

PU VULPECULAE (OBJECT HONDA-KUWANO 1979) - A POSSIBLE
SHORT-PERIOD RELATIVE OF THE SYMBIOTIC STARS

D. Chochol

Astronomical Institute, Slovak Academy of Sciences,
Tatranská Lomnica/Czechoslovakia

J. Grygar

Institute of Physics, Czechoslovak Academy of Sciences,
Rez/Czechoslovakia

1. PHOTOMETRIC HISTORY

PU Vul was discovered by Honda (1979) and Kuwano (1979) due to its conspicuous increase of brightness in the years 1977-79. The analysis of the archive data by Liller and Liller (1979) revealed that the star was about 16.0^m - 16.5^m since the year 1898 until October 1977, with occasional brightening to 15^m in 1926 and 1955. Since November 1977 it started to flare up by 5^m until April 1979 when it reached a maximum of 9.0^m . After the flat maximum lasting to June 1979, the brightness of the object started to diminish (Nakagiri and Yamashita, 1980). It reached 14.0^m in the autumn of 1980, but then it flared up again, and was again of 9.0^m in the summer of 1981 (Belyakina et al., 1981). The latter authors have found that the B-V index diminished in the 1980 minimum.

UBV photometry was conducted in Brno and Skalnaté Pleso observatories during the 1979 maximum (Chochol et al., 1981) and the authors searched for possible periodicity in the V data, compiled from their own observations as well as from data in the I.A.U. Circulars. The best period found is 76.4 days, but periods up to 80 days are also possible. Over this period, the object changes its V magnitude within about $0.^m2$ - $0.^m25$.

2. SPECTROSCOPIC OBSERVATIONS

The spectroscopic evolution of the object was described by Honda et al. (1979), Mochnacki (1979), Bensammar et al. (1980) and Hric et al. (1980). Until September 1978, the star displayed an M-type spectrum. In the April 1979 maximum, the spectrum was classified as A4 from the appearance of the absorption lines, while the infrared continuum was still well represented by a black-body radiation with $T = 3200$ K, equal to spectral class M0 III. Only $H\alpha$ and $H\beta$ lines were seen in the emission, $H\alpha$ exhibiting P Cyg profiles implying a velocity of mass ejection close to 50 km s^{-1} . The absorption spectrum changed to F5 in September 1979 and was again of a mid-M type during

the photometric minimum in the second half of 1980. IUE spectrum obtained in the August 1981 flare-up, corresponded to the spectral type A9 (Cassatella et al., 1981). No emissions were seen in the UV part of the spectrum.

3. A TENTATIVE MODEL

Several authors (Bensammar et al., 1980; Belyakina et al., 1982; Honda et al., 1979) proposed that PU Vul is actually an interacting binary. The M star is a giant or supergiant shedding mass on the low luminosity companion. The light curve originally resembled slow novae, but the spectral evolution is certainly different; the absence of typical emission lines is particularly striking.

It seems probable that both outbursts, in the years 1979 and 1981, were the consequences of enhanced accretion of matter onto the low-luminous component. For this, the Roche lobe overflow of the giant or supergiant component is apparently necessary. The 76-80 days period found by Chochol et al. (1981) could be well explained as an orbital period. If this is the case, the system PU Vul may be regarded as a short-period relative to the "normal" symbiotic stars.

Most probably we may expect a prolonged stage of an enhanced activity of this "down-scaled" symbiotic object. Thus, it is to be expected, that while at this Colloquium the star was a subject of a short note, on the next Bamberg meeting it may be in the focus of attention.

Our thanks are due to the I.A.U. and to Prof. J. Rahe for his support, which enabled us to attend the meeting, and also to Prof. M.J. Plavec for valuable advice.

REFERENCES

- Belyakina, T.S., Chuvaev, K.K., Gershberg, R.E., Petrov, P.P.: 1980, IAU Circ. No. 3494.
- Belyakina, T.S., Gershberg, R.E., Efimov, Y.S., Krasnobabtsev, V.I., Pavlenko, E.P., Petrov, P.P., Chuvaev, K.K., Shenavrin, V.I.: 1982, IAU Colloq. No. 70, p. 221.
- Bensammar, S., Friedjung, M., Assus, P.: 1980, *Astr. Astrophys.* **83**, 261.
- Cassatella, A., Ponz, D., Friedjung, M., Viotti, R.: 1981, private commun.
- Chochol, D., Hric, L., Papousek, J.: 1981, private commun.
- Honda, M., 1979, IAU Circ. No. 3348.
- Honda, M., Ishida, K., Noguchi, T., Norimoto, Y., Nakagiri, M., Soyano, T., Yamashita, Y.: 1979, *Tokyo Astr. Bull.*, IInd. ser., No. 262, 2983.
- Hric, L., Chochol, D., Grygar, J.: 1980, *Inform. Bull. Var. Stars* No. 1835.
- Kuwano, Y., 1979, IAU Circ. No. 3344.
- Liller, M.H., Liller, W.: 1979, *Astron. J.* **84**, 1357.
- Mochnacki, S.: 1979, IAU Circ. No. 3350.
- Nakagiri, M., Yamashita, Y.: 1980, *Tokyo Astron. Bull.*, IInd ser., No. 263, 2993.