Fakhranda Alimardanova

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LONG-TERM PHOTOMETRIC AND SPECTRAL VARIATIONS OF DI CEPHEI

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We have analyzed the photometric and spectral variations of the classical T Tauri star DI Cep for the last 50 years. Currently the star is at its faintest state and possesses an emission spectrum in the visual range. Synchronous spectroscopy and *UBV R* photometry show that the higher thebrightness, the stronger were the intensities of hydrogen Hα, Hβ emission lines and of FeII, HeI 5876 ºA emissions. For the first time, we detected, with a high probability, quasi-periodic variations of the star's brightness and of its spectrum with the period *P* = 2020 *±* 200 days.

ПОИСК ДОЛГОПЕРИОДИЧЕСКИХ ИЗМЕНЕНИЙ БЛЕСКА ЗВЕЗД ТИПА Т ТЕЛЬЦА: T Tau, DI Cep И SU Aur

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Для поиска протозвездных или протопланетных образований в окружении молодых звезд типа T Тельца применен метод, позволяющий выделить из наблюдаемой кривой блеска долгопериодические составляющие. Проведен статистический спектральный анализ среднегодовых кривых блеска трех отобранных звезд (T Tau, DI Cep и SU Aur), и по наиболее достоверным периодам для каждой звезды построены синтетические кривые блеска. Полученный результат в первом приближении говорит о хорошем совпадении полученных синтетических кривых с исходными кривыми блеска, что делает гипотезу о наличии в исследованных звездных системах протозвездных или протопланетных образований достаточно достоверной. Анализ распределений энергии рассматриваемых звезд в области 0.36–20 мкм также привел к выводу о том, что наблюдаемые аномалии в инфракрасной части спектра у молодых звезд, скорее всего, связаны с тепловым излучением несформировавшихся спутников, находящихся в околозвездном окружении.

ULTRAVIOLET SPECTRUM VARIABILITY OF BP TAU

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Results of the ultraviolet IUE archive spectrum researches of classic T Tauri type star BP Tau had been presented. Spectroscopic parameters of mainly strong emission lines were measured. On the more full massive which had been created on the intensity values of the emission doublet MgII λ 2800 A a variability with period P = 8.275±0.005 days with high confidence level was obtained. There is some group of lines, intensities of emission lines for which were showed decreasing for more than 13 years of time interval. As a rule, lines with high potential of excitation related to the first group. More probable, such lines shows periodic variability. It is showed that we have as a minimum two local physical conditions of matter in the circumstellar disk of the star.

Key words: Pre-Main Sequence Stars: UV spectrum: variability; individual: BP Tau.

 SOME PROPERTIES OF ENERGY DISTRIBUTION CURVES OF YOUNG STARS

 F.N.ALIMARDANOVA

2010 VESTNIK BQU, N3, [www.bsu.az](http://www.bsu.az)

The paper analyzes the results of the investigation of SED curves of some group of young stars of T Tauri, Ae/Be Herbig types and IR protostar members. It is established that effective temperatures determined on the spectral types are systematically less than the temperatures derived on the maximums of SED curves. Direct correlation between temperatures determined due to the peaks in the SED curves is discovered in the article as well.

 The Ultraviolet spectrum study of young stars

I. IUE archive spectrograms processing

N.Z.Ismayilov, F.N.Alimardanova, O.V.Khalilov, G.R.Bahaddinova

2010 VESTNIK BQU, www.bsu.az

 The article presents the results of 40 IUE archive processing obtained for dwarf stars at the range λλ 1200-3000 AA. For each of spectral classes in B0-M0 interval at the depth and half width of 20 spectral lines are measured. Our measurements show, that the half intensity width of delta λ lines can be determined by precision ±1.5 A (for SWP camera) and ±3 A (for LWP and LWR cameras), line intensities by 10 % and equivalent width by 15-20%.

 VARIABLE STARS, THE GALACTIC HALO AND GALAXY FORMATION

 C. Sterken, N. Samus and L. Szabados (Eds.) 2010

Features of Sources of Radiation in the Environment of Young Stars

N. Z. Ismailov and F. N. Alimardanova

 Using the results of broad-band ground-based and extra-atmospheric infrared photometric observations, we studied the spectral energy distributions of 87 young stars in the 0.36–100 μm range. Only 5 types of SED curves are met among the objects of our sample. We suggest to append the photometric classification scheme based on the IR spectra of young stars, earlier introduced by other authors. For some stars, we observe up to three wavelength intervals with excess radiation in the spectrum, which can be explained with the presence of additional thermal radiation sources in the system. The most probable temperatures of these sources are 1500−2500 and 90−120 K. We subdivided our 87 young program stars into groups with similar spectral

energy distribution (SED) curves. The program objects show only 5 SED types.

Type I. Objects with several wide maxima in the near- and far-IR parts of the spectrum. Such spectra are mainly met among infrared sources. We have 9 such objects in our list.

Type II. Objects with a single wide maximum in the SED curve. In rare cases, the peak can be situated in the optical range, but it is predominantly revealed in the IR range, at 1.25−1.62 μm. In our list, we have 14 such objects.

Type III. Objects with at least 2 humps in the SED curve, the second maximum being higher than the first one. Most of these objects have a strong maximum at 0.25 μm, corresponding to the temperature T = 2500 K.

Type IV. Same as in Type III, the only SED difference being that the first maximum is higher than the second one. The humps are found at 0.56 μm and 0.25 μm, corresponding to the temperatures of 5000 and 2500 K.

Type V. Objects with smooth SED curves having a single maximum in the optical range corresponding to a temperature 5000 K. Most of these objects are Herbig Ae/Be stars.

For most stars, the temperature T1 derived from the first SED “hump” generally agrees with the star’s effective temperature corresponding to its spectral type (the correlation coefficient is r = 0.84). However, this coincidence does not occur for all stars. Besides, some stars reveal 2–3 additional excess-radiation ranges, corresponding to lower temperatures. The most frequent temperatures in the excess-radiation spectrum are 2500, 1500, and 90−120 K. The strong correlation between the temperatures can indicate that sources formed in the circumstellar environment of different stars during condensation of the circumstellar envelope have masses dependent on the mass of the center.

SPECTRAL ENERGY DISTRIBUTIONS OF YOUNG STARS

IN THE RANGE 0.36-100 MKM

N.Z. Ismayilov, F.N.Alimardanova

AAJ\_2008\_V3\_N3\_4

Using results broad-band ground-based and exoatmospheric infrared photometric observations the spectral energy distributions (SEDs) of 87 young stars in the range 0.36-100 mkm have been studied. Selected objects showed only 5 types of SED curves. It was expanded a photometric classification scheme on the IR spectrum of young stars which earlier has been proposed. For some stars we can see up to four excess radiation ranges in the spectrum which can be explained with presence of additional thermal radiation bodies in the system. More probable temperatures of additional members is equal ~1500-2500 and 90-120 K.

Key words: T Tauri type stars, energy distribution, IR radiation, circustellar matter



ULTRAVIOLET SPECTRUM VARIABILITY OF BP TAU

N.Z.Ismailov, F.N.Alimardanova, G.R.Baheddinova

AAJ\_2009\_V4\_N3\_4

Results of the ultraviolet IUE archive spectrum of classic T Tauri type star BP Tau had been presented. Spectroscopic parameters of mainly strong emission lines were measured. On the more full massive of measurements of the emission doublet MgII λ2800 Å variability of the intensity with period P=8.275±0.005 days with high confidence level was obtained. Although for two separate series obtained with high time resolution a character of variability is cyclic, for total observations of many lines is not fitted a periodicity. There are some group of lines, intensities of

emission lines for its were showed decreasing for more than 10 years time interval.

Key words: young stars, activity, UB spectra, individual – BP Tau

Revealing the nature of the strong emission-line star MWC 137

Fakhranda Alimardanova, A. Miroshnichenko, N. Manset, S. Zharikov

MWC 137 is an object with a strong emission-line spectrum associated with the 1 arc minute size H II region Sharpless 266. In 1967 it was included in a catalog of planetary nebulae, in 1976 in a list B [e] stars, and in 1984 in a list of Herbig Ae/Be stars. All these classifications imply very different evolutionary status. Analysis of the stellar and nebular spectra published in 1998 suggested that MWC 137 is a B[e] supergiant located at a distance over 6 kpc away from the Sun. No high-resolution spectra of the object have been published so far. We present preliminary results of our analysis of high-resolution spectra of MWC 137 obtained in 2004-2014 at different observatories that is intended to solve the problem of its nature.

Planet formation processes in the young Solar-type stars

Nariman Z. Ismailov, Fexrende N. Alimardanova (Conference material)

More likely the formation of planets occurred around young stars with an extended

protoplanetary disks. For example of young objects with protoplanetary disks can be

classic T Tauri (CTTS) and Ae/Be Herbig type stars. These objects show an emission

spectrum with relatively high excitation temperature than the star photosphere in the

visible, ultraviolet and infrared spectral regions. Sometimes a flux radiation of these

stars varies in large range – from minutes to many years, and it is most often

irregular but sometimes periodic.

We have using the following methods of researches: 1) investigation of the spectral

energy distribution (SED) in the wide range of the spectrum - 0.36-100 μm, 2) study

the structure and parameters of spectral emission lines in different spectral ranges,

and 3) analysis of the light curves obtained for a long time observations.

We have carried out of SED curves for 87 young objects, 16 of which are IR objects

that are not observable in the optical range. According to the forms of the SED

curves selected objects we are divided them into 5 subgroups. A study of SED

curves in this range showed that by using this method we can identify up to three

areas of excessive radiation fields in the infrared part of spectrum. The characteristic

temperature for the excess radiation in the infrared part of the spectrum is

corresponding 1500-2500 K and 90-120 K. Obtained SED curves of young stars can

be described by an additional thermal radiation, which possible is creating by still

sufficiently unformed objects in the circumstellar environment.

By using 2-3 most probable values of long time photometric periods of variability on

the spectral Fourye method were obtained synthetic light curves for stars T Tau, DI

Cep and SU Aur. These obtained synthetic light curves in the first approximation are

good agreement with the observed light curves of these stars. This result confirms

the hypothesis on the existence of young stars surrounded by protoplanets and/or

proto-stars.

On the observations of T TauN in the optical range for lines of hydrogen and H and K

CaII first time was detected a periodic variability of the emission spectrum with a

period of 33 1.5 days. The observed period was also observed by IUE

spectrograms obtained in the ultraviolet range. The variability of the polarization in

the visual range is also consistent with that founded period. Based on observational

data, we assume that perhaps, there is a comet like object around the component T

TauN.

For DI Cep synchronous variability of Hequivalent widths, radial velocities of

individual components in the emission hydrogen lines, HeI 5876Å and UBVR

brightness with a period of 9 days were discovered. The observed period of rotation,

showed that 9 days period is not to regard the stellar photosphere, but to the outer,

more slowly rotating parts of the disk. Spectral and photometric parameters indicated

long time variability, for nearly 6 years. Perhaps, the observed variability of the

spectrum is result of duplicity of the star.