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HT CASSIOPEIAE AS AN SU URSAE MAJORIS TYPE DWARF NOVA

In the existing catalogues (P.N. Kholopov et al., GCVS 4th ed., 1985; H. Ritter, Garching MPA 106, 1983; R.F. Webbink, Urbana IAP 6, 1984) HT Cas is listed as one of the very few SS Cygni type dwarf novae (sometimes also called U Geminorum stars in the narrower sense) with orbital periods shorter than two hours. Most of the dwarf novae in this period domain are SU Ursae Majoris variables, in general exhibiting "supermaxima" from time to time, which can be distinguished from the ordinary maxima by their greater brightness and longer duration.

In order to clarify the nature of HT Cas I checked a sample of about 1000 Sonneberg sky patrol plates taken between 1949.0 and 1985.0 mainly by P. Ahnert and H. Huth of fields centred at $0^{\text{h}} +60^{\circ}$ (65°), Gamma Cas, and $1^{\text{h}} +60^{\circ}$ (65°).

The brightness of what now maybe classified as "normal" eruptions of the star was reported as being only slightly higher than $14^{\text{m}}.0$ (J.S. Glasby, The Dwarf Novae, p.177, 1970; C. Hoffmeister, Veröff. Sternw. Sonneberg, 1, p.61, 1947), and a cycle length for these maxima of 30 to 35 days was clearly visible (Glasby, l.c.). From the very beginning it was therefore obvious that on our plate material we would be able to detect only "supermaxima" (if present at all), the threshold of good-quality exposures being $14^{\text{m}}.2$ at the position of the variable.

Altogether 905 suitable plates yielded 16 cases when the star was brighter than or equal to 12.8^{p} g (system of Bergedorfer Spektraldurchmusterung of SA 8). These observations belong to eight eruptions. We conclude that in this way we have discovered "supermaxima" of the star. None of these maxima are, to the best of my knowledge, identical with findings reported by the AAVSO, AFOEV, or SUAA. On the other hand, three outbursts brighter than $13^{\text{m}}.0$ vis. not present in our material have been found by the observers of these organizations. J. Patterson (Astrophys.J.Suppl., 45, 517, 1981) measured one further bright maximum accidentally; the outburst of January 1985 (J. Mattei et al.,

IAU Circ., Nos. 4027 and 4037, 1985) is outside the time interval covered by the inspected plates.

The supermaximum of October 1959 lasted $L=9$ days at least (visibility above the plate limit), that of January 1985 about 10 days, but much shorter eruptions of this kind also seem to occur ($L \leq 3$ days: July 1963).

It should be noted that on many a good plate faint traces at the position of the star can be perceived, caused by the combined light of HT Cas at or near normal maximum (14^m) and a star $14^m.6$ just to the south of the variable. These observations were of course ignored.

The mean cycle length C of the supermaxima can be evaluated in various ways (W. Wenzel, G.A. Richter, Astron. Nachr., in press, 1986):

- i) by Poisson distribution of bright observations independently recorded,
- ii) by means of the (known or estimated) mean duration of the outbursts, or by averaging the observed outburst interval with (iii) or without (iv) taking into account sun and moon gaps.

Clearly the last method (iv) yields the largest value for C . From the procedures i-iii) follows

$$C (\text{supermaxima}) \approx 430^d \dots 660^d$$

where values near the lower one are more trustworthy.

A listing of all supermaxima known up to now and some further details will be given in a forthcoming issue of *Mitteil. Veränd. Sterne Sonneberg*.

W. WENZEL
Sternwarte Sonneberg
Zentralinstitut für Astrophysik
der Akademie der Wissenschaften
der DDR