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Ultra-High-Energy Cosmic Rays and Neutrinos from relativistic jets of Active Galactic Nuclei

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Using particle tracking in 3D relativistic magnetohydrodynamical simulations, we investigate the espresso mechanism, a one-shot reacceleration of galactic cosmic rays that may lead to the production of ultra-high-energy cosmic rays (UHECRs) in the relativistic jets of active galactic nuclei. In this work we also include UHECR diffusion due to small-scale magnetic fluctuations, photodisintegration, and neutrino production. We assess the impact of such a sub-grid scattering on UHECR spectra and the relative importance of espresso and stochastic acceleration, finding that the highest energy particles are invariably produced via the espresso mechanism. Finally, we study high-energy neutrino production, taking into account the effects of external photon fields, and incorporate the effects of photodisintegration and the production of secondary particles. We discuss our results in the light of recent observations by Auger, Telescope Array and IceCube.

Keywords

UHECRs; Neutrino production; AGN jets; Particle acceleration;

Collaboration

other Collaboration

Subcategory

Theoretical Results

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