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o AND: ANOTHER MAJOR SHELL PHASE JUST COMING?

The bright B6IIIe shell star o And ( 1 And, HR 8762, HD 217675, SAO 52609) has been observed spectroscopically and photometrically for nearly a century. The Be shell star is the brightest component A of a multiple system of at least four stars (see, e.g., Hill et al. 1988, Harmanec et al. 1987 and Harmanec 1983, plus references therein). Component B at a distance of about 0.3" apparently revolves in a common orbit with A - the estimated orbital period is well over 100 years. Component B itself is a double-lined spectroscopic binary with a period of 33.08 days composed of two B6-B8 stars. There is a faint fourth component a at a distance of some 0.05" for which no direct spectroscopic evidence has been found so far. If this component is also gravitationally bound to A, the expected orbital period is about 10 years.

Many investigators since the end of the 19th century have helped to accumulate evidence of the gradual variations in the spectrum of o And A from B-absorption to Be, Be shell, and vice versa. Horn et al. (1982) demonstrated that the object becomes fainter during the development of a new shell, similar to BU Tau, 88 Her or V1294 Aql. Harmanec (1984) - compiling and analyzing all historical photoelectric photometry and most of the available spectroscopic records - concluded that both - the light minima and re-appearances of the hydrogen shell lines - are cyclic or even periodic, with a cycle length of about 8.5 years. He also pointed

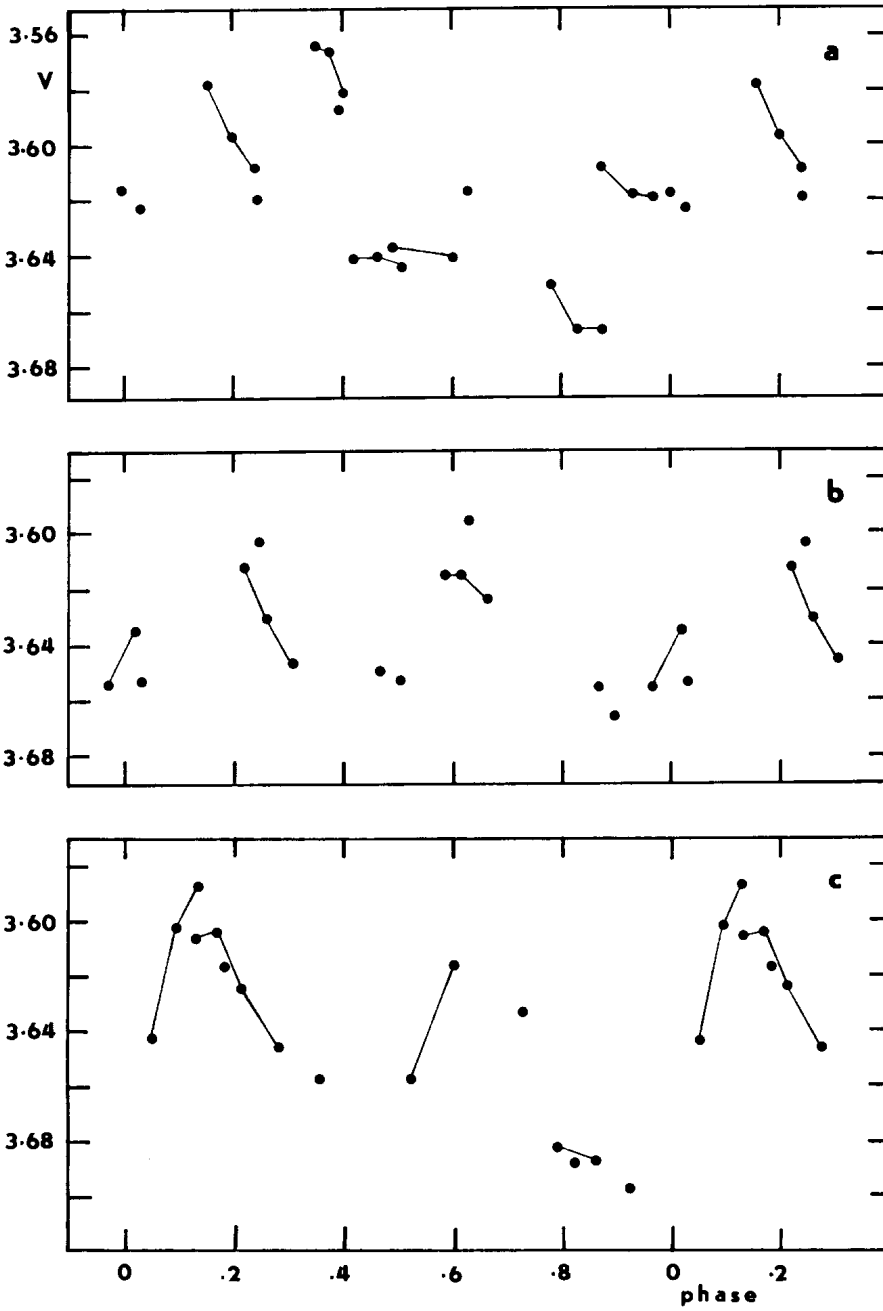


Fig. 1

out the possible connection of this cycle with the expected orbital period of subsystem Aa. Harmanec further concluded that the short-term light variations of  $\alpha$  And are periodic, with a period of 1.571 days, but that the light curve varies in amplitude and shape along with the 8.5-year cycle. In particular, he noted that a well-defined double-wave light curve with a full amplitude of  $0.1^m$  in V and B, reminiscent of a close eclipsing binary, is usually observed during the presence of the hydrogen shell lines.

Gulliver et al. (1980) and Koubský (1984) have shown that the overall behaviour of the shell may be more complicated than simply periodic. Koubský stressed that the 8.5-year period is in a better agreement with those shell events when also metallic shell lines were observed. These were recorded in 1891, 1949-53, 1974-76 and 1981-83. Should the suspected 8-9 year cycle be preserved, the first indications of a new major shell phase must soon re-appear.

Since the occurrence of the last major shell in 1981,  $\alpha$  And has been monitored systematically by a large group of photometric observers associated with the International Be Observing Campaign (Harmanec, Horn and Koubský 1981). The results will be published elsewhere. Here, we wish to report first preliminary results of the UBV observations of the star secured by us with the 0.65-m reflector of the Hvar Observatory, Yugoslavia in July, August and October 1988. They seem to indicate that a new major shell phase may indeed be just coming.

Fig. 1 is a plot of our preliminary V observations versus phase of the 1.577-day period (the best-fit seasonal value of the period) shown separately for the data secured before HJD 2447372 (Fig. 1a), between HJD 2447373 and ... 387 (Fig. 1b) and in October (HJD 2447443-58) - Fig. 1c. It is seen that the variations displayed in Fig. 1a are somewhat erratic, while Figs. 1b and 1c show a double-wave light curve of a growing amplitude. (The comparison star was HR 8733, the V magnitude of the check, 10 Lac was  $4.88^m$ , with a  $0.02^m$  scatter.) A full amplitude of the rapid light variations in V as large as  $0.10^m$  (as seen in Fig. 1c) has only been observed during the major hydrogen and metallic shell phases, for the last time in 1981-83. Our observations may therefore indicate a rapid development of a new major shell.

We thus alert all northern-hemisphere observers to obtain as many as possible new photometric, polarimetric, spectroscopic and magnetic observations of  $\alpha$  And before the star disappears from the winter sky.

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#### References:

- Gulliver A.F., Bolton C.T., Poeckert R. 1980 Publ. Astron. Soc. Pacific 92, 774
- Harmanec P. 1983 Hvar Obs. Bull. 7, 55
- Harmanec P. 1984 Inf. Bull. Var. Stars 2506
- Harmanec P., Horn J., Koubský P. 1981 IAU Com. 29 Be Newsletter 2, 3
- Harmanec P., Hill G.M., Walker G.A.H., Dinshaw N., Yang S. 1987 Publ. Astron. Inst. Czechosl. No. 70, 115
- Hill, G.M., Walker, G.A.H., Dinshaw, N., Yang, A., and Harmanec, P. 1988, Publ. Astron. Soc. Pacific. 100, 243.
- Horn J., Koubský P., Arsenijević J., Grygar J., Harmanec P., Krpata J., Kříž S., Pavlovski K. 1982 IAU Symp 98, 315
- Koubský P. 1984 Inf. Bull. Var. Stars 2584