

Study of cosmic ray sources using data on extragalactic diffuse gamma-ray emission

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In space, ultra-high energy cosmic rays interact with cosmic microwave background and thus dissipate energy. This results in a lack of particles at energies about 10^{20} eV at the Earth (GZK-effect) if cosmic rays come from distances of more than ~ 100 Mpc. Another effect of interaction with cosmic microwave background is electromagnetic cascades that particles initiate in extragalactic space.

Assuming that sources of ultra-high energy cosmic rays are active galactic nuclei (AGN) we have calculated cosmic ray energy spectra at the Earth and intensity of cascade quanta produced. We consider several types of AGNs including the type in which supermassive black hole in AGN is surrounded by a superstrong magnetic field of $10^{10} - 10^{11}$ Gs. Proceeding from numerical results obtained and data by Pierre Auger Observatory, Telescope Array and by Fermi LAT we discuss the probable fraction of AGNs surrounded by superstrong magnetic fields.

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