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FO Vir: A NEWLY-DISCOVERED ECLIPSING BINARY

FO Vir (1950 coords: $13^h27^m.2$, $+1^\circ21'$) is a bright (V~6.6) A-type star that bears the designation of RR? in the GCVS. Jackisch (1972) found it to be variable by about 0.3 mag in V with a period of order 0.5 to 0.7 day, a figure disputed by Poretti (1977), who found a period of 0.2859 day from visual estimates. Eggen (1983), however, from four-colour observations spanning quarter of a day showed the period must exceed 0.5 day.

During April and May of 1983 we obtained four-colour photometry of FO Vir with our 0.6-m reflector at this observatory, as well as thirty-eight 12 A/mm spectrograms with our 1.9-m telescope for radial velocity purposes. Our intention was to find a more accurate period and to clarify the nature of the star, the suggestion of RR Lyrae seeming doubtful at best.

Since we could find no reference to a modern spectral classification of the star, Dr Robert Garrison kindly obtained a number of plates with his classification spectrograph on our 0.6-m telescope in Chile and reports a firm classification of A7 V. We thank him for this.

A power-spectrum analysis of our data yielded a period of 0.7755 day, and this enabled us to phase our observations to those of Eggen obtained up to five years earlier. With these the period is improved to 0.775567 ± 0.000004 day.

Figure 1 shows our preliminary light and velocity curves for FO Vir. The radial velocities are offset by an arbitrary zeropoint due to the manner in which they were reduced; a more complete discussion will correct this. Meanwhile, a first estimate of the systemic velocity is -44 km/sec, but this is uncertain because of the blending effects described below. The open circles represent Eggen's photometric observations, we are most indebted to him for communicating the details of these.

The nature of the star seems clear from Figure 1: it is a partially eclipsing binary with ellipsoidal components. But a rough analysis of the velocity curve yields a mass function of only 2×10^{-3} $M_\odot$, which is much lower than one would expect. For $i \sim 90^\circ$ and a primary star mass of about

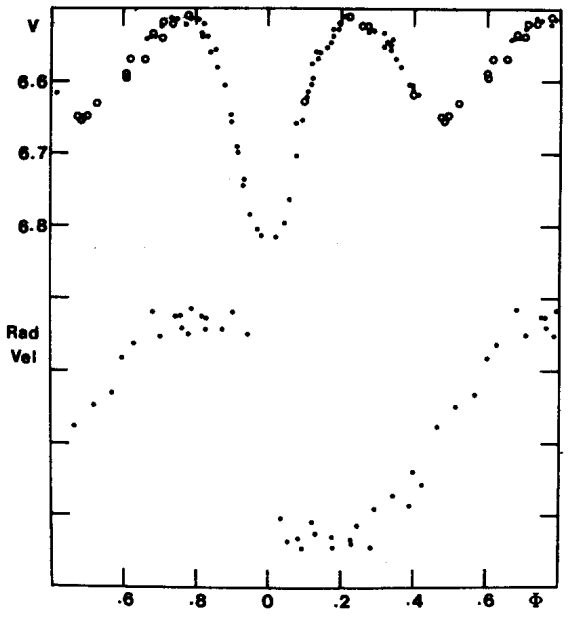

Figure 1

The light- and velocity-curve of FO Vir. Open circles in the light-curves represent earlier observations by Eggen. Tic marks on the velocity-curve axis are 10 km/sec apart.

2.0 $M_\odot$, this mass function implies a secondary star mass of only about 0.2 $M_\odot$, whereas the depth of secondary eclipse and the colour indices suggest the secondary is more likely an F dwarf. Since the mass function scales as the cube of the velocity curve amplitude, we suggest that the conflict arises through blending of the primary star's spectral lines with those of the secondary, which would act to reduce the velocity extrema.

We are making further observations to improve the light and velocity curves, as well as adding RI photometry and Reticon spectroscopy at Hα and beyond in the hope of unravelling the secondary star problem.

Our best current estimate for the ephemeris of primary minimum is

$$\text{HJD} = 2445441.7110 + 0.775567\ E$$
$$\pm 5 \qquad\qquad \pm 4$$

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References:

Eggen, O.J., 1983, Astron. J. 88, 361
Jackisch, G., 1972, Astron. Nach. 249, 1
Poretti, E., 1977, Inf.Bull.Var. Stars, No. 1336