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COMMUNICATIONS FROM THE OBSERVATORY AT LEIDEN.

Preliminary orbit of I 260, β_2 Tucani, by *W. H. van den Bos.*

$0^h\ 26^m\ 58^s$ $-63°\ 31'$ (1900) $4{\cdot}7 - 6{\cdot}7$, *A* 2

As a wide pair β Tuc was first seen by LACAILLE. The two stars, nearly of the same brightness, have been observed separately on the meridian as well as measured with the micrometer.

BOSS assigns the proper motions:

β_2, P.G.C. 101	$\mu_\alpha \cos\delta = +''{\cdot}088+$	$\mu_\delta = -''{\cdot}062$
β_1, P.G.C. 100	$+\ {\cdot}088-$	$-\ {\cdot}054$
$\beta_2 - \beta_1$:	$+\ {\cdot}001-$	$-\ {\cdot}008$

whereas from micrometer measures 1835—1927

$\beta_2 - \beta_1$:	$+\ {\cdot}009$	$+\ {\cdot}002$

This difference shows, that the proper motions are sufficiently uncertain not to exclude the possibility that a third star, P.G.C. 107, β_3 or 54 *G* Tuc, which is 1^m following 4′ South, may belong to the system. Its proper motion is:

$$\mu_\alpha \cos\delta = +''{\cdot}080\,,\ \mu_\delta = -''{\cdot}039 \text{ (Boss).}$$

The magnitudes and spectral types (Draper Cat.) are:

β_1	4·52	*B* 9
β_2	4·48	*A* 2
β_3	5·16	*A* 2

The double star observers have made the stars equal, or, if different, the yellower star β_2 the fainter.

The duplicity of β_2 was discovered independently by INNES (Cape, 7-inch) and BAILEY (Arequipa, 13-inch, erroneously called β_1); BAILEY's discovery was made earlier, but published later than INNES's, so that the star has received the designation I 260.

Recently a very faint companion to β_1 has been found with the 26½-inch at Johannesburg, and β_3 was seen as a very close double below the dividing limit of the telescope; these stars are *B* 7 and *B* 8 respectively. The companion to β_1 was measured on three nights, the distances being guess-work:

1925·786	$-0^h{\cdot}6$	148°·5	[1″·65]	14^m
1925·972	$+\ 1\ {\cdot}3$	148 ·4	[2 ·79]	14
1926·926	$+\ 0\ {\cdot}8$	150 ·2	[1 ·81]	14

It was glimpsed on two other nights, and not seen on several others.

B 8 was measured on six nights in 1925 (range 23°) and on seven nights in 1926 (range 44°):

1925·815	143°·1	0″·14 (est)	6 *n*	5·7 — 6·1
1926·836	163 ·8	0 ·15 („)	7 *n*	5·7 — 6·1

On these same nights I 260 was measured. In the first year it could not be devided, but was materially easier than *B* 8; in 1926 it was separated (range 7° 7°). The fact that β_1 is in the field, even with a high power, helps in judging the appearance of β_2.

The measures of I 260 fall into three groups: those with the Cape 18-inch in 1900 and 1901, those with the Johannesburg 9-inch 1911—1917 with a few doubtful results 1916—1923 by DAWSON with the La Plata 17-inch, and the recent measures with the 26½-inch. They allow the derivation of three fairly reliable normal places and the areal constant, and hence of an orbit by THIELE's method, but the observed arcs on which these normal places fall are so short, that the resulting orbit can only be tested by future observations. That the computation was carried through under these circumstances is due to the wish to publish an orbit for an INNES star before Dr. INNES retires from active astronomical observation.

The orbit given below is based on:

1901·58	293°1	0″78
1912·93	270°2	0″60
1926·77	354°4	0″24

$c = \rho^2 \frac{d\theta}{dt} = -0{\cdot}0176$ [(seconds of arc)^2 × radians per annum].

The first and second distances are smaller than the actual observations. The observed distance 0″·94 in 1901 is a mean of 1″·11 and 0″·78, the first of which is decidedly too large, and the second in good agreement with the 1900 results. The distances of such close and difficult pairs measured with the 9-inch are usually larger than the 18-inch and 26½-inch results. Moreover orbits derived from larger distances for the first and second normal places proved unsatisfactory.

The elements are:

P	41·3	A	−0″·162	a	0″·477
n	8°72	B	+0″·438	i	± 135°8
T	1923·57	F	+0″·321	ω	4°6
e	0·668	G	+0″·099	☊	113°6

precession neglected

dynamical parallax $\sqrt[3]{\frac{1}{2}} . a . P^{-\frac{2}{3}} = 0''{\cdot}032$

A rough dynamical parallax from the measures of β_1 and β_2, taking the total mass 3 ⊙, a circular orbit of radius 27″1 and period 20000 years, gives 0″·025.

The following list gives: date, observer, aperture of instrument, number of nights, observed angle and distance, residuals observed minus computed in angle, reduced to arc, and distance

Date	Obsr	ap.	n	θ	ρ	O—C θ	O—C ρ
1895·9	Bailey	13	1*n*	335° ±	0″·4 ±	(+ 33°)	(+ ″·4) (— ″·3)
1897·9	Innes	7	1	300 ±	0·7 ±	(+ 1)	(+ ·0) (± ·0)
1900·36	Innes	18	2,1	297·9	0·76	+ 3·3	+ ·04 — ·01
1900·71	Lunt	18	1	302·9	0·81	+ 8·9	+ ·12 + ·04
1901·58	Innes	18	3,2	293·1	(0·94)	± 0·0	± ·00 (+ ·16)
1909·8	Innes	9	1	300 ±	0·4 ±	(+ 22)	(+ ·3) (— ·3)
1911·04	Innes	9	4	276·7		+ 1·7	+ ·02
1911·93	Innes	9	2	272·3	0·66	— 0·6	— ·01 + ·03
1912·93	Innes	9	3	270·2	0·74	± 0·0	± ·00 + ·14
1913·88	Innes	9	4	268·7	0·67	+ 1·2	+ ·01 + ·10
1914·91	Innes	9	4	265·5	0·65 [1]	+ 1·5	+ ·01 + ·13
1915·92	Innes	9	4,2	260·9	0.67 [1]	+ 1·2	+ ·01 + ·19
1916·81	Dawson	17	1	268·0	0·37 [2]	(+ 12·6)	(+ ·10) (— ·06)
1916·82	Dawson	17	1		<0·3		—
1916·92	Innes	9	2	255·2	0·47	+ 0·5	+ ·00 + ·04
1917·94	Innes	9	1	257 ?		(+ 9)	+ ·06
1920·83	Dawson	17	1	189 ?	0·2 ?	(— 21)	(— ·08) (± .0)
1920·86	Dawson	17	1	96	<0·25 ?	(— 114)	
1920·86	Dawson	17	1		<0·15 ?		
1922·8	Dawson	17	1		<0·15 ?		
1925·88	van den Bos	26½	6	1·7	0·18	— 13·9	— ·05 — ·01
1926·84	van den Bos	26½	7	354·0	0·24	+ 0·9	+ ·00 ± ·00

[1]) note : the measured distances are too large, is about 0″5.
[2]) note : hardly better than a guess.

The residuals are sufficiently small for such a difficult star, but a fairly reliable orbit cannot be computed until the measures cover the fourth quadrant completely.

Ephemeris.

1927·87	340°7	0″312	1934·87	308°0	0″643
28	331·9	·374	35	305·6	·674
29	325·8	·431	36	303·5	·699
30	320·7	·483	37	301·5	·722
31	316·8	·529	38	299·6	·739
32	313·4	·572	39	297·7	·753
33	310·6	.611	40	296·0	·765