

7th Heidelberg International Symposium on High-Energy Gamma-Ray Astronomy

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Cosmic Rays and Neutrinos at the Highest Energies

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Ultrahigh energy cosmic rays (UHECRs), i.e., cosmic rays with energies above 10^{18} eV ($=1$ EeV), are the most energetic particles ever observed. Their sources are still a mystery. Giant ground-based observatories, such as the Pierre Auger Observatory and the Telescope Array, have shown that the sources of UHECRs are extragalactic. The observed UHECR spectrum has subtle features that can be explained by a combination of interactions with cosmic backgrounds, a changing composition of the primaries, and a maximum acceleration energy of the dominant sources. Hints of anisotropies begin to appear at energies above tens of EeV, just when statistics become very limited. We review the progress over the last decade of UHECR observations, the implication for the neutrino and photon counterparts, and the future outlook for discovering the origin of UHECRs.

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