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OUTBURST OBSERVATION OF PU Per

PU Per is a faint dwarf nova discovered by Hoffmeister (1967). Romano and Minello (1976) examined Asiago plates and found two outbursts: the first short one (JD 2440644) reached a magnitude of 17.4, and the second long one (JD 2441295 – 2441303) reached a magnitude of 15.2. These data seem to suggest existence of different types of outbursts in PU Per. Busch and Häussler (1979) reported two long outbursts (JD 2439052 – 2439056, 2439380 – 2439390) from Sonneberg plate collection. Further positive outburst observation was reported by Bruch et al. (1987). The object is at or below the plate limit of POSS, suggesting a large outburst amplitude.

The variable was again caught in outburst by Iida (VSNET message) on 1995 Oct. 13.549 UT at unfiltered CCD magnitude of 17.6. The outburst was subsequently confirmed at Ouda Station, Kyoto University. The observations were carried out using a CCD camera (Thomson TH 7882, 576 × 384 pixels) attached to the Cassegrain focus of the 60 cm reflector (focal length=4.8 m) at Ouda Station, Kyoto University (Ohtani et al., 1992). To reduce the readout noise and dead time, an on-chip summation of 2×2 pixels to one pixel was adopted. An interference filter was used which had been designed to reproduce the Johnson V band. The exposure time was 120 s on Oct. 13 and 240 s on Oct. 14. The frames were first corrected for standard de-biasing and flat fielding, and were then processed by a personal-computer-based PSF photometry package developed by one of the authors (T.K.). The differential magnitudes of the variable were determined against a local standard star marked as C1 in Figure 1. The constancy of the comparison was checked against several stars in the same field. By comparison with GSC stars, we adopted a magnitude of C1 as 13.4.

An accurate position was determined by Iida (private communication) from a CCD image taken at Ouda. He gave a position of $02^{\rm h}42^{\rm m}16\overset{\rm s}{.}14$ $+35^\circ40'46\overset{''}{.}4$ (J2000.0) based on 10 GSC stars with a mean residual of $0\overset{''}{.}1$. This position is 17″ north to that given by Downes and Shara (1993), but is in good agreement with that given by Bruch et al. (1987) measured from an outburst photograph.

Figure 2 shows the overall light curve of PU Per by our CCD photometry. The magnitudes are given relative to C1. The star showed a very rapid decline with a rate of 1.9 ± 0.1 mag d^{-1}. This behavior closely resembles the first outburst recorded by Romano and Minello (1976). Figure 3 shows an enlarged light curve of Oct. 13. Low-amplitude hump-like features seem to exist in the light curve. Owing to the relatively large scatter in the light curve especially in the later half, we have chosen to estimate the period from the times of hump maxima. The resultant period was 0.058 ± 0.002 day. Although the identification of this period as a possible orbital one is very tentative due to large observational scatter, this dwarf nova would be a good candidate of ultrashort orbital period SU UMa-type dwarf novae related to WZ Sge-type stars (Bailey, 1979; Downes, 1990). The rate of decline also seems to support this idea. The second outburst observed in

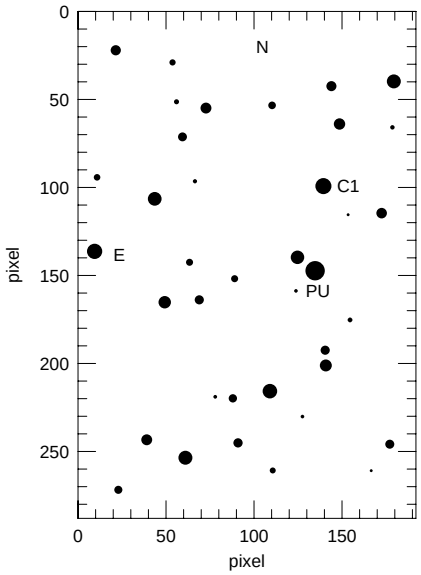

Figure 1. Finding chart of PU Per drawn from a CCD image. North is up, and the field of view is about 10×7 arcmin. The primary comparison star (C1) and PU Per are marked.

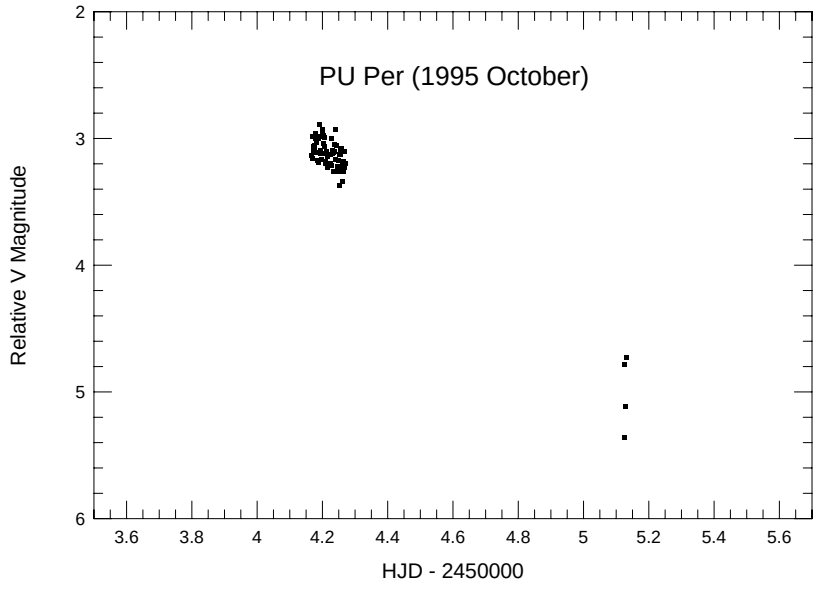

Figure 2. V-band light curve of PU Per during 1995 Oct. outburst. Note the very rapid decline with a rate of 1.9 ± 0.1 mag d^{-1}.

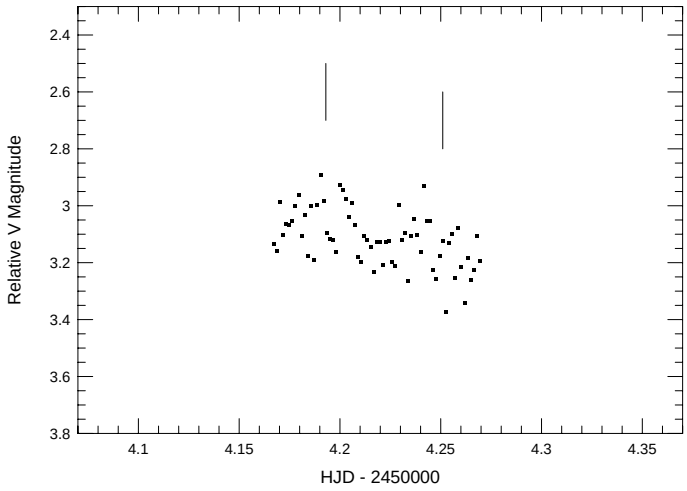

Figure 3. Enlarged light curve on Oct. 13. Low-amplitude hump-like features are visible. From times of maxima (marked by ticks), a period of 0.058 $\pm$ 0.002 day is suggested.

Romano and Minello (1976) and two outbursts reported by Busch and Häussler (1979) could then be identified as superoutbursts. From the shortest interval of these suspected superoutbursts, the supercycle length might be estimated to be $\sim$ 330 d. Further close monitoring to detect superoutbursts and superhumps is recommended.

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