

## THE KUWANO PECULIAR OBJECT (PU VULPECULAE)

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U, B, V, J, H, K photometry, polarimetry and spectroscopy of this peculiar object was made from August 1979 to December 1980. During 1979 it was at a phase of stable maximum brightness with variations of less than 0<sup>m</sup>.2 in magnitude and less than 0<sup>m</sup>.1 in colour. A change occurred at the beginning of 1980; the object was 0<sup>m</sup>.5 fainter in mid March and then faded rapidly. During the rapid fading the object became redder in U-B and B-V, and there was an intrinsic polarization of about 1%. At minimum in September 1980, B-V became even bluer than at maximum, while the 1.2-2  $\mu$  flux was twice lower in October 1980 than in April 1979. At maximum the spectrum was of type F; the BaII lines indicating a luminosity higher than that of a normal supergiant. In autumn 1979 H $\alpha$  had a narrow absorption core superposed on a broad shallow base, not present for H $\beta$ . During the rapid fading, the spectrum became of M type with clear emission in H $\alpha$ . The spectral type was M5 or M6 in summer 1980, and M4 in autumn 1980. From our spectra we cannot exclude the dwarf and supergiant luminosity classes. The equivalent width of H $\alpha$  decreased by a factor of two from summer to autumn 1980, while H $\beta$  emission became absorption. [NII] and [OIII] lines appeared, and NaI emission increased by a factor of 3. Radial velocities had not changed by more than 20-30 km s<sup>-1</sup> from 1979.

We consider PU Vul to be binary with a late M giant and a component of probably low luminosity. The latter flared in 1979, and the former also changed a little. From the photometric, spectroscopic and polarimetric data we estimate E(B-V)  $\leq$  0.4 and locate the star at 5-7 kpc from the sun and 0.7-1.0 kpc from the galactic plane. The photometric behaviour, duplicity, and nature of the components are similar to those of novae and symbiotic stars, but no evidence for an ejected envelope is seen.

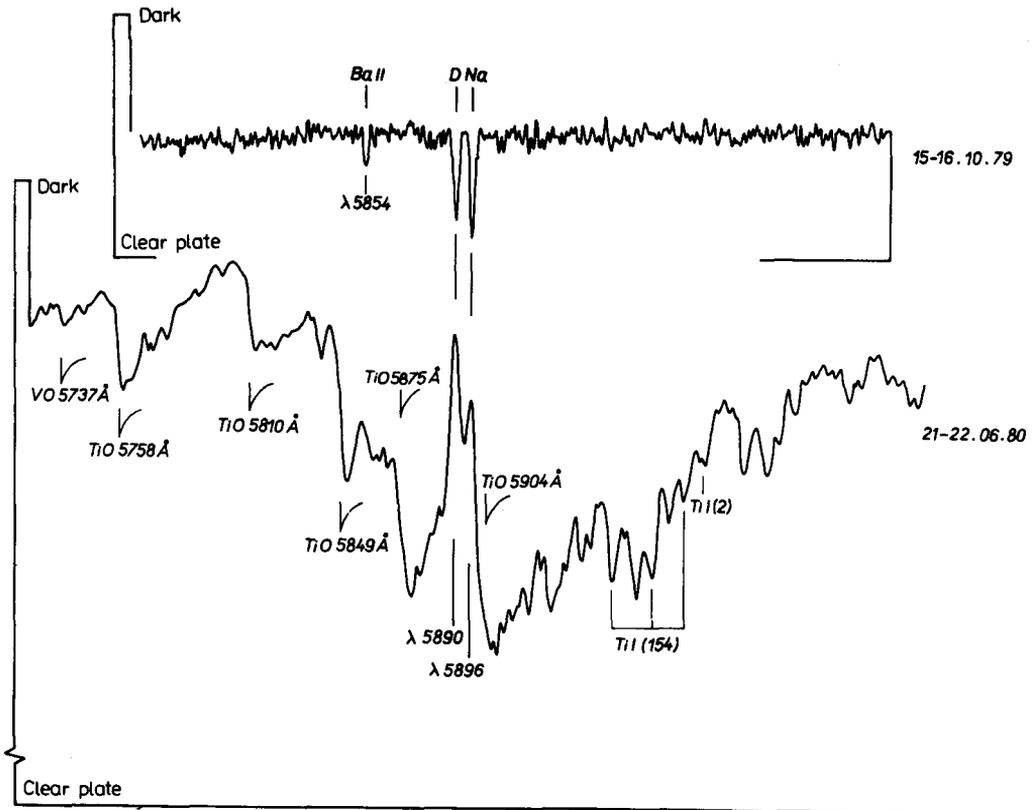


Figure 1. The spectrum of PU Vul at maximum and minimum luminosity. Note the strong emissions of NaI doublet during minimum.

#### DISCUSSION ON PU VULPECULAE

Friedjung: Infrared observations made at maximum by Bensammar et al. (1980 *Astr. Ap.* **83**, 261) showed the presence of a cool component even then. Actually, this is a very funny object. People who observed it keep thinking they have seen the wrong star, because its spectrum is so normal compared with those of novae and symbiotic stars.

Viotti: IUE observations of the LW spectrum of PU Vul made by Cassatella and Ponz at VILSPA on August 3 this year (when the star was again at maximum) show a normal A9 spectrum, while they failed to detect it in August 1980, during minimum phase.