

VHE gamma-ray Emission from Passive Supermassive Black Holes: Constraints for NGC 1399

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Very high energy (VHE; >100 GeV) gamma-rays are expected to be emitted from the vicinity of super-massive black holes (SMBH), irrespective of their activity state. In the magnetosphere of rotating SMBH, efficient acceleration of charged particles can take place through various processes. These particles could reach energies up to $E \sim 10^{19}$ eV. VHE gamma-ray emission from these particles is then feasible via leptonic or hadronic processes. Therefore passive systems, where the lack of a strong photon field allows the VHE gamma-rays to escape, are expected to be detected by Cherenkov telescopes. We present results from recent VHE experiments on the passive SMBH in the nearby elliptical galaxy NGC 1399. No gamma-ray signal has been found, neither by the H.E.S.S. experiment nor in the Fermi data analyzed here. We discuss possible implications for the physical characteristics of the system. We conclude that in a scenario where particles are accelerated in vacuum gaps in the magnetosphere, only a fraction ~ 0.3 of the gap is available for particle acceleration, indicating that the system is unlikely to be able to accelerate protons up to $E \sim 10^{19}$ eV.

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