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SOME PECULIARITIES OF THE PULSATING STAR DELTA SCUTI

The pulsating star δ Sct differs in many respects from the other Delta Scuti stars. Frolov (1972) proposes that δ Sct is perhaps a dwarf cepheid. For this star Elliott (1974) gives a series of (especially photometric) peculiarities and discrepancies of the observational data.

It is of interest to study other characteristics of δ Sct. Using observational data of 59 Delta Scuti stars (Breger and Bregman, 1975) we have estimated their pulsation modes and have calculated the evolution and pulsation masses (Tsvetkov, 1977 a, b). Our results have indicated new peculiarities of δ Sct, which distinguish this star from the remaining Delta Scuti stars.

1. By comparison of the photometric M_V and "theoretical" M_{bol} absolute magnitudes (the latter are derived from theoretical period - effective temperature - luminosity relations for the four lowest modes) we have estimated the pulsation modes. The difference between the two kinds of luminosities for the estimated in this manner mode of a given star does not exceed 0.2-0.3mag. But for δ Sct this difference is about 1 mag: $M_V=1^m.62$, $M_{bol}=0^m.56$ for fundamental mode (for overtones M_{bol} is still smaller).

2. The pulsation M_Q and evolution M_e masses of all stars studied by us are consistent (in the limits of the accuracy of determination). For δ Sct, however, we have derived a too large difference: $M_Q=0.57 M_\odot$, $M_e=1.66 M_\odot$.

Using a scanning spectrometer, moreover, Doroshenko and Glushneva (1971) have observed a variable emission at $\lambda 4501 \text{ \AA}$ in the δ Sct spectrum. The presence of a strong emission during the larger part of the pulsation period just at $\lambda 4501 \text{ \AA}$ (if it would be confirmed by new observations) is perhaps another

peculiarity of this star. We note that a weak emission in the spectral lines of the hydrogen (Valtier et al., 1975) or calcium (Dravins et al., 1977) has been observed in certain Delta Scuti stars.

The results of the investigations given above confirm Elliott's conclusion that "in nearly every respect δ Sct is the exception rather than the rule" for Delta Scuti stars. It is possible that δ Sct belongs to another type of variable stars, the mass is not "normal" and the evolution stage is different, or the ordinary photometric calibrations are not applicable to this star. Further detailed observations of δ Sct are needed to clarify these problems. The investigators must pay special attention to this star.

In conclusion we note that only ρ Pup of the remaining stars studied by us has similar but less expressed peculiarities: $M_V = 1^m.82$, $M_{bol} = 1^m.31$ for fundamental mode; $M_2 = 0.98 M_\odot$, $M_e = 1.59 M_\odot$. A chromospheric-type emission has been observed in this star (Dravins et al., 1977).

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