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Particle Astrophysics with Space- and Ground-Based Telescopes

Department of Physics Colloquium



Very-high-energy (VHE) gamma-ray astrophysics has emerged as an exciting and vital field, with major discoveries made through experiments in space and on the ground. In space, at energies above 100 MeV, the Fermi satellite studies some of the most violent processes in the Universe, and explores nature's highest energy accelerators. At energies greater than about 100 GeV, gamma-ray astronomy can be carried out using ground-based telescopes, such as the VERITAS Observatory, which detects the Cherenkov light from air-showers initiated by gamma rays impacting the upper atmosphere. VERITAS has discovered many astrophysical sources of VHE gamma rays. Some of the most exciting sources detected are blazars, with highly variable fluxes. The combination of high luminosities and time variations seen in the data indicates that gamma-rays are an important component of the relativistic jet thought to characterize blazars. This talk will outline the scientific motivation for VHE gamma-ray astronomy, describe the techniques involved, and survey the astrophysics of the extreme Universe, as revealed by observations made with gamma rays.