Abstract

A new balloon instrument, the advanced thin ionization calorimeter (ATIC), is currently under development by an international collaboration involving researchers in the U.S., Germany, Korea, Russia and the Ukraine. The instrument will be used, in a series of long duration balloon flights, to investigate the charge composition and energy spectra of primary cosmic rays over the energy range from about 10^{10} to 10^{14} eV. The ATIC instrument is designed around a new technology, fully active Bismuth Germanate (BGO) ionization calorimeter that is used to measure the energy deposited by the cascades formed by particles interacting in an approximately 1 proton interaction length thick carbon target. The charge module comprises a highly segmented, triply redundant set of detectors (scintillator, silicon matrix and Cherenkov) that together give good incident charge resolution plus rejection of the 'backscattered' particles from the interaction. Trajectory information is obtained both from scintillator layers and from the cascade profile throughout the BGO calorimeter. This instrument is specifically designed to take advantage of the existing NASA long duration balloon flight capability in Antarctica and/or the Northern Hemisphere. The ATIC instrumentation is presented here, while a companion paper at this conference discusses the expected performance