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The PAMELA mission: results after ten years in space

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For nearly ten years, from 2006 to 2016, PAMELA (a Payload for Antimatter-Matter Exploration and Light-nuclei Astrophysics) has been making high-precision measurements of the charged component of the cosmic radiation opening a new era of precision studies in cosmic-ray physics.

The measured antiparticle component of the cosmic radiation shows features that can be interpreted in terms of dark matter annihilation or pulsar contribution. The measurements of the energy spectra of protons, electrons, helium and light nuclei challenges our basic vision of the mechanisms of production, acceleration and propagation of cosmic rays in the galaxy. The study of the time dependence of the various components of the cosmic radiations clearly shows solar modulation effects as well as charge sign dependence.

PAMELA measurement of the energy spectra during solar energetic particle events fills the existing energy gap between the highest energy particles measured in space and the ground-based domain.

Finally, by sampling the particle radiation in different regions of the magnetosphere, PAMELA data provide a detailed study of this structure surrounding the Earth. In this talk I will review the PAMELA experiment and its scientific results.

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