Physics community to discuss latest results of the Alpha Magnetic Spectrometer experiment

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An artist's concept of the Alpha Magnetic Spectrometer installed on the International Space Station.

The Alpha Magnetic Spectrometer (AMS) collaboration will present today the latest results in its quest to understand the origin of cosmic rays and dark matter. These intriguing results will be shared and discussed during the "AMS days" starting today at CERN, with many of the world's leading theoretical physicists and principal investigators of some of the major experiments exploring the field of cosmic-ray physics. The main objective of this scientific exchange is to understand the interrelation between AMS results and those of other major cosmic-ray experiments and current theories.

"I am very pleased that so many of the world's leading scientists are interested in AMS results and are coming to CERN for this meeting," said AMS spokesperson Samuel Ting.

In particular, AMS is presenting unexpected new results on the antiproton/proton ratio in the cosmic rays, and on the proton and helium fluxes. Pre-existing models of ordinary cosmic rays cannot explain the AMS results. These new observations may provide important information on the understanding of cosmic-ray production and propagation. It is possible that the results may be explained by new astrophysical sources or new acceleration and propagation mechanisms, and the latest AMS results are also consistent with dark matter collisions.

"Unexplained results are stimulating for the physics community, whether you are a theorist or an experimentalist. This means that we may be at the door of a new discovery, or of a new mystery," said CERN Director General Rolf Heuer.

The latest AMS measurements of the positron fraction, the antiproton/proton ratio, the behaviour of the fluxes of electrons, positrons, protons, helium and other nuclei provide precise and unexpected information. The accuracy and characteristics of the data, simultaneously from many different types of cosmic rays, require a comprehensive model to ascertain if their origin is from dark matter, astrophysical sources, acceleration mechanisms or a combination.

To distinguish if the observed new phenomena are from dark matter, measurements are underway by the AMS collaboration. Discussions with principal investigators from IceCube, Pierre Auger Observatory, Fermi-LAT, H.E.S.S. and CTA, the Telescope Array, JEM-EUSO and ISS-CREAM, and with some of the world's leading theoretical physicists, may also show new directions for future cosmic-ray research.

AMS is the only major particle physics experiment on the International Space Station (ISS). In its first four years in orbit, AMS has collected more than 60 billion cosmic-ray events (electrons, positrons, protons, antiprotons, and nuclei of helium, lithium, boron, carbon, oxygen, …) up to multi-TeV energies. As an external payload on the ISS until at least 2024, AMS will continue to collect and analyse an increasing volume of statistics at the highest energies which, combined with in-depth knowledge of the detector and systematic errors, will produce valuable insight.

The conference can be followed on live webcast.

Provided by CERN