Answer on question #61097, Physics / Astronomy | Astrophysics

What is an active galaxy? What is the source of its activity? Under what conditions does an active galaxy emit synchrotron radiation?

Answer:

What is an active galaxy?

Active galaxy is a galaxy with an active nucleus.

Active galactic nuclei are the nuclei where there are processes accompanied by the release of large amounts of energy, does not explain the activity are in their individual stars and gas-dust complexes.

Galaxy with active nucleus are divided into Seyfert galaxies, radio galaxies, quasars and this BL Lacertae by the nature of activity.

Signs of active galactic nuclei:

1. The spectrum of electromagnetic radiation active galaxy covers a wider range than conventional spectra of galaxies from radio range to the hard gamma radiation.

2. There is a fast light variability - variation "power" of the radiation source with a period of 10 minutes in the X-ray and up to about 10 years in the optical and radio bands.

3. Moving large masses of highly heated gas with great speed in different directions has been proven.

4. The visible morphological characteristics (in particular, emissions ("jets") and "hot spots").

5. The total radiation power greatly exceeds the capacity of ordinary galaxies; the basic amount of energy is released from the compact center.

Energy source of active galaxies

The most convincing hypothesis describes an active galactic nucleus as follows: a supermassive black hole is in the center, for which a very high speed falls heated to a high temperature gas. This releases a tremendous amount of energy, mainly in the x-ray and gamma-ray range. This energy heats the surrounding gas to the temperature in the millions and billions of degrees, causing it to emit different spectral observed lines in active galactic spectra emission line are born in this area, and therefore studying these lines, we can talk about properties of matter, close to the central black hole and even attempt to study the black hole itself.

Under what conditions does an active galaxy emit synchrotron radiation?

The observed synchrotron radiation active nuclei are due to the fall (accretion) of the substance in the form of plasma to the central object a black hole.

Accretion is of two types: a disk (when the infalling matter forms a disk) and spherical (when the infalling matter is relatively evenly fills the neighborhood of the black hole).

The disc material moves along spiral paths and the interaction with the magnetic field it emits so-called synchrotron radiation in the former case. This hypothesis is fully confirmed. However, the nature of the magnetic field remains unclear to this day. In the second case, the material falls to not rotating center.

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