Alpha Magnetic Spectrometer (AMS) on the International Space Station (ISS)

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AMS is an International Collaboration (4 Institutes from TAIWAN, AS CSIST NCU NCKU)



AMS (A TeV precision, multipurpose magnetic spectrometer)



(Beam Test) Calibration at CERN SPS with different particles at different energies





AMS was installed on the ISS in May 2011, it will continue through the lifetime of ISS. (>= year 2028)

> In nine years, over 170 billion charged particles have been measured



On the Origins of Cosmic Antimatters



Four elementary particles (Protons Electrons Antiprotons Positrons) are stable and could travel through the Galaxy. They carry information of the origin and propagation history of cosmic rays.

The Origin of Cosmic Positrons and Electrons



Electrons and positrons spectra have totally distinct behavior: the properties of electrons and positrons cannot be studied from (e+ + e-) measurements.

AMS Measurement of Positron Flux Anisotropy

Sky map of positron arrival directions in galactic coordinates

Sky map in the hypothesis of isotropic positron flux



Upper limit on amplitude of the dipole anisotropy of the positron flux < 0.019 at 95% CL High energy positrons don't come from near pulsars.

Positrons and Dark Matter Model



Precision Study of Cosmic Nuclei



The measured spectra of Cosmic Rays break at ~200 GV.



Star

11

Secondary cosmic rays Li, Be, and B also have identical rigidity dependence but they are different from primaries



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The Sun has an 11-year activity cycle shown by sunspot number (SSN)







Observation of Fine Time Variations in Proton and Helium Fluxes



The detailed study of solar effects on cosmic rays is important to assess cosmic rays' Local Interstella Spectra. Space radiation measurements are crucial to model radiation hazards for human travel in space. 14