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Low-luminosity jetted AGN as particle multi-messenger sources

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Gamma rays, high-energy neutrinos and cosmic rays (CRs) impinging on Earth signal the existence of environments in the Universe that allow acceleration of particle populations into the extremely energetic regime. In order to understand these observable signatures from putative CR sources in-source acceleration of particles, their energy and time-dependent transport including interactions in an evolving environment and their escape from source have to be considered, in addition to source-to-Earth propagation.

Low-luminosity jets of Active Galactic Nuclei (AGN) constitute the most abundant persistent jet source population in the local Universe. The dominant subset of these, Fanaroff-Riley 0 (FR0) galaxies, have recently been proposed as sources contributing to the ultra-high-energy cosmic ray (UHECR) flux observed on Earth. This presentation assesses the survival, workings and multi-messenger signatures of UHECRs in low-luminosity jet environments, with focus on FR0 galaxies. For this purpose we use our recently developed, fully time-dependent CR particle and photon propagation framework which takes into account all relevant secondary particle production and energy loss processes, allows for an evolving source environment and efficient treatment of transport non-linearities due to the produced particles/photons being fed back into the simulation chain.

Submitted on behalf of a Collaboration?

No

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