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ON THE PERIOD OF RY SCUTI

The unusual eclipsing system RY Scuti, one of the few radio binaries, was for decades a rather neglected object. It was believed that its period was not constant, but the nature of the period changes--as Wenzel and Gessner recently (1977) pointed out--remained to a large extent unknown. The method of estimating the minimum epoch from isolated "faint observations" is obviously of very little avail, as a plot of the data from the table of these authors illustrates. They addressed the owners of other plate collections to try to fill the gaps.

The University of Oklahoma plate collection contains 198 plates taken by Professor B. S. Whitney with the 85 mm Zeiss astrograph which show the variable. The observing seasons 1948 (with 1949), 1955, 1957 and 1958 are well represented and allow the construction of mean light curves and the derivation of normal minima. The plates were measured with the Coffey iris photometer using a blue photometric sequence, derived earlier by Professor Whitney from 14 comparisons with the NPS.

Normal epochs for these years are given below.

(1) Min. I = JD 2432796.445 O-C = $+0^d.006$
(2) 35366.218 O-C = -0.082
(3) 36078.080 O-C = -0.216
(4) 36433.91 : O-C = -0.39 :

The last epoch is of much less weight, since its value hinges mainly on two plates taken near $\phi = 0.86$. The O-C values are calculated from Gaposchkin's elements (1937):

Min. I = 2427979.34 + $11^d.124939 \cdot E$

The figure shows these O-C values (against Gaposchkin's formula) together with other normal epochs. We omitted all times of minima derived from "faint observations", even if based on scattered photoelectric data. The last point corresponds to a set of photoelectric observations made in Catania and published in a preliminary form (Ciatti et al. 1977); we incorporated the observed phase shift -0.06 P into the figure, by tentatively substituting JD 244297 (Aug. 6, 1976) for the expression "during summer 1976." The agreement with the adjacent Sonneberg normal epoch of the minimum is quite satisfactory.

There still exists a gap of about 15 years between the Oklahoma observations and the more recent ones, but the two groups of minimum epochs can be remarkably well represented by a single linear formula:

Min. I = JD 2432796.477 + $11^{d}.124138 \cdot E$

(after JD 2432000)

The corresponding O-C values are tabulated below.

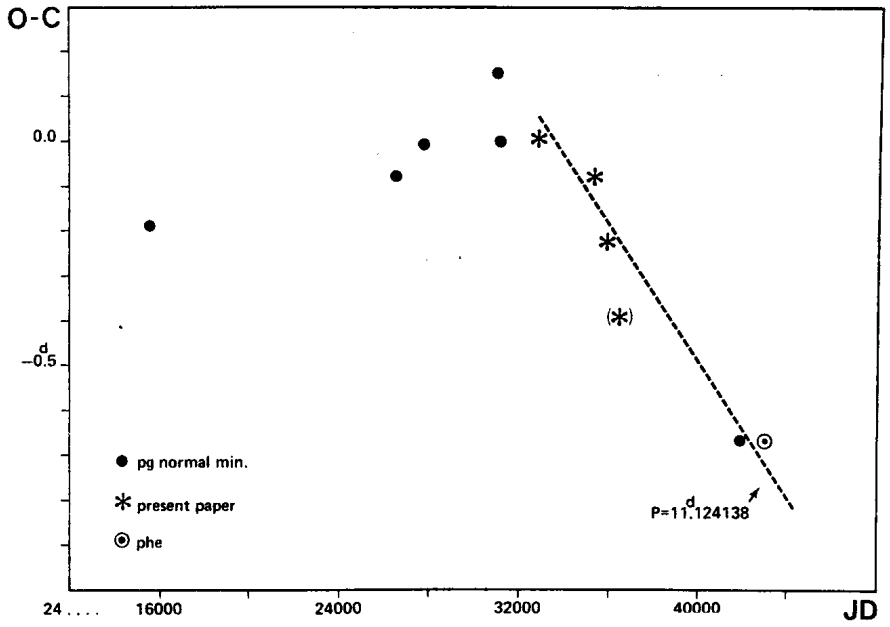
E = 0	O-C = $-0^{d}.032$	Oklahoma min. no. 1
E=231	+0.065	no. 2
E=295	-0.018	no. 3
E=814	O-C = $-0^{d}.045$	Sonneberg, normal min.
E=917	+0.030	Catania, phe

This representation suggests that

1. the period of RY Scuti seems to have shown relatively little change during the past 30 years;

2. there was a marked change (decrease) of the period some time around 1938-1942. The derived amount of the period variation depends crucially on the early observations discussed by Gaposchkin (l.c.). Taken these residuals at face value the net change of the period between 1900 and 1975 turns out to be of the order of $-0^{d}.00104$ or -90 sec. It is, however, nearly impossible to tell whether this change occurred instantaneously or by continuous decrease.

A mean light curve for the years 1948-1960 shows a wide scatter of about 0.25 magn.; this is almost certainly due mainly to changes in the light curve. While the depth of primary minimum did not show conspicuous variations, its shape varied noticeably, especially in 1957 when it was much narrower than usual (see also O'Connell 1949).



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