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Physical Science & Biophysics Journal
ISSN: 2641-9165

The Study of Extended Extra Galactic Radio Sources: 2. The Study of Quasar 3c219 as a Nearest Extended Radio Source

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Research Article

Volume 3 Issue 4

Received Date: November 18, 2019

Published Date: December 06, 2019

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Abstract

The study of 3C 219 quasar and its surroundings was carried out. The distribution of galaxies, galaxies systems, and quasars inside the surface within a 360-minute radius is the same every- where. It turned out that the distribution in the 3C 219 is homogeneous.

Keywords: Extended Radio Sources; Quasars; Radio Galaxies; Homogeneous Distribution

Introduction

The quasar 3C219 is one of the 35 extended radio sources, of which 19 are quasars. It is the closest of those quasars. Its redshift is z = 0.174732 and it is a pretty bright optical source of m = 17,8m magnitude. The study of quasar 3C219 is interesting because it has strong radiation in radio waves and large angular sizes, as it is far enough and has too large geometric dimensions [1]. To find out what features this quasar has it was done multi frequent investigations in all the areas studied so far. An extensive study was carried out using the all data of NASA database also (www.nasa.extragalactic database) [2]. It was studied not only the quasar, but also the extra galactic sources around it that are located within a radius of up to 360 minutes. In these regions were studied galactic pairs, triplets, groups, clusters, quasars, groups of quasars, gravity lenses, sources with absorption lines, sources with radiation lines, radio sources and supernovae stars, which could be obtained from NASA's sites [3]. The galaxies have been investigated for up to 60 minutes radius. For the regions with larger radius it is impossible to do, because the number of galaxies is too large. Within the 360-minute radius that number often exceeds one hundred thousand, and it is meaningless to involve so many galaxies in this study.

Galaxies in the Environment of Quasar 3C219

It is very important to find out the density distribution of galaxies 'in the environment of quasar. We've scanned the regions from 1 minute to 60 minutes. Table 1 presents data in the following sequence: The first column is the distance from the quasar center in minutes; in the second, the number of galaxies inside that circle; in the third column the ratio of the surface to the surface of the region with a radius of one minute; the fourth is the number of galaxies inside the ring surrounded by neighboring radii, in the fifth the galaxy density in the ring, in the sixth column the galactic density within the corresponding radius. As seen from the table, the density of galaxies decreases with the distance from quasar. The comparison of five and six column allows us to understand that the

density of galaxies in the quasar environment is large. This is possible if the presence of the main part of galaxies in the quasar environment is conditioned by the interaction with quasar. If the galaxies were distributed uniform lee in the direct environment of quasar, the number of galaxies would be not more greater. Since not for all galaxies we have the redshifts, it is not possible to speak about the immediate environment of the quasar, so we discussed in terms of single spherical distribution, especially when the relative number of galaxies with known red shifts is small.

R	N	S	N1	N1/S	N/πR2
1	22	1	22	22	22
2	60	3	38	12.7	15
3	104	5	44	8.8	11.6
4	186	7	82	11.7	11.6
5	270	9	84	9.3	10.8
6	373	11	103	9.4	10.4
7	474	13	101	9.2	9.8
8	613	15	139	9.3	9.6
9	755	17	142	8.4	9.4
10	930	19	175	9.2	9.3
20	3415	300	2485	8.3	8.5
30	7432	500	4017	8	8.3
40	14144	700	6712	9.6	8.8
50	20260	900	6116	6.8	8.1
60	28901	1100	8641	7.9	8

Table 1: Galaxies in the environment of quasar 3C219 till the radius of 60 minutes.

In Table 2 we bring the number of different objects in the regions with different radius R. The designations in the first line are: GP for galactic pairs, GT - galactic triplets, GG - galactic groups, GC - galactic cluster, Q - quasars, QG { groups of groups, GL - gravity lens, AbLS - sources with absorption lines , EmLS - sources with radiation lines. In the first column there are the radius of regions in minutes, and the number of corresponding objects in the other columns.

R	GP	GT	GG	GC	QG	GL	AbLS	EmLS
60	2	2	28	93	0	0	0	0
120	4	10	92	318	0	2	2	0
180	9	19	224	612	0	5	5	0
240	17	34	357	1050	0	6	8	3
300	27	63	608	1662	0	6	19	16
360	44	93	904	2411	0	10	27	35

Table 2: The number of systems of galaxies in the environment of quasar 3C219.

Table 2a shows the concentrations of these same objects. Table 3 shows the number of radio sources in the environment of the quasar, their concentrations inside the corresponding radius and within the ring between the neighboring radius. It turns out that the density of radio sources decreases with the distance from the quasar. This can be due to the fact that there is accumulation of radio sources inside in the neighborhood of quasar 3C219,

which was expected. In Table 4, the number and concentrations of other quasars are given in the environment of quasar 3C219. Apparently, the distribution of quasars is not subject to any regularity; these quasars are independent of each other and are independent of the 3C219 quasar.

R	GP 10^{-4}	GT 10^{-4}	GG 10^{-3}	GC 10^{-2}	QG 10^{-4}	GL 10^{-4}	AbLS 10^{-4}	EmLS 10^{-4}
60	5.6	5.6	7.8	2.6	0	0	0	0
120	2.8	6.9	6.4	2.2	0	1.4	1.4	0
180	3	5.9	6.9	1.9	0	1.5	1.5	0
240	3	5.9	6.2	1.8	0	1	1.4	0.5
300	3	7	6.8	1.8	0	0.7	2.1	1.8
360	3.4	7.2	7	1.9	0	0.8	2.1	2.7

Table 2a: The density of systems of galaxies is in the environment of the quasar 3C219.

1	3	1	3	3
2	8	3	2	1.7
3	8	5	0.9	0
4	8	7	0.5	0
5	9	9	0.4	0.11
6	13	11	0.53	0.36
7	17	13	0.35	0.31
8	18	15	0.28	0.07
9	21	17	0.26	0.18
10	25	19	0.25	0.21
20	53	300	0.13	0.09
30	74	700	0.08	0.04
40	122	700	0.08	0.07
50	174	900	0.07	0.06
60	252	1100	0.07	0.07
120	835	10800	0.06	0.05
180	1720	18000	0.12	0.05
240	3216	25200	0.06	0.06
300	5477	32400	0.06	0.07
360	8435	39600	0.07	0.07

Table 3: Radio sources in the environment of quasar 3C219.

The number of quasars depends on the distance to such extent as it is possible to detect quasars at these distances. So the number of other quasars around the quasar 3C219 does not decrease, but diminishes the likelihood of detecting them. In the environment of quasar 3C219 there are other quasars at all possible distances. We can say that in this region the space is homogeneous. Of course there are regions where it is not so. About this a separate article will be presented.

In Figure 1 we bring all the known, full observational data for the quasar 3C219. From the spectra of the quasar 3C219 it is clear that the very definite ratio $\lg(f_\nu)/\lg(\nu)$ is maintained by the whole region of electromagnetic waves [4-10].

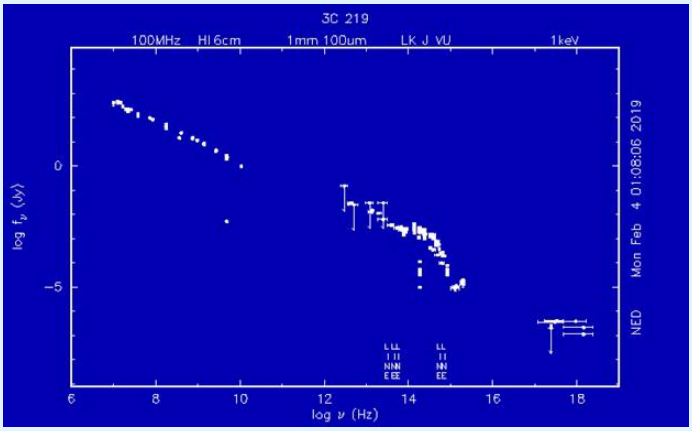

Figure 1: The intensity of the quasar 3C 219 in the frequencies from 10MHz to 10KEV.

Conclusion

The distribution of extra galactic sources in the conical volume in a 360-minute radius and up to redshift z = 6 can be considered as homogeneous. Consequently, the quasar 3C219 is located in such a region where other cosmic objects also have the same characteristics as the quasar 3C219.

Figure 2 shows the distribution of quasars by their red shifts. The picture shows the existence of two maxima where there is a certain deficiency of the number of quasars in the regions of z~0.7-1.7. In the case of red shifts with greater value, the deficit of quasars is conditioned by the deficit of opportunity to find relatively weak quasars, and in the case of smaller ones there are no quasars. Naturally, that the deficit of quasars in closest space is conditioned by the absence of quasars in those regions. The image of the 3C219 quasar environment is very in line with the perceptions of the homogeneous universe, with only one deviation that at some distances there is a weakly deficient. We have such an image at the NGC 6251 radio galaxy [11]. In this domain, the quasi-distribution divides between the relative distributions, in contrast to the four distinct domains, where there are large-scale inequalities different from the homogeneous cosmos. In the region near to NGC 6251 the distribution of quasars is near to homogeneous, in difference to the four distinct domains where there are large scale inhomogeneous.

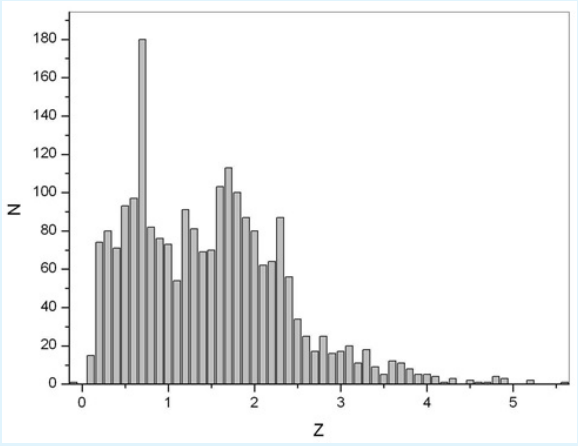

Figure 2: The distribution of quasars by their red shifts.

1	1	1	1	1
2	2	3	0.5	0.33
3	2	5	0.22	0
4	2	7	0.13	0
5	2	9	0.08	0
6	3	11	0.08	0.09
7	3	13	0.06	0
8	3	15	0.05	0
9	3	17	0.04	0
10	5	19	0.05	0.11
20	10	300	0.03	0.02
30	23	500	0.03	0.03
40	38	700	0.02	0.02
50	55	900	0.02	0.02
60	72	1100	0.02	0.02
120	222	10800	0.02	0.01
180	486	18000	0.02	0.01
240	886	25200	0.02	0.02
300	1426	32400	0.02	0.02
360	2123	39600	0.02	0.02

Table 4: Other quasars in the environment of quasar 3C219.

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