

Ultra-high energy cosmic rays from supermassive black holes: contribution to particle flux on the Earth and extragalactic diffuse emission.

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We discuss ultra-high energy cosmic rays from supermassive black holes and their contribution to the particle flux on the Earth along with diffuse gamma-ray emission and cosmogenic neutrino flux. Several processes of particle acceleration in supermassive black holes are suggested in literature, based on which various particle injection spectra are considered in this paper. Cosmic ray spectra on the Earth and the intensity of quanta and neutrinos produced by particles in extragalactic space are obtained. The computational results are compared with the data by Pierre Auger Observatory and Telescope Array, with extragalactic diffuse gamma-ray emission measured by Fermi LAT, and neutrino flux obtained by IceCube. We conclude that supermassive black holes are possibly cosmic ray sources which make a negligible contribution to the particle flux at the Earth but contribute noticeably to extragalactic diffuse gamma-ray emission. We also conclude that data on diffuse gamma-ray emission can be applied to study processes in supermassive black holes. Model flux of cosmogenic neutrino is several orders lower than IceCube flux.

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