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**EF DRACONIS IS A TRIPLE SYSTEM**

EF Draconis (1E1806.1+6944) was discovered serendipitously as an X-ray source in the Einstein Observatory Extended Medium Sensitivity Survey (Gioia et al. 1987). Fleming et al. (1989) made three radial-velocity measurements of the object and suggested that the object is probably a W UMa-type variable. Shortly after Fleming et al.'s work, Robb & Scarfe (1989) published their VRI light curves of the variable and confirmed that it is a W UMa system. In 1989, Plewa et al. (1991) independently observed the system and analysed their data. They concluded that EF Dra is an A-subtype of W UMa binaries, with a mass ratio of 0.125. Wunder & Agerer (1992) also made B & V photometry of the variable and refined its orbital period.

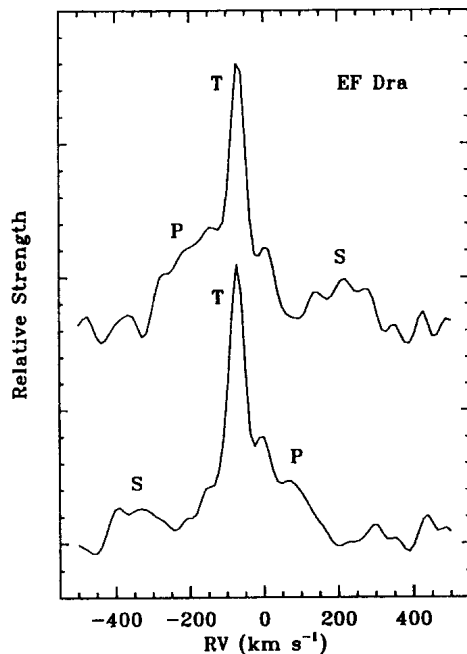


Figure 1. Broadening function profiles of EF Dra.  
The letters P, S, and T indicate the profiles of the primary, secondary,  
and third components of the system, respectively.

I observed the variable spectroscopically in 1991 and 1992 using the Cassegrain spectrograph and CCD detector on the 1.9-m telescope at David Dunlap Observatory. A total of 43 spectra was obtained. The data were reduced for radial velocities by means of the Spectral Broadening Function Method (Rucinski, 1992). It is interesting to discover that this variable is actually a triple system. Two broadening function profiles obtained at the two quadratures are shown in Fig.1, in which P, S, and T indicate the profiles of the primary, secondary, and third components of the system, respectively. The light of the third component clearly revealed as a narrow component in the broadening function profiles and must be included as "third light" in the light curve solution. A spectroscopic orbit has been determined for the close pair, whose mass ratio was found to be small but significantly different from the one derived by Plewa et al. The close pair indeed belongs to the A-subtype of W UMa stars. The velocity of the third component was constant during the two periods of observations. It has a value of  $-38$  km/sec comparative to the systemic velocity of  $-42$  km/sec of the contact binary in the triplet, which suggests that the third component is physically related to the contact binary. A combined analysis of the radial-velocity and existing light curves is in progress and will be published in the near future.

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#### References:

- Fleming, T.A., Gioia, I.M., Maccacaro, T., 1989, *AJ*, **98**, 692  
 Gioia, I.M., Maccacaro, T., Wolter, A. 1987, in IAU Symposium 124, Observational Cosmology, eds. A. Hewitt, G. Burbidge, Li-Zhi Fang (Reidel:Dordrecht), p.593  
 Plewa, T., Haber, G., Wlodarczyk, K.J., Krzesinski, J., 1991, *Acta Astron.*, **41**, 291  
 Robb, R.M., Scarfe, C.D., 1989, *IBVS*, No. 3370  
 Rucinski, S.M., 1992, *AJ*, **104**, 1968  
 Wunder, E., Agerer, F., 1992, *IBVS*, No. 3811

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