

Energy Spectra of H and He from the ATIC-2 Experiment

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The Advanced Thin Ionization Calorimeter (ATIC) experiment measures the energy spectra of individual elements, from H to Fe, in the energy region from about 100 GeV to tens of TeV. A detailed description of the ATIC spectrometer, and the method of calorimeter calibration may be found in [1]. The event trajectory reconstruction, calibration of the silicon matrix detectors, algorithm of primary particle charge measurements, and charge resolution of the charge detector are described in [2, 3] in detail. The ATIC instrument was flown twice in long-duration balloon flights around the South Pole; the ATIC-1 test flight during Dec. 2000 – Jan. 2001 and the ATIC-2 science flight during Dec. 2002 – Jan. 2003. Due to the “lessons learned” during ATIC-1 significant improvements were made to the experiment prior to ATIC-2. As a result ATIC-2 encountered fewer problems during flight as well as during the subsequent data analysis. For example, the number of conflicts in deciding on the particular gain range to use in determining energy deposit [4] has been reduced in ATIC-2, relative to ATIC-1, to a point where these conflicts are now statistically insignificant. Preliminary results on proton and helium spectra from the ATIC-1 test flight were presented at the last ICRC [4, 5] and initial results from the ATIC-2 analysis were published in [6]. During the conference presentation and updated paper we will discuss the separation of protons from helium and present preliminary energy spectrum of each component, including de-convolution of the measured energy deposit spectra. The results are compared to previous data and to different cosmic ray propagation models, including a diffusion model with weak re-acceleration.

References

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