

High-energy gamma-rays from magnetically arrested disks in nearby radio galaxies

The origins of the GeV gamma-rays from nearby radio galaxies are unknown. Hadronic emission from magnetically arrested disks (MADs) around central black holes (BHs) is proposed as a possible scenario. Particles are accelerated in the MAD by magnetic reconnection and stochastic turbulence acceleration. We investigate the feature of the radio galaxies that can be explained by the MAD model. We pick up the fifteen brightest radio galaxies in the GeV band from the Fermi 4LAC-DR2 catalog and apply the MAD model. We find that we can explain the GeV data by the MAD model if the accretion rate is lower than 0.1% of the Eddington rate. For a higher accretion rate, GeV gamma-rays are absorbed by the two-photon interaction due to copious low-energy photons. This causes the MAD model to fail to reproduce the GeV data. We also apply the MAD model to Sgr A and find that the GeV-TeV gamma-rays observed at the Galactic center do not come from the MAD of Sgr A.

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