-10^{\circ} 60' 88.9$	$201^{\circ} 9' 68.61$ $-12^{\circ} 63' 04.2$
May 5	$197^{\circ} 8' 59.78$ $8^{\circ} 42' 89.7$	$198^{\circ} 7' 61.67$ $9^{\circ} 84' 06.7$	$199^{\circ} 26' 95.6$ $12^{\circ} 45' 63.9$
» 25	$195^{\circ} 16' 29.7$ $8^{\circ} 07' 07.2$	$196^{\circ} 36' 45.3$ $9^{\circ} 17' 77.2$	$196^{\circ} 61' 13.6$ $12^{\circ} 47' 38.1$

IV		V	
Date	α (1930) δ (1930)	Date	α (1930) δ (1930)
1930 Apr. 22	205° 14' 875 — 10° 63' 000	1930 Apr. 24	234° 9' 1156 — 11° 8' 1592
May 5	202° 93' 558 9° 03' 244	May 30	228° 59' 539 7° 49' 253
» 25	201° 11' 936 7° 29' 217	June 29	225° 73' 981 5° 95' 117

The elements are:

I, II, III and IV Epoch May 6°0 (Gr. M. Astr. Time);
V 1930 May 30°0.

	I	II	III	IV	V	
M_0	302° 25' 336	92° 50' 487	44° 03' 123	342° 50' 136	317° 43' 881	1925°0
ω	264° 86' 143	97° 24' 407	140° 97' 250	30° 7' 1687	92° 66' 477	
δ_0	24° 7' 1448	12° 33' 651	17° 53' 919	210° 30' 128	205° 49' 673	
i	4° 7' 2997	3° 10' 740	9° 78' 851	5° 35' 878	12° 83' 617	
φ	11° 3' 1038	4° 75' 255	6° 13' 268	12° 41' 527	11° 92' 428	
μ	912° 230	1063° 904	855° 202	767° 029	643° 169	
$\log a$	0° 39' 3269	0° 34' 8736	0° 41' 1959	0° 44' 3463	0° 49' 4455	

The planet IV was identified by Dr. G. STRACKE with Nr. 821 (Fanny) which was observed with certainty only in its discovery opposition of 1916. The four others are new and their provisional designations are:

I = 1930 HD, II = 1930 HK, III = 1930 HL and
V = 1930 HM.

The observed places, the residuals and the magnitudes are given in the following tables:

I		II		m
Date	α (1930) $O-C$	δ (1930) $O-C$	m	
1930 Apr. 23	200° 33' 43" — 0"1	— 9° 0' 7"8 — 0"0	13°5	
» 26	199 51 1'7 — 5	8 50 47'5 + 9	13°8	
» 30	198 55 27'1 — 2'1	8 38 50'7 + 2'2	14°0	
May 5	197 51 35'2 — 1	8 25 44'3 0	14°0	
» 16	196 2 38'8 + 3'5	8 7 2'5 — 2'7	13°8	
» 25	195 9 46'7 — 1	8 4 14'6 + 1	14°0	

II		III		m
Date	α (1930) $O-C$	δ (1930) $O-C$	m	
1930 Apr. 23	201° 24' 45"8 + 0"2	— 10° 36' 32"0 — 0"1	14°5	
» 26	200 41 57'7 — 3'5	10 24 17'0 + 1'1	13°8	
» 30	199 47 15'8 — 5	10 8 26'8 — 4	14°0	
May 5	198 45 42'0 0	9 50 26'4 0	14°0	
» 25	196 21 52'3 + 1	9 10 39'8 0	14°0	

IV		V		m
Date	α (1930) $O-C$	δ (1930) $O-C$	m	
1930 Apr. 22	205° 8' 55"5 — 0"1	— 10° 37' 48"0 0"0	13°0	
» 26	204 25 37'7 — 1'3	10 7 33'3 — 1'0	13°0	
» 30	203 43 49'7 — 1'8	9 37 35'1 — 1	13°5	
May 5	202 56 8'1 + 1	9 1 56'8 — 1	13°8	
» 16	201 38 15'9 + 2'6	7 56 6'5 + 7	13°8	
» 25	201 7 9'7 0	7 17 31'8 0	13°3	

The ephemerides for the next opposition are: (for midnight)

I		II		III		IV	
1931	α (1925) δ (1925)	1931	α (1925) δ (1925)	1931	α (1925) δ (1925)	1931	α (1925) δ (1925)
Sept. 24	h m 2 19°0 + 7 24'	Aug. 7	h m 23 2'7 — 9 50'	July 14	h m 22 1'1 — 26 10'	Aug. 23	h m 23 49'9 + 4 37'
Oct. 2	2 13'4 7 13	» 15	22 56'9 10 22	» 22	21 55'8 26 47	» 31	44'7 3 59
» 10	2 6'4 7 4	» 23	22 49'7 11 0	» 30	21 49'2 27 23	Sept. 8	38'7 3 13
» 18	1 58'4 6 58	» 31	22 41'8 11 39	Aug. 7	21 41'6 27 55	» 16	32'3 2 21
» 26	1 50'2 6 55	Sept. 8	22 33'6 12 16	» 15	21 33'5 28 19	» 24	26'1 1 27
Nov. 3	1 42'3 6 55	» 16	22 25'9 12 46	» 23	21 25'5 28 32	Oct. 2	20'3 + 0 34
» 11	1 35'3 7 0	» 24	22 19'2 13 9	» 31	21 18'1 28 35	» 10	15'5 — 0 15
Oppos. Oct. 24, magn. 14'2		Oppos. Sept. 1, magn. 13'9		Oppos. Aug. 14, magn. 14'2		Oppos. Sept. 16, magn. 14'6	

V		V (continued)	
1931	α (1925) δ (1925)	1931	α (1925) δ (1925)
Aug. 23	h m 0 15'3 + 12° 24'	Sept. 24	h m 23 57'2 + 8° 43'
» 31	12'0 11 47	Oct. 2	52'0 7 27
Sept. 8	7'7 10 56	» 10	47'3 6 11
» 16	2'6 9 54	Oppos. Sept. 23, magn. 13'8	