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DATA ON THE VARIABLE STAR STUDIES IN THE USSR DURING 1972-1975

Only a small part of the "Data on the Variable Star Studies in the USSR during 1972-1975" is contained in the Reports on Astronomy, volume XVI A, part 2, 1976.

Here we present the missing part of the "Data" according to kind permission of President of the IAU Commission 27, Dr.J. Smak.

1. General Data

The 60th name list of variable stars (498 objects) was published. The "Third Supplement" is being prepared, the 61st name list of variable stars containing 200 objects is in press. The work on the storage of the Catalogue data on a magnetic tape is under way.

The last, 5th volume of the series of monographs on variable stars "The Phenomena of Non-Stability and Stellar Evolution" was published (ed. A.A.Boyarchuk and Yu.N.Efremov). The monographs "RW Aurigae Type Stars" by V.P.Tsesevich and B.A.Dragomiretskaya, "Nova-like Stars and Novae" by V.G.Gorbatsky and "Novae and Supernovae" by Yu.P.Pskovsky were published. The edition of the bulletin "Variable Stars" was continued. 11 issues of bulletin and 6 Supplements were published during the period.

The Odessa depositarium of the photoelectric observations of the variable stars received 34 lists of observations of 65 stars in 1973-1975 (see Astron.Circ. 765 and 844). The photographic sky patrol was continued in Odessa (Mayaki station) and in Dushanbe; at the Sternberg Institute and its Crimean station the regions of clusters and associations were photographed.

2. The Orion and flare stars

In 1973 co-operative observations of four T Tau stars (RY Tau, T Tau, AB Aur, NU Ori) were carried out at six observatories. The results of photometric, polarimetric and IR spectroscopic investigations are given by Shanin et al. (Var.Stars, 1975, in press). Shanin, Shevchenko and Shcherbakov (Proceed. IAU Symp.67) obtained IR spectra of four T Tau stars; they found P Cyg profiles for He I 10380 line in the spectra of T Tau and V 1057 Cyg. On the basis of the analysis of television observations of 12 T Tau stars in seven spectral regions Petrov (Crimean Publ. 54, 1975) concluded that for more massive stars the non-stability is caused by processes in the dust envelope mainly whereas for low mass stars the non-stability resembling the chromospheric activity dominates. Zaitseva et al. (Astrofisika 10, No.3, 1974) investigated the changes of emission lines in the spectrum of RY Tau.

Zakirov (Tashkent) found that 71 per cent of T Tau stars in four T-associations are members of binary systems or Trapezium Ori systems. Satyvoldiev and Filin (Dushanbe) confirmed the reality of the association Sco T-1; among 57 variables in this association 47 were discovered by them. Dragomiretskaya (Astron. Circ. 824) found that for the stars of T-associations in Taurus the nearer the star to the initial main sequence, the higher the intensity of the H-alpha emission.

Karetnikov and Pugach (IBVS 783, Var.Stars, 1975) came to the conclusion that the explanation of the variability of stars showing Algol-like fadings in terms of the hypothesis of the circumstellar dust envelope meets difficulties.

Gershberg and Chugainov (Ap. and Sp. Sci. 19,75,1972, Crimean Publ. 50,93,1974) carried out the analysis of many-years co-operative observations of flare stars and estimated the statistical parameters of their activity. Krasnobabtsev and Gershberg (Crimean Publ. 53, 154, 1975) carried out the statistical analysis of the observations of flare stars in the Pleiades and Orion and found some statistical parameters common for both samples of flare stars in clusters and solar neighbourhood. There are similar features in the energy distribution of flares in wide ranges of luminosity and ages. Kulapova and

Shakhovskaya(Crimean Publ.49,65,1974) found out that in the system EQ Peg both the faint and the bright component show flare activity.

Gershberg and Shakhovskaya(Crimean Publ. 49, 73, 1974)found a correlation between the spottedness of BY Dra and the intensity of its emission spectrum and concluded that electromagnetic activity similar to thatof solar chromosphere causes isolated flares of UV Ceti type as well as slow light variations of BY Dra type.

Shakhovskaya(Crimean Publ. 50,84,1974) found a correlation between the rate of the fading after the flare and the luminosity at maximum light which is common for 11 stars in the luminosity range from $+8^m$ to $+16^m$. She also carried out quantitative analyses of more than 100 spectrograms of 43 dK2e-dM8e stars and, particularly, found another correlation between the luminosity of quiet chromosphere of the star and the energy emitted during flares (Crimean Publ. 51, 92, 1974).

Gershberg (Russian AJ 51, 552, 1974; Crimean Publ. 51,117, 1974) evaluated the electron density of the flare stars chromospheres and concluded that at this density the agent exciting the flares acts during the time nearly equal to that of the optical flare.

3. Other eruptive variables

Gorbatsky (Russian AJ 50,19,1973; ibid. 51, 753,1974) investigated the causes for the coronal lines appearance in the Novae spectra and the mechanism of matter outflow after the separation of the main envelope. He found that outbursts of U Gem stars occur when the outflow of matter from the companion is increasing due to the non-stability of convection (Russian AJ Lett., 1, 23, 1975). He also investigated the genetic connection between U Gem and W UMa stars (Ap. and Sp.Sci.,1975).

Mustel (IAU Symp. 67) argumented for existence of strong magnetic fields at the Novae. Sharov and Alksnis continued the search for Novae in the Andromeda nebula and its surroundings.

The thorough investigations of R CrB stars were carried out at Abastumani and Kiev; Proceeding of Colloquium on this topic held in Kiev in October 1973 are published (Var.Stars 19, No.6, 1975). Orlov and Rodriges (Astr.and Ap.31,203,1974; Astron.Circ.

813, 1974) investigated the spectra of RY Sgr and XX Cam; they found that the spectrum of DZ And is like that of a normal K-giant. The theory of envelopes of the stars and energy transport in them was elaborated by Zhilyaev, Redkoborody, Shulman (Astrometry and Ap. 22, 21, 1974; ibid. 22, 30, 1974). Totochava discovered light variations with amplitude $0^m.15$ and the cycles 30-40 days for R CrB and XX Cam. Pugach confirmed the existence of permanent re-emitting envelope of RY Sgr and found that deep minima do not change the phases of 38-day pulsations.

Sharov (Var.Stars 19, 3, 1973) obtained light curves of luminous irregular blue variables in M 31 and M33. Shulov and Kopatskaya (Astrofisika 10, 117, 1974) discovered the light variations of the white dwarf G 29-38.

4. Pulsating variables

The Odessa Observatory headed by Prof.V.P. Tsesevich continued the compilations of ephemeris for bright RR Lyrae stars which are published in Cracow (SAC 45,46,47). More than 2000 maxima for more than 100 stars were determined in 1973-1975. Romanov et al. (Astron. Circ. 787), Firmanuk (Astr.Circ. 828, 843), Frolov (Astron. Circ. 745) studied the Blazhko effect; RZ Lyr, RR Lyr, XZ Cyg, KX Lyr, TV Boo, ST Boo and SX Phe were investigated.

Kukarkin (IAU Symp. 67) gave the review on RR Lyrae and W Virginis stars; he stressed the non-homogenity of these stars entering halo as well as disk population. Frolov (Astron. Circ. 759, 1973) found the luminosity of RR Lyrae field stars to be possibly no more than $+1^m$. He concluded also that Delta Scuti and AI Velorum stars may be separated according to their light amplitudes only if their periods are smaller than $0^d.1$.

It was found (Frolov, Var. Stars 19, 327, 1975) the factor "p" for the conversion from radial to pulsation velocity to be equal to 1.28 instead 1.41 for stars with tenuous atmospheres.

Efremov and Kholopov (IBVS 1073, 1975; Var.Stars 20, No.2, 1976) confirmed their conclusions of 1967 that V 367 Sct is double mode Cepheid with the fundamental period $6^d.2930$ and obtained the secondary period $4^d.3849$. This is the only double mode cepheid in an open cluster (NGC 6449). Efremov (Astron. Circ., 1975 in press; 3rd European Meeting 1975) obtained the period-

age relation based on 70 Cepheids connected with more than 30 clusters and associations of the Galaxy and Magellanic Clouds. This relation is close to theoretical one of Kippenhahn and Smith.

Erleksova divided the RV Tauri stars into groups according the physical and kinematical criteria. The existence of RV Tau stars with periods similar to those of W Vir stars was established. Kiseleva found two sequences of Mirae in the color-magnitude diagram and concluded that B-V and U-B for these stars correlate with the carbon and oxygen abundance. Vasilyanovska concluded that the difference between Cepheid light curves may be explained by variation in the phase lag between maxima of fundamental and overtone pulsations. These works were carried out at the Dushanbe Observatory.

Shanin and Shcherbakov (Crimean Publ. 53, 1975) investigated the spectrum of ζ Gem in the range 10580-11020 A°.Klimishin (Ap. and Sp.Sci. 22, 1973) elaborated the theory of shock and thermal waves in atmospheres of Novae and pulsating stars.

5. X-ray sources

Kurochkin (Astron.Circ. 717; Circ.IAU 2436, 1972) proved the identity of Her X-1 with HZ Her having found for the latter the period equal to that of the X-ray variation. Cherepashchuk, Efremov, Kurochkin, Shakura and Sunyaev (IBVS 720, 1972)explained the optical variations of HZ Her as the consequence of optical re-emission of the X-ray radiation of compact component at the surface of colder star ("reflecting" effect). The theory of this re-emission was elaborated by Basko and Sunyaev (Ap. and Sp. Sci. 23, 117, 1973). Efremov, Sunyaev and Cherepashchuk (Var. Stars 19, 407, 1974) examined the photometric effect in close binary systems with X-ray sources; they suggested that Cyg X-2 may be a system of HZ Her type and noted the division of X-ray sources into two groups belonging to the extreme Population I and to the Population II. Karimova and Pavloskaya (Astron. Circ. 868, 883, 1975) showed that the galactic orbit of Cyg X-1 = V 1357 Cyg is typical for Population I objects whereas the orbit of Her X-1 = HZ Her is similar to those of Population II stars.

Cherepashchuk et al.(Var.Stars 19,no.4, 1975) carried out photoelectric photometry of HZ Her and V 1357 Cyg.

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on Variable Stars