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A WARNING TO THE OBSERVERS OF BETA CMA-TYPE STARS

It is the current policy at most observatories to restrict the telescope time available for the observation of the (all bright) Beta CMA stars to the bright moon period, when work on fainter objects becomes hard or impossible.

Observers should be well aware of the serious danger hidden in this apparently sound procedure, at least when their observations are aimed at the determination of period lengths and amplitudes in these multiperiodical stars.

Let us indeed first consider a short period variable with a single period P and suppose that the observations on it lie clustered around epochs (full moon) that are separated by a characteristic interval T . Let be $P=T/n$, with n large, but not necessarily an integer. In the course of a periodogram analysis the exact period will of course yield the global mean light or velocity curve with the largest amplitude possible. But the periods $P=T/n+i$ ($i=1, 2, 3, \dots$) will also fit the observations on the individual full moon periods quite well (as long as $i \ll n$) and since the mean curves derived for the latter are all in phase, the global mean curve will have an amplitude that decreases but slowly with increasing i . On the contrary, for $i=1/2, 3/2, 5/2, \dots$ the various groups are of opposite phases and the global mean curve will never reach a significant amplitude. Consequently the periodogram will show, instead

of its normal aspect, a large number of narrow bands closely packed together and having heights that go increasing towards the central one, which corresponds to the true oscillation both in period and amplitude. The latter thus remains easily recognizable in this case.

But if we consider next a variable in which several true periods lie closely together, as is the case of the Beta CMa stars, the band patterns from the various periods will interfere and produce a very misleading spectrum; several of the resulting bands will show high peaks, while others will have their heights reduced almost to nothing. The identification of the physically meaningful bands will then become a very tough job. If our general knowledge of these stars may prove a competent guide at this stage, it is of little help at the next: the determination of accurate periods and of reliable amplitudes. Both remain unknown.

May both the observers and those who have to allocate telescope time keep in mind this special aspect of the investigation of stars with multiple short periods.

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