Physics & Space Sciences Colloquium

Fermi on the Origin of Galactic Cosmic Rays

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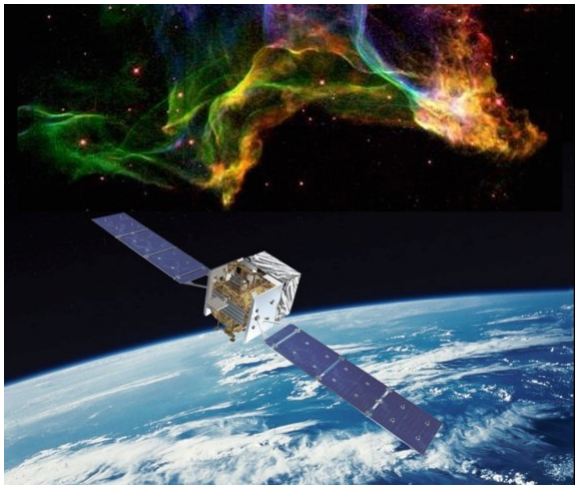

Charged particles at relativistic energies permeate our galaxy and are fundamental to astronomy as the primary ionizing source deep within dense interstellar clouds that form stars and planets. The origin of these "cosmic rays" has remained unresolved for more than a century. Though Galactic cosmic rays are widely thought to be accelerated in the expanding shock waves of supernovae, the chief difficulty has been to identify active accelerators and measure the energetics of protons and electrons. Seven years ago, the launch of NASA's Fermi Gamma-ray Space Telescope promised to reveal a new population of gamma-ray supernova remnants (SNRs) and determine their energetics. Now we have clear evidence of that cosmic-ray protons are accelerated in at least some SNRs and a population of more than 30 gamma-ray SNRs in which to trace the acceleration, escape, and diffusion of cosmic rays. The Fermi LAT collaboration recently released a new event-level analysis, dubbed Pass 8, which delivers dramatically improved spatial resolution and sensitivity at key energies to both identify SNRs and discriminate between cosmic ray protons and less energetic, but more radiative, relativistic electrons. I will present the latest morphological and spectral analyses of individual SNRs, as well as blind surveys for Galactic gamma-ray sources, that bring us ever closer to solving the cosmic-ray mystery.

Friday, February 5, 2016

502OPS, Room 140

4:00-5:00 PM

Light refreshments will be served