

Total overview of the delta Sco pro-am monitoring from July 2000 to May 2015

The following overview and diagrams 1 to 11 show the dynamics of the H α and HeI 6678 EW variations, correlations between them, combined with period analyses, and finally the analysis of the HeI 6678 V/R behavior in Fig. 12-14. Such an overview seems to be helpful in order to get an impression of what the entire process of activities looks like, beginning with the Helium activities close to the surface of the star and continuing with the flow of material into the disk.

Fig. 1-3:

EW monitoring of H α & HeI 6678 and its correlation. In Fig. 1 one can recognize a cyclic EW variation with a period of approx. 9 years. The character of the EW long-term trend of the HeI 6678 seems to be different from H α .

Following the generally accepted assumption that the disc of this binary system is being fed essentially in a kind of outbursts of the helium zone near the photosphere of the primary component, a comparison of the contemporaneous equivalent widths of H α and HeI6678 Å permits the study of the correlation between them (Fig. 3). Such a correlation should give an impression about the quantities, how the matter of the disk depends of them.

Fig. 4-7:

H α period analysis with a dominant period of 509 days.

Fig. 8-11:

EW HeI 6678 period analysis with a dominant period of 476 days. The period is shorter because this line seems to form closer to the star than the H α . Otherwise, it may be the same period within the uncertainties of the Fourier analysis (because the peaks in the power spectrum are wide).

Fig. 12-14:

V/R HeI 6678 period analysis with a dominant period of 553 days. One concern is that the peaks in the power spectra are very wide (many frequencies/periods are covered by the peaks) which means that the periodicity is not very well defined. It is conceivable that some density structures (or just one structure) in the disk rotate around the star with different periods. The occasional occurrence of the triple peak profile (at orbital phases approx. 0.7 to 1.1, observed in 2006 & 2009) could hereby be the connection.

Another meaningful project would be to compare the behavior of delta Sco with some other Be stars of a similar temperature/luminosity (for example, gamma Cas). The reason is to try to understand whether such periodic phenomena are unique to the object or if there are some common patterns in the variability of different objects. At first glance, such periodicity looks similar to those observed previously in 48 Lib and zeta Tau.

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