

Ultra-High-Energy Cosmic Ray Contribution from the Spin-Down Power of Black Holes

Dr. Ioana Dutan/Institute of Space Science, Bucharest

Abstract: Cosmic rays are a direct sample of matter from outside the solar system, and their study can, for instance, provide important information on the chemical evolution of the universe or improve constraints on Galactic and extragalactic magnetic fields. In this talk, I present the results of our investigation of the production of ultra-high-energy cosmic ray (UHECR) in jets from low-luminosity active galactic nuclei (LLAGN). We propose a model for the UHECR contribution from the spin-down power of black holes in LLAGN, which present a jet power $P_j \leq 10^{46}$ erg s⁻¹. This is in contrast to the opinion that only high-luminosity AGN can accelerate particles to energies ≥ 50 EeV. Next, we apply the model to a complete sample of 29 steep spectrum radio sources with a total flux density greater than 0.5 Jy at 5 GHz to make predictions for the maximum particle energy and flux of the UHECRs from nearby AGN. These predictions are then used in the Monte Carlo simulations of the UHECR propagation from their sources to the Earth to obtain a sky plot for the UHECR events. Finally, we compare the spectral energy distribution of the predicted UHECR events with that observed by the Pierre Auger Observatory.