THE STELLAR POPULATION IN GALAXIES OBSERVED ON THE ASTROPHYSICAL STATION "ASTRON"

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25 star systems were observed in 1983-1987 with the 80cm telescope on the board of astrophysical station "Astron". Entrance diaphragms were 60" and 10". Spectrometer with the exit slit 28 A has measured fluxes in erg/sec cm^2 A in the region 1600-3500 AA in regime of narrow band photometry. Exposures in every point were 2-5 min for bright objects and 10-30 min for week ones.

Spectral data of 18 extragalactic objects were analysed to investigate stellar population. Entrance diaphragm 60" permit to measure the fluxes of 0.2-20 kpc central regions (mainly 1-6 kpc). H=75 km/sec Mpc. Continuum energy distribution and absorption features in spectra of galaxies were considered.

The brightest absorption features in spectra of some galaxies were near λ2350 A and λ2800 A . Main contributors of λ2800 A feature are lines MgI,2852 A and MgII,2796, 2803 AA. Intensity index $C_{2800}=lg\ F_{cont}/F_{2800}$ calculated for all objects, shows the correlation with the spectral type of the galaxy obtained by van den Bergh (1960).The maximum values of C_{2800} correspond to *g-k* spectral types galaxies. Fig.1 shows large scattering of maximal values of C_{2800} but in Fig.2 these indexes are in good correlation with the dimension of central region of observed galaxies.When dimension of the observed region decreased,the values of C_{2800} increased: in accordance with the optical results for equivalent width W_λ(*MgII,5150* A) (Faber et al,1977;Faber,1983).

The main contributors of λ2350 A feature can be absorption lines FeII,2388, 2390, 2413 AA and NiII,2296, 2316, 2394 AA,known for A-F stars spectra (Cianni et al, 1984; Jamar,Macau,1974) and dust absorption, having maximum near λ2175 A (Aiello et al,1988).But brightness of λ2350 A feature is correlated with that of λ2800 A feature,caused mainly by stellar population (Fig.3).The comparison of the spectra obtained for E and Sa galaxies with that of α Car (F0 Ib-II) permit us to suppose that UV spectra of these galaxies are caused by A-F stars,having bright λ2350 A and λ2800 A absorption features.

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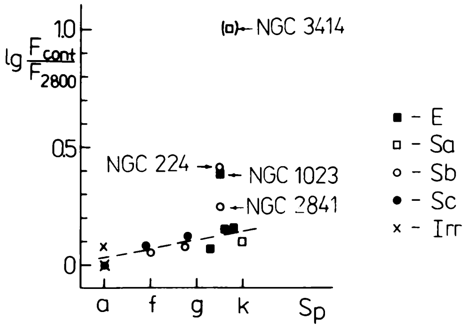

Fig.1. Comparison of λ2800 A absorption index with the spectral type of the galaxy. In brackets- weak value of flux.

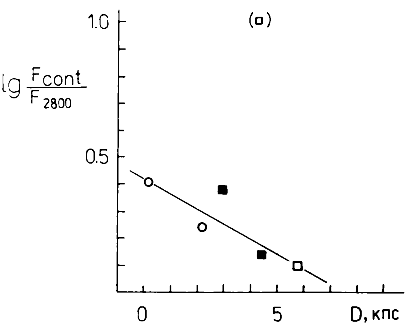

Fig.2. Comparison of λ2800 A absorption index with the dimension of central region of galaxy,corresponding to 60" entrance diaphragm.

UV-continuum distribution in spectra of observed galaxies was compared with that of other UV explorers,using different diaphragms: IUE (10"x20"), ANS (2'.5 x 2'.5), OAO (10'). In the most cases (NGC 4486, E1; NGC 1023, E7; NGC 5194,Sc; NGC 1569,Irr, et al) energy distribution in continuum is not depend on diameter of diaphragm.

Two spectral indexes - red and blue - were calculated to describe the continuum of galaxies. Fig 4 showes that the spectral index $lg\ F_{3400}/F_{2800}$ is connected with the optical spectral type of the galaxy. So we suppose that this index is caused synonymously by stellar population of the galaxy. It distinguished the maximum for E,Sa(*g*-*k*) galaxies. But Sc, Irr galaxies,having *a*-*f* spectral types,show almost flat continuum in the region 3400-2800 AA.

Behaviour of continuum in the region 2200-1800 AA does not connect simultaneously with the optical spectral type of

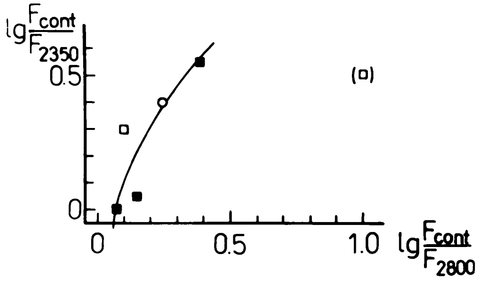

Fig.3. Comparison of λ2350 A and λ2800 A indexes for early types galaxies.

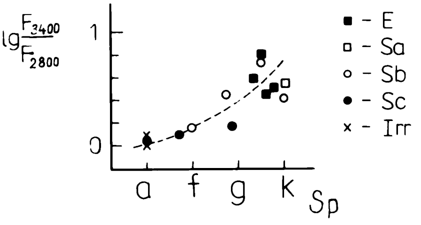

Fig.4. Dependence between spectral indexes and spectral types of galaxies.

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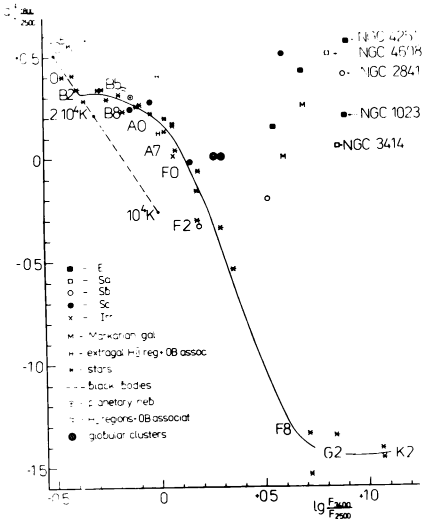

Fig.5. Two-colour diagram of central regions of 14 normal galaxies,2 Markarian galaxies,2 HII regions,containing O-B associations in spiral branches of S galaxies and of our Galaxy objects.

the galaxy and its morphological type,too. Flux increasing from λ2200 A to λ1800 A is observed as for Sc,Irr (*a*-*f*) galaxies so for E,Sa (*g*-*k*) ones. Maximum inclination of continuum in the region 1800-2200 AA is observed for E,Sa galaxies.This result was improved by two-colour diagram method.

The two-colour diagram method requires the knowledge of dust influence on colour indexes.Such diagram plotted for 65 O-A5 stars of our Galaxy,having different values of dust absorption, shows that when dust absorption increases, stars shift on two-colour diagram from left to right and down.Fig.5 gives two-colour diagram for 14 normal galaxies (E-Irr), two HII regions,containing O-B stars in S galaxies, two Markarian galaxies and objects in our Galaxy: 2 globular clusters (NGC 6397 and NGC 7078),60 unreddened O9-K2 stars,8 planetary nebulae and HII regions with the O-B associations and black bodies (10^4K≤T≤10^5K). One can see that extragalactic objects are divided in two sequences - left and right.

Left sequence consists of Sc,Irr galaxies and HII regions,containing OB associations.It coincides with the main-sequence B-F stars. The bluest galaxies of these types are located near B8 stars of main sequence. We suppose that UV emission of left sequence galaxies is caused by groups of early types, having normal luminosity function like that of O-B associations and A-B star clusters : population I stars. Radiation of its red stars was not detected in the region 1800-3500 AA.

Right sequence of galaxies on Fig.5 represents the central regions of E, Sa, Sb galaxies. Its both indexes $lg\ F_{1800}/F_{2500}$ and $lg\ F_{3400}/F_{2800}$ reach higher values than those of left sequence of galaxies. Extremely high values of

$lg\ F_{1800}/F_{2500}$ index of E galaxies are more than those of hottest stars and cannot be a result of dust influence, but only a result of stellar population. Luminosity function of right sequence objects has the gap between hot and cold stars, like that of population II stars. But it differs from the luminosity function of globular clusters of our Galaxy (see Fig.5) by high number of extremely cold stars.

Extreme right objects on diagram from top to bottom are: NGC 4251, NGC 4608, NGC 2841, NGC 1023 and NGC 3414. Index of absorption feature λ2800 A increases in this direction,showing that the main stellar population of horizontal branch of HR-diagram changes from hottest to moderate hot stars in this direction. Optical spectral classes of these galaxies are G5-K and spectral indexes $lg\ F_{3400}/F_{2800}$ are equal to those of G2-G3 stars. Main-sequence-turnoff in this case is near G3-G5 stars. Such systems are not younger than $10x10^9$ years. Model calculations give the similar ages. Dimensions of the central regions of investigated galaxies are mainly 1-6 kpc. They can evolve as closed systems.Models of such systems were calculated by Brusual (1983) and Burstein et al (1988). According to these models systems, having $lg\ F_{1800}/F_{2500} = 0.41$ (extreme right galaxies on Fig.5), are $16x10^9$ years old.

In the middle part of two-colour diagram there are three galaxies:NGC 4486,Mrk 573 and Mrk 800. In the spectra of these galaxies absorption features are weak or absent evidencing that their luminosity function in UV region caused not only by A-F, but by other early type stars,too. Their red and blue colour indexes are not so high as those of extreme right galaxies on Fig.5. We suppose that modern star formation influences on UV light of these galaxies. Galaxies,having regions of modern star formations, are known as "active". As a rule, Markarian galaxies belong to this type of objects. D.Burstein et al (1988) showed that NGC 4486 have regions of recent star formation, too, as a result of gas accretion from Virgo cluster of galaxies, nucleus of which is NGC 4486.

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