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INFRARED AND OPTICAL PHOTOMETRY OF T Tau AND RY Tau IN 1975 - 1976

Since the discovery of IR excesses in T Tau variables (1,2) infrared photometry of many young stars has been made by Glass and Penston (3) and Cohen (4 and references therein). Recently the results of simultaneous optical and infrared monitoring for variability of 22 T Tau type stars and related objects were presented by Cohen and Schwartz (5).

At the Crimean station of Sternberg Astronomical Institute some studies of T Tau itself and RY Tau (InT type), including UBV photometry (6), photoelectric measurements of the Hα-emission intensities (7) and observations of variations in the Hα-emission line profiles (8,9,10) have been made. Here we present the results of optical (UBV) and infrared (JKL) observations of these two stars made during 1975, October - 1976, February.

The observations in UBV were carried out at the 60-cm reflector using the photon counting photoelectric photometer. JKL measurements were made on the 125-cm reflector using the infrared photometer with cooled PbS photodetector (10" diaphragm was used). For the infrared observations 44 Per (BS 1203) was taken as standard star, its JKL values were determined by Johnson et al. (11). Tables I and II present our results, the time of observations is given in Julian dates. Standard deviations of the means were estimated from the statistical errors of measurement only; the observational uncertainties of the infrared photometry are as follows: $\pm 0^{m}.04$ in J, $\pm 0^{m}.03$ in K and $\pm 0^{m}.18$ in L.

T Tau. In 1971-72 years the T Tau optical brightness has remained practically constant (6). Since the beginning of this observ-

ing program, the star has clearly exhibited the monotonic decline in the optical fluxes (see values B and V in Table I).One may compare the photometric results obtained between J.D.2442731 and ...826-829 (mean values for two dates) and the amplitudes of the brightness decrease follow: $\Delta U \approx 0^{m}.53$, $\Delta B \approx 0^{m}.31$, $\Delta V \approx 0^{m}.16$, $\Delta J \approx 0^{m}.08$ and $\Delta K \approx 0^{m}.04$. The possible reason for this decline may be the existence of selective dust absorption. However, this procedure seems to be somewhat formal and cannot allow to make definite conclusions for the next reasons: a) it is well-known that UV-excess in T Tau stars can change independently on the stellar brightness; b) the decrease of optical flux was not profound; c) as can be seen from sets of JK values in Table I, the infrared brightness did not change sistematically with time.

During the observations the star's brightness at 3.5μ changed in the range of $3^{m}.85$ - $4^{m}.60$, the time scale of variability was smaller than one day. The dependence of colour indexes (V - 3.5μ) upon 3.5μ magnitudes from Cohen (5) (dots) and our measurements (crosses) are shown in Fig.1. There is a good agreement between the two sets of data.

RY Tau. The decreases in optical brightness on time lapse of 50-100 days were early mentioned (6,7) as characteristic detail of its light curve. Probably such phenomenon has occurred during the period of our observations. The following amplitudes of the brightness decrease of RY Tau can be inferred comparing the measurements made between J.D. 2442731 and ...826-829 (mean values): $\Delta U \approx 0^{m}.57$, $\Delta B \approx 0^{m}.55$, $\Delta V \approx 0^{m}.62$, $\Delta J \approx 0^{m}.44$ and $\Delta K \approx 0^{m}.21$.

The magnitudes of RY Tau at 3.5μ scattered within the range of $4^{m}.06$ - $4^{m}.46$ and did not seem to depend on the brightness declining in V.

During the simultaneous optical and infrared observations by Cohen and Schwartz (5) the radiations of T Tau and RY Tau were found to be constant. In spite of the marked variability for RY Tau than for T Tau, the explanation from our measurements of its persistent decline in brightness is not obvious. Further observations of this kind are needed to improve our knowledge of T Tau type variables.

Table I

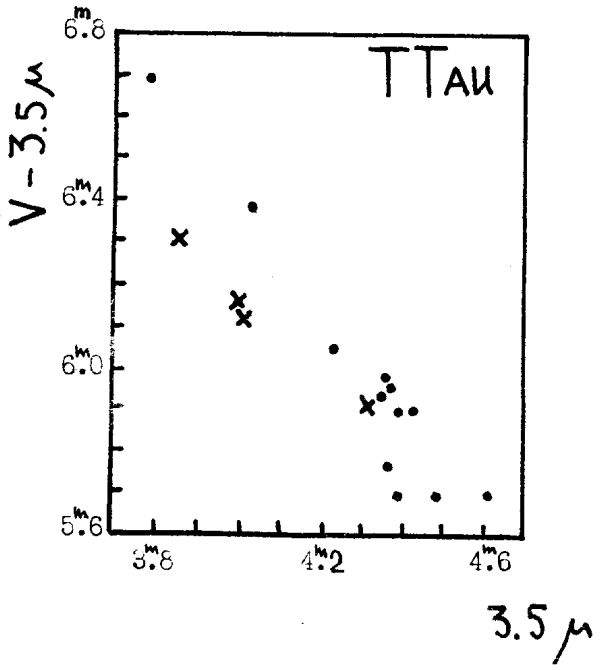
T Tau

J.D.	U	B	V	J	K	L
2442702.58	-	-	-	7.57	5.57	-
731.30	11.27	11.11	10.05	-	-	-
.42	-	-	-	7.36	5.68	-
746.29	11.82	11.28	10.10	-	-	-
.43	-	-	-	-	-	3.96
758.44	-	-	-	-	-	4.60
759.35	-	-	-	7.58	5.75	4.05
760.36	-	-	-	-	-	4.25
768.36	-	-	-	7.26	5.47	-
824.24	-	-	-	-	-	3.85
.25	11.87	11.35	10.14	-	-	-
825.18	-	-	-	-	-	3.99
.25	11.81	11.31	10.11	-	-	-
826.18	-	-	-	7.46	5.75	-
.27	11.70	11.37	10.18	-	-	-
829.22	-	-	-	7.43	5.69	4.32
.29	11.99	11.47	10.24	-	-	-

Table II

RY Tau

J.D.	U	B	V	J	K	L
2442689.55	-	-	-	7.84	5.79	-
691.53	-	-	-	-	5.68	4.06
702.52	-	-	-	7.63	5.63	4.29
731.28	11.88	11.55	10.52	-	-	-
.47	-	-	-	7.72	5.64	-
759.34	-	-	-	7.75	5.83	4.14
760.33	12.22	11.75	10.70	-	-	-
.35	-	-	-	-	-	4.46
768.38	-	-	-	7.61	5.60	-
825.20	-	-	-	-	-	4.29
.23	12.44	12.06	11.10	-	-	-
826.20	-	-	-	8.12	5.77	-
.26	12.38	12.07	11.12	-	-	-
819.23	-	-	-	8.20	5.92	4.41
.27	12.51	12.12	11.17	-	-	-



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