Giant radio galaxies, with jets larger than 0.5 Mpc, represent the biggest single objects in the universe. The largest known radio source is J1420-0545 with a size of 4.7 Mpc while the highest-redshift giant radio galaxy known so far is J1145-0033 at a redshift of 2.055. They are rare among the entire population of radio galaxies and to date, there are about 300 giants known. Morphologically, most of giants resemble powerful Fanaroff–Riley type II objects. Physical evolution of giant radio galaxies is not well understood though for many years they have been of special interest for several reasons. These are useful for studying a number of astrophysical problems which include probing the late stages of evolution of radio sources and constraining orientation-dependent unified schemes. Since giants have about 10 to 100 times larger jets than normal radio galaxies, their influence on the ambient medium is correspondingly wider and is pronounced on scales comparable to those of clusters of galaxies or larger.

For several years GRGs were not supposed to be found at redshifts higher than z=1, because of the expected strong density increase of intergalactic medium (IGM). However, Law-Green et al. (1995) discovered 4C39.24 hosted by a galaxy located at z=1.883. Besides galaxies also quasar host giant radio structures. Kuźmicz, Kuligowska & Jamrozy (2011) noticed the most distant giant, J1145-0033, hosted by a quasar located at z=2.055. Radio quasars, which are on average more luminous than radio galaxies, should have higher lobe expansion speeds than radio galaxies and, assuming similar mean lifetimes of both these types of AGNs, radio quasars have the potential to reach larger size. A sample of 45 giant radio quasars was analysed by Kuźmicz & Jamrozy (2012).

The large angular sizes of GRGs (at least of those located at low redshift) provide a great opportunity to study their physical conditions in several different locations (independent points) within their lobes. GRGs are not easy to be identified at the modern interferometric radio survey maps available. Detecting steep-spectrum and low surface-brightness radio-bridges connecting the radio core with hotspots is a challenging task but it would be possibly facilitated with the advent of novel low-frequency telescopes such as the Low Frequency Array (LOFAR) and the Square Kilometre Array (SKA).

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**REFERENCES**


**CONSEQUENCES OF GRGS ENERGETIC OUTFLOWS**

- ISM/IGM cloud compression and triggering of starformation,
- formation of a population of baryon-rich, dark-matter-deficient dwarf galaxies from the mass swept out in the IGM by outflows from quasars,
- IGM pollution by magnetic field and particles.

**SYNCHROTRON AGES**

- high energy content,
- large ordered magnetic field structures (often on scales > 100 kpc),
- absence of strong large-scale shocks,
- very low upper limits on their internal thermal plasma densities,
- direct and efficient conversion of force-free magnetic field to particle energy.

**MEAN VALUES OF GRGS' PHYSICAL PARAMETERS**

- synch. age: \(40 \times 10^6\) yrs
- volume: \(10^{65}\) m
- magnetic field: 3 \(\mu\)G
- lobe pressure: \(10^{-3}\) dyn m
- jet power: \(7 \times 10^{45}\) erg s
- total energy: \(4 \times 10^{61}\) erg
- outer densities: \(10^{-5}\) cm

**GRGS HAVE**

- high energy content,
- large ordered magnetic field structures (often on scales > 100 kpc),
- absence of strong large-scale shocks,
- very low upper limits on their internal thermal plasma densities,
- direct and efficient conversion of force-free magnetic field to particle energy.

**THEORY**

- high energy content,
- large ordered magnetic field structures (often on scales > 100 kpc),
- absence of strong large-scale shocks,
- very low upper limits on their internal thermal plasma densities,
- direct and efficient conversion of force-free magnetic field to particle energy.