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PLEIONE: A NEW Be PHASE

Phase transition is the most striking feature of the variability in Be stars. A few Be stars exhibited the phase transition of B→Be, B→Shell, and Be→Shell, and/or vice versa. Pleione is one of these stars. Since it was first discovered to be a Be star (Pickering, 1889), the star has undergone one B-star phase, two Be phases and two shell phases (Kogure, 1990). The shell strength of the last shell phase, which began in 1972-73, reached the maximum around 1981 (Goraya et al., 1987). Since 1986, a number of authors had pointed out that the shell phase was ending based on their own observations (Chauville and Ballereau, 1986, Goraya et al., 1987 and Guo Yulian, 1988).

Figure 1 illustrates a series of the H α profiles, which were taken with the All-Fiber Coupler grating spectrograph of 2.16 m telescope at the Beijing Observatory in 1991 Dec.-1993 Jan. The detector used, the observational and data reduction techniques have already been described in detail elsewhere (Guo Yulian and Guo Xiaozhen, 1992). Table 1 lists the equivalent width (W_α) and the maximum intensity (I_{max}) of H α emission lines, relative to the adjacent continuum. On the new and previous results obtained with the same reciprocal linear dispersion, 50Å/mm (Guo Yulian, 1988), it may be seen that the H α emission line of Pleione exhibits conspicuous variations:

1. The appearance of the H α profile has experienced prominent changes. The 1983-1987 profiles displayed distinct double emission peaks with visible central reversal but they appeared as single emission peaks after 1991 Dec. (see Figure 1 and Guo Yulian, 1988).
2. Since 1983, H α emission has gradually strengthened. The intensity of H α emission was 2.4 in 1983 Dec., 3.0 in 1987 Dec., 3.8 in 1991 Dec., and 5.2 in 1993 Jan. (see Table 1 and Guo Yulian, 1988).

Table 1

| Date (U.T.) | No. of profiles | I_{max} | W_α (Å) |
|--------------|-----------------|-----------|----------------|
| 1991 Dec. 16 | 1 | 3.8 | 26.3 |
| 1991 Dec. 27 | 3 | 3.8 | 26.2 |
| 1992 Nov. 14 | 1 | 4.7 | 30.5 |
| 1993 Jan. 09 | 2 | 5.2 | 33.7 |

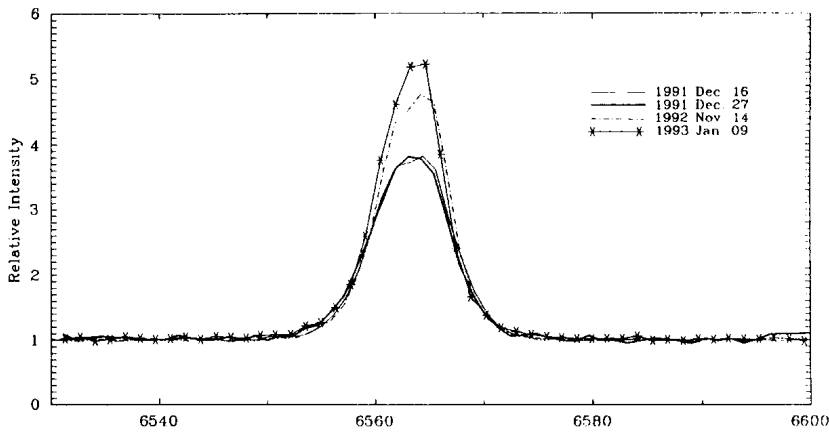


Figure 1. H_{α} profiles in Pleione.

Based on the earlier observations, it was known that, in the course of the transition from the shell phase, which began in 1938, to the Be phase, which began in 1955, the Balmer emission lines of Pleione (for example, H_{β}) gradually enhanced and the central reversal of the emission lines progressively became shallower (Gulliver, 1977 and Morgan et al., 1973). Recently observed variations of H_{α} show the same behavior as mentioned above for H_{β} . In addition, the equivalent width of the H_{α} emission line reached 25-35Å during 1960-64 emission maximum of the last Be phase (Hirata et al., 1976). The 1993 Jan. equivalent width of the H_{α} emission line already raised to about 33Å. From the above comparison it is inferred that Pleione has again entered into a Be phase since the end of 1991 or somewhat earlier, and its emission will continuously increase and is expected to reach the maximum before long. Consequently, continuous monitoring of its change at different wavelengths using various methods will be very interesting.

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References:

- Chauville, J., and Ballereau, D., 1986, *IAU Circ.*, No. 4282
 Goraya, P. S., Tur, N. S., and Rautela, B. S., 1987, *IBVS*, No. 3052
 Gulliver, A. F., 1977, *Ap. J. Suppl.*, **35**, 441
 Guo Yulian, 1988, *Be Star Newsletter*, No. 19, 24
 Guo Yulian, and Guo Xiaozhen, 1992, *IBVS*, No. 3786
 Hirata, R., and Kogure, T., 1976, *Publ. Astron. Soc. Japan*, **28**, 509
 Kogure, T., 1990, *Astrophys. Sp. Sci.*, **163**, 7
 Morgan, W. W., White, R. A., and Tapscott, J. W., 1973, *A. J.*, **78**, 302
 Pickering, E. C., 1889, *Astron. Nach.*, **123**, 95