

Searching for the origin of Cosmic Rays

Friday 29 August 2025 09:30 (30 minutes)

In this talk, I will review recent progress in the measurement of Galactic and extragalactic cosmic rays, along with advances in their theoretical interpretation. For Galactic cosmic rays, in addition to direct observations from space-based experiments such as AMS-02, CALET, and DAMPE, the proton spectrum for the first time has been measured in the knee region by the ground-based LHAASO experiment. Detailed measurements of the diffuse gamma-ray background from the Galaxy have also been performed—below 1 TeV by Fermi, and from 1 TeV to 1 PeV by HAWC and LHAASO. Furthermore, the diffuse neutrino flux from the Galaxy has been measured for the first time by IceCube, with independent indications of an excess also reported by ANTARES and Baikal-GVD. I will present models of cosmic ray sources that are consistent with these multi-messenger observations and discuss how future measurements could help distinguish between them.

For extragalactic cosmic rays, I will review the main observational results from the Pierre Auger Observatory and the Telescope Array experiments. I will highlight recent advances in the combined interpretation of anisotropy, energy spectrum, and mass composition data and their connection to progress in understanding of Galactic and inter-galactic magnetic fields. Finally, I will discuss current prospects for probing the transition region between Galactic and extragalactic cosmic rays.

Collaboration you are representing

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