Ultra-high-energy cosmic messengers

Credit: Osaka Metropolitan University/Kyoto University/Ryuunosuke Takeshige

Rafael Alves Batista is a Professor at the Institut d'Astrophysique de Paris at the Sorbonne Université, in France
Website: https://www.8rafael.com/en/

Abstract: The origins of the most energetic particles in the Universe have been a long-standing puzzle. In the quest to identify their sources, it is crucial to understand how these particles are accelerated, how they escape their production sites, and which paths they take on their journey to Earth. The multimessenger framework has proven to be a powerful tool for exploring the Universe at these extreme energies.
In this talk, I will focus on the triad of (ultra-)high-energy messengers: cosmic rays, neutrinos, and gamma rays. I will begin with a summary of the state of affairs of the field, reviewing some key theoretical developments and recent experimental results. I will then explore the essential components required for building theoretical models that explain these observations. Particular emphasis will be placed on modelling the propagation of these messengers, including their interactions with matter and radiation fields, as well as with the poorly understood cosmic magnetic fields. Finally, I will discuss the prospects for constructing a unified and self-consistent model of the Universe at ultra-high energies and the implications such a model would have for astrophysics, cosmology, and fundamental physics.

Jueves 10 abril 2025, 12 horas, seminario de Física Nuclear

On-line

Centro de Astropartículas y Física de Altas Energías
Universidad Zaragoza