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Spaced-based Cosmic Ray Astrophysics EUN-SUK SEO, University of Maryland — The bulk of cosmic ray data has been obtained with great success by balloon-borne instruments, particularly with NASA's long duration flights over Antarctica. More recently, PAMELA on a Russian Satellite and AMS-02 on the International Space Station (ISS) started providing exciting measurements of particles and anti-particles with unprecedented precision upto TeV energies. In order to address open questions in cosmic ray astrophysics, future missions require space-flight exposures for rare species, such as isotopes, ultra-heavy elements, and high (the "knee" and above) energies. Isotopic composition measurements up to about 10 GeV/nucleon that are critical for understanding interstellar propagation and origin of the elements are still to be accomplished. The cosmic ray composition in the knee (PeV) region holds a key to understanding the origin of cosmic rays. Just last year, the JAXA-led CALET ISS mission, and the DAMPE Chinese Satellite were launched. NASA's ISS-CREAM completed its final verification at GSFC, and was delivered to KSC to await launch on SpaceX. In addition, a EUSO-like mission for ultrahigh energy cosmic rays and an HNX-like mission for ultraheavy nuclei could accomplish a vision for a cosmic ray observatory in space. Strong support of NASA's Explorer Program category of payloads would be needed for completion of these missions over the next decade.

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