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RAPID SHELL LINE VARIATIONS IN THE Be STAR ω Ori

The Be star ω Ori (HD 37490, according to Slettebak, 1982: B2 IIIe, v sin i = 160 km/sec), has a long history of irregular variability in Balmer line emissions (Dachs et al., 1977, 1981; Slettebak and Reynolds, 1978; Hubert-Delplace and Hubert, 1979; Andrillat and Fehrenbach, 1982). In the framework of our interest in short-period variability of Be stars, we performed 36 spectroscopic Reticon observations of this object during two nights (Dec. 11 and Dec. 12, 1986), using a B and C mod. 31523 grating spectrograph combined with the 182 cm telescope of the Osservatorio Astronomico di Asiago. We chose a spectral range including Hα and the HeI 6678 A line, and an inverse dispersion of about 18 A/mm.

In Hα the shell components covered the photospheric one, while only two faint emission features affected the HeI line wings. Anyway, both in Hα and in HeI line, the shell profiles showed unequivocal variations during our observational period. Figure 1 and Figure 2 represent the evolution of Hα and HeI line profiles respectively during our second observation night (for reasons of graphic clearness, we include in these pictures only 10 spectrograms out of 23). The behaviour of some line parameters is also shown in Table I (the wavelength difference between emission component and shell absorption, with the respective equivalent widths, for Hα : the absorption equivalent width and the V/R ratio of the emission features for the HeI line). Typical error bars are about 0.015 A for $\lambda_e - \lambda_a$, 0.05 A for $E.W._e$ (Hα), 0.025 A for $E.W._a$ (Hα), 0.015 A for $E.W._a$ (HeI) and 0.08 for V/R: all the detected variations have to be considered real. Moreover, all the patterns shown in Table I are consistent with the probable 1^d photometric period proposed by Balona et al. (1987).

The detection of possible rapid shell variations in Be stars is not a novelty: we can consider, for instance, the case of ζ Tau (Bossi et al., 1987). Nevertheless, our good signal-to-noise ratio allows us, perhaps for

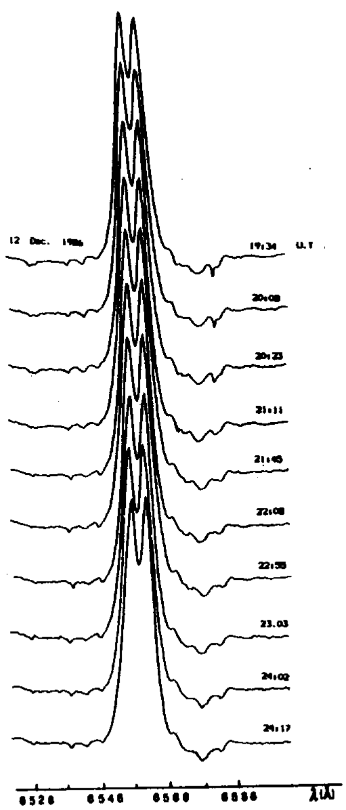

Figure 1

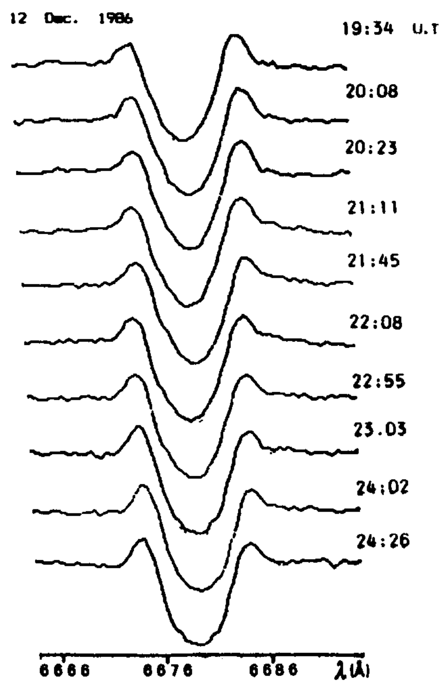

Figure 2

the first time, to be sure about the reality of this phenomenon. The time scales of this kind of variability are consistent with the hypothesis of high order pulsations only. On the other hand, if we consider again ζ Tau, only high order shell pulsations can explain the $H\alpha$ profiles shown by Hanuschik et al. (1988).

Table I

JD 2440000+	H_α λ_e-λ_a (Å)	EW_e (Å)	EW_a (Å)	He I 6678 EW_a (Å)	V/R
6776.4227	0.009	9.963	1.621	0.724	1.07
6776.4331	0.000	9.983	1.631	0.675	0.86
6776.4387	0.004	9.925	1.632	0.670	0.91
6776.4491	0.004	9.992	1.622	0.674	1.01
6776.4553	-0.003	9.994	1.603	0.690	0.83
6776.4651	-0.004	9.973	1.572	0.643	0.86
6776.4713	-0.003	9.951	1.579	0.661	0.83
6776.4984	0.002	10.021	1.591	0.647	0.97
6776.5081	0.001	10.065	1.621	0.645	0.92
6776.5144	0.002	10.047	1.600	0.645	0.79
6776.5248	0.005	10.029	1.642	0.719	0.78
6776.5303	0.005	10.013	1.631	0.672	1.24
6776.5408	0.000	10.048	1.665	0.626	1.15
6777.3102	-0.029	9.906	1.748	0.539	0.61
6777.3206	-0.032	9.929	1.739	0.515	0.75
6777.3276	-0.030	9.954	1.719	0.514	0.70
6777.3380	-0.028	9.918	1.743	0.537	0.73
6777.3442	-0.029	9.946	1.769	0.530	0.61
6777.3546	-0.022	9.965	1.764	0.517	0.82
6777.3616	-0.017	9.979	1.762	0.517	0.67
6777.3720	-0.018	9.964	1.765	0.508	0.62
6777.3776	-0.017	9.973	1.774	0.515	0.68
6777.3880	-0.014	9.988	1.763	0.526	0.72
6777.4116	-0.006	9.967	1.757	0.580	0.79
6777.4220	-0.005	9.997	1.771	0.585	0.81
6777.4276	-0.006	10.020	1.784	0.600	0.85
6777.4380	-0.003	10.021	1.766	0.599	0.88
6777.4498	-0.002	10.046	1.772	0.644	0.88
6777.4602	0.001	10.086	1.822	0.638	1.08
6777.4658	-0.003	10.088	1.814	0.664	1.00
6777.4762	0.005	10.100	1.811	0.646	0.91
6777.4824	0.010	10.135	1.825	0.700	1.04
6777.4935	0.019	10.136	1.809	0.700	1.01
6777.5067	0.021	10.174	1.847	0.688	1.08
6777.5171	0.024	10.158	1.839	0.704	1.10
6777.5234	0.027	10.178	1.859	0.755	1.12

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References:

Andrillat, Y., Fehrenbach, C.: 1982, Astron. Astrophys. Suppl. 48, 93.
Balona, L.A., Marang, F., Monderen, P., Reitermann, A., Zickgraf, F.-J.: 1987, Astron. Astrophys. Suppl. 71, 11.
Bossi, M., Guerrero, G., Scardia, M.: 1987, "Physics of Be Stars", Proceedings of the 92nd IAU Colloquium, A. Slettebak and T.P. Snow ed., Cambridge University Press.
Dachs, J. Maitzen, H.-M. Moffat, A.F.J., Sherwood, W.A., Stift, M.: 1977, Astron. Astrophys. 56, 417.
Dachs, J., Eichendorf, W., Schleicher, H., Schmidt-Kaler, T., Stift, M., Tug, H.: 1981, Astron. Astrophys. Suppl. 43, 427.
Hanuschik, R.W., Kozok, J.R., Kaiser, D.: 1988, Astron. Astrophys. 189, 147.
Hubert-Delplace, A.M., Hubert, H.: 1979, "An. Atlas of Be Stars", Paris, Observatoire de Meudon.
Slettebak, A., Reynolds, R.C.: 1978, Astrophys. J. Suppl. 38, 205.
Slettebak, A.: 1982, Astrophys. J. Suppl. 55, 50.