АСТРОФИЗИКА

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THE MAGNETIC FIELDS AND RADIO JET IN GIANT RADIO GALAXIES

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The study of giant radio galaxies by the scintillation method [1-4] at the102 MHz frequency enables us to estimate the strength of magnetic field and also the density of relativistic electrons in compact radio sources. Using formulae $\theta=4.3'10^{16}S^{1/2}\nu^{-5/4}H_{\perp}^{1/4}(1+z)^{1/4}$ [5] the strength of magnetic field $H_{\perp}$ is estimated, where θ is the angular size of the source, S is the maximum flux density at ν frequency, and z is the redshift.

One readily may determine the energies of magnetic field and relativistic electrons by estimated values of $H_{\perp}$ and the density of electrons. Comparison of these energies (see Table 1) shows that in the radio galaxy DA240 the strength of magnetic field is in 6 order of magnitude greater than the energy of relativistic electrons [1]. In the DA240 the relativistic electrons can be easily captured by magnetic field and consequently emit isotropic radiation. In this case the radio jet cannot be formed.

In the NGC1275 the energy of magnetic field is in 8 order of magnitude less than the energy of electrons [2], and the relativistic electrons easily can pass through the galaxy into the intergalactic medium. Hence the radiation in the radio-range is absent far from the core. In this case the radio jet will not be observed.

Table 1

RESULTS OF THE OBSERVATIONS

Source name	$E_н$(erg)	$E_э$(erg)	θ(arcsec)	L(pc)	Jet
DA240	10^{56}	10^{50}	0.07	40	no
NGC1275	10^{47}	10^{55}	0.03	11	no
NGC315	10^{50}	10^{49}	0.002	1	yes
3C31	10^{51}	10^{50}	0.002	1	yes

In NGC315 and 3C31 the energy of magnetic field is comparable with the energy of electrons [3,4], and the electrons are gathered in the galaxy and around it. But the magnetic field prevents electrons to pass through the galaxy, which are captured by magnetic field radiating in radio-range.

If the magnetic field has a fixed direction or electrons are being ejected by galaxy core in fixed direction, then the radio jets can be formed. The interaction of electrons with the vicinity can form compact radio sources at the edge of radio jet.

Thus, we can draw the statement, that in the radio galaxies,where the energies of magnetic field and relativistic electrons are comparable, the radio jets can be formed, otherwise they do not form.

Магнитные поля и радиоджеты в гигантских радиогалактиках. Если энергия магнитного поля близка к энергии релятивистических электронов, то могут образоваться радиоджеты. В других случаях джеты не формируются.

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