

**Properties of Heavy Cosmic Nuclei Phosphorus, Chlorine, Argon,
Potassium, and Calcium:
Results from the Alpha Magnetic Spectrometer
- SUPPLEMENTAL MATERIAL -**

(AMS Collaboration)

For references see the main text.

Detector.— AMS is a general purpose high energy particle physics detector in space. The layout of the detector is shown in Fig. S1. The key elements are the permanent magnet, the silicon tracker, four planes of time of flight (TOF) scintillation counters, the array of anti-coincidence counters (ACCs), the transition radiation detector (TRD), the ring imaging Čerenkov detector (RICH), and the electromagnetic calorimeter (ECAL).

The AMS coordinate system is concentric with the magnet. The x axis is parallel to the main component of the magnetic field and the z axis points vertically with $z = 0$ at the center of the magnet. The (y - z) plane is the bending plane.

The central field of the magnet is 1.4 kG. Before flight, the field was measured in 120 000 locations to an accuracy of better than 2 G.

The tracker has nine layers, the first ($L1$) at the top of the detector, the second ($L2$) just above the magnet, six ($L3$ to $L8$) within the bore of the magnet, and the last ($L9$) just above the ECAL. $L2$ to $L8$ constitute the inner tracker. Each layer contains double-sided silicon microstrip detectors, which independently measure the x and y coordinates. The tracker accurately determines the trajectory of cosmic rays by multiple measurements of the coordinates with a resolution in each layer of $7.6 \mu\text{m}$ for P, $6.8 \mu\text{m}$ for Cl, $6.2 \mu\text{m}$ for Ar, $5.9 \mu\text{m}$ for K, and $5.6 \mu\text{m}$ for Ca nuclei in the bending (y) direction [21], see Fig. S2. Together, the tracker and the magnet measure the rigidity R of charged cosmic rays, with a maximum detectable rigidity of 3.0 to 3.6 TV for P to Ca nuclei over the 3 m lever arm from $L1$ to $L9$. Each layer of the tracker provides an independent measurement of the charge Z with a resolution of $\sigma_Z/Z = 2.9\%$ for P to Ca nuclei. Overall, the inner tracker has a resolution of $\sigma_Z/Z = 1.1\%$.

As seen from Fig. S1, two of the TOF planes are located above the magnet (upper TOF) and two planes are below the magnet (lower TOF). The overall velocity ($\beta = v/c$) resolution has been measured to be $\sigma(1/\beta) = 0.01$ for P to Ca nuclei. This discriminates between upward- and downward-going particles. The pulse heights of the two upper planes are combined to provide an independent measurement of the charge with an accuracy $\sigma_Z/Z = 2\%$. The pulse heights from the two lower planes are combined to provide another independent charge measurement with the same accuracy.

Nuclei traversing AMS were triggered as described in Ref. [24]. The trigger efficiency has been measured to be $>95\%$ with the uncertainty $< 1\%$ over the entire rigidity range.

Monte Carlo (MC) simulated events were produced using a dedicated program developed by the collaboration based on the GEANT4-10.3 package [25]. The program simulates electromagnetic and hadronic [26] interactions of particles in the material of AMS and generates detector responses. The digitization of the signals is simulated precisely according to the measured characteristics of the electronics. The simulated events then undergo the same reconstruction as used for the data.

Event Selection.— In the first 13.5 years, AMS has collected 2.4×10^{11} cosmic ray events. The collection time used in this analysis includes only those seconds during which the detector was in normal operating conditions and, in addition, AMS was pointing within 40° of the local zenith and the International Space Station was outside of the South Atlantic Anomaly. Due to the geomagnetic field, this collection time increases with rigidity, reaching 2.9×10^8 s above 30 GV.

Cosmic ray nuclei are required to be downward going and to have a reconstructed track in the inner tracker which passes through $L1$. For the Ar and Ca, in the highest rigidity region, $R \geq 1.2$ TV, the track is also required to pass through $L9$. Track fitting quality

criteria such as a $\chi^2/\text{d.o.f.} < 10$ in the bending plane are applied.

Charge measurements on $L1$, the upper TOF, the inner tracker, and, for $R > 1.2$ TV, the lower TOF and $L9$ are required to be compatible with charge $Z = 15$ for P, $Z = 17$ for Cl, $Z = 18$ for Ar, $Z = 19$ for K, and $Z = 20$ for Ca, see Fig. S4 for the inner tracker.

The measured rigidity is required to be greater than a factor of 1.2 times the maximum geomagnetic cutoff within the AMS field of view. The cutoff was calculated by backtracking [39] from the top of AMS out to 50 Earth’s radii using the most recent International Geomagnetic Reference Field model [40].

Data Analysis.— The effective acceptance for a given bin i is defined as

$$A_i = A^{\text{geom}} \epsilon_i^{\text{surv}} \epsilon_i^{\text{sel}} \prod_{k=1}^4 (1 + \delta_i^k), \quad (\text{S1})$$

where A^{geom} is the geometric acceptance, ϵ_i^{surv} is the nuclei survival probability in the AMS detector, ϵ_i^{sel} is the selection efficiency, and δ_i^k are minor corrections to the selection efficiency, namely for efficiencies of ($k = 1$) velocity vector determination, ($k = 2$) track finding, ($k = 3$) charge determination, and ($k = 4$) tracker quality cuts such as a $\chi^2/\text{d.o.f.} < 10$ in the bending plane. The geometric acceptance for this analysis is $A^{\text{geom}} = 2016 \text{ cm}^2\text{sr}$. The products $A^{\text{geom}} \epsilon_i^{\text{surv}} \epsilon_i^{\text{sel}}$ are determined from Monte Carlo simulation and shown in Fig S6a. In order to determine the corrections δ , for efficiencies of velocity vector determination, track finding, and charge determination independent event samples were selected using information from the detectors unrelated to that selection. Efficiencies for tracker quality cuts were directly compared between data and Monte Carlo simulations. The overall corrections were found to be a smooth function of the rigidity and shown in Fig. S6b.

The material traversed by nuclei from the top of AMS to $L9$ is composed primarily of carbon and aluminum. The survival probabilities of P, S, Cl, Ar, and Ca nuclei due to interactions in the materials were measured using cosmic ray data collected by AMS as described in Ref. [26]. The simulation of nuclear interactions has been validated with data using all AMS measured nuclear charge changing cross-sections (e.g. $\text{Ca} \rightarrow \text{He} \dots \text{K} + \text{X}$). Figure S7a shows three examples $\text{Ca} \rightarrow \text{Ar} + \text{X}$, $\text{Ca} \rightarrow \text{Si} + \text{X}$, and $\text{Ca} \rightarrow \text{O} + \text{X}$. Figure S7b,c shows the examples of comparison between the simulated and measured survival probabilities between $L1$ and $L2$ in TRD and upper TOF for Ar and Ca.

TABLE SI: The P flux Φ_P as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_P	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(7.613	0.174	0.405	0.895	0.037	0.983) $\times 10^{-3}$
2.40 – 2.67	(8.292	0.157	0.421	0.522	0.025	0.671) $\times 10^{-3}$
2.67 – 2.97	(8.682	0.144	0.426	0.271	0.015	0.505) $\times 10^{-3}$
2.97 – 3.29	(8.859	0.130	0.424	0.130	0.006	0.444) $\times 10^{-3}$
3.29 – 3.64	(8.219	0.113	0.387	0.067	0.001	0.393) $\times 10^{-3}$
3.64 – 4.02	(7.115	0.096	0.331	0.051	0.004	0.335) $\times 10^{-3}$
4.02 – 4.43	(6.156	0.080	0.284	0.047	0.006	0.288) $\times 10^{-3}$
4.43 – 4.88	(5.021	0.062	0.230	0.040	0.007	0.234) $\times 10^{-3}$
4.88 – 5.37	(4.174	0.051	0.191	0.033	0.007	0.194) $\times 10^{-3}$
5.37 – 5.90	(3.352	0.042	0.153	0.026	0.006	0.155) $\times 10^{-3}$
5.90 – 6.47	(2.637	0.034	0.120	0.019	0.005	0.122) $\times 10^{-3}$
6.47 – 7.09	(2.198	0.028	0.100	0.015	0.005	0.101) $\times 10^{-3}$
7.09 – 7.76	(1.777	0.023	0.081	0.011	0.004	0.082) $\times 10^{-3}$
7.76 – 8.48	(1.477	0.019	0.067	0.009	0.004	0.068) $\times 10^{-3}$
8.48 – 9.26	(1.164	0.016	0.053	0.006	0.003	0.053) $\times 10^{-3}$
9.26 – 10.1	(9.407	0.134	0.429	0.043	0.026	0.432) $\times 10^{-4}$
10.1 – 11.0	(7.579	0.114	0.346	0.031	0.022	0.348) $\times 10^{-4}$
11.0 – 12.0	(6.079	0.095	0.278	0.022	0.018	0.279) $\times 10^{-4}$
12.0 – 13.0	(5.085	0.086	0.232	0.017	0.016	0.234) $\times 10^{-4}$
13.0 – 14.1	(4.006	0.071	0.183	0.012	0.013	0.184) $\times 10^{-4}$
14.1 – 15.3	(3.289	0.060	0.151	0.009	0.011	0.151) $\times 10^{-4}$
15.3 – 16.6	(2.669	0.051	0.122	0.006	0.009	0.123) $\times 10^{-4}$
16.6 – 18.0	(2.158	0.043	0.099	0.005	0.007	0.100) $\times 10^{-4}$
18.0 – 19.5	(1.688	0.035	0.078	0.003	0.006	0.078) $\times 10^{-4}$
19.5 – 21.1	(1.353	0.029	0.062	0.003	0.005	0.063) $\times 10^{-4}$
21.1 – 22.8	(1.094	0.024	0.050	0.002	0.004	0.051) $\times 10^{-4}$
22.8 – 24.7	(8.903	0.197	0.411	0.015	0.033	0.413) $\times 10^{-5}$
24.7 – 26.7	(7.034	0.165	0.325	0.012	0.027	0.327) $\times 10^{-5}$
26.7 – 28.8	(5.573	0.141	0.258	0.009	0.022	0.259) $\times 10^{-5}$
28.8 – 33.5	(4.012	0.078	0.186	0.007	0.016	0.187) $\times 10^{-5}$
33.5 – 38.9	(2.752	0.060	0.128	0.005	0.011	0.129) $\times 10^{-5}$
38.9 – 45.1	(1.730	0.045	0.081	0.003	0.007	0.081) $\times 10^{-5}$
45.1 – 52.2	(1.193	0.035	0.056	0.003	0.005	0.056) $\times 10^{-5}$
52.2 – 60.3	(7.250	0.252	0.342	0.017	0.034	0.344) $\times 10^{-6}$
60.3 – 69.7	(4.853	0.193	0.230	0.013	0.024	0.231) $\times 10^{-6}$
69.7 – 80.5	(3.208	0.146	0.152	0.010	0.017	0.154) $\times 10^{-6}$
80.5 – 93.0	(2.130	0.110	0.102	0.007	0.012	0.103) $\times 10^{-6}$
93.0 – 108	(1.332	0.080	0.064	0.005	0.008	0.065) $\times 10^{-6}$

Table continued

TABLE SI – (Continued).

Rigidity [GV]	Φ_P	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
108 – 125	(8.262	0.590	0.398	0.032	0.055	0.403) $\times 10^{-7}$
125 – 147	(5.570	0.429	0.271	0.024	0.041	0.275) $\times 10^{-7}$
147 – 175	(3.035	0.281	0.149	0.015	0.025	0.152) $\times 10^{-7}$
175 – 211	(1.878	0.195	0.094	0.012	0.017	0.096) $\times 10^{-7}$
211 – 259	(1.115	0.128	0.057	0.009	0.012	0.059) $\times 10^{-7}$
259 – 330	(4.744	0.683	0.253	0.057	0.063	0.267) $\times 10^{-8}$
330 – 441	(2.575	0.394	0.147	0.049	0.044	0.161) $\times 10^{-8}$
441 – 660	(7.938	1.621	0.517	0.272	0.193	0.615) $\times 10^{-9}$
660 – 1200	(2.387	0.534	0.201	0.185	0.103	0.292) $\times 10^{-9}$

TABLE III: The Cl flux Φ_{Cl} as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_{Cl}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(8.666	0.220	0.495	1.026	0.042	1.140) $\times 10^{-3}$
2.40 – 2.67	(8.957	0.174	0.483	0.601	0.027	0.772) $\times 10^{-3}$
2.67 – 2.97	(8.817	0.155	0.455	0.315	0.015	0.553) $\times 10^{-3}$
2.97 – 3.29	(8.577	0.136	0.428	0.160	0.006	0.457) $\times 10^{-3}$
3.29 – 3.64	(7.908	0.118	0.386	0.089	0.001	0.396) $\times 10^{-3}$
3.64 – 4.02	(7.070	0.102	0.340	0.065	0.004	0.346) $\times 10^{-3}$
4.02 – 4.43	(6.176	0.085	0.293	0.054	0.006	0.298) $\times 10^{-3}$
4.43 – 4.88	(5.238	0.068	0.247	0.043	0.007	0.251) $\times 10^{-3}$
4.88 – 5.37	(4.439	0.056	0.208	0.035	0.007	0.211) $\times 10^{-3}$
5.37 – 5.90	(3.586	0.046	0.168	0.026	0.007	0.170) $\times 10^{-3}$
5.90 – 6.47	(2.805	0.037	0.131	0.019	0.006	0.133) $\times 10^{-3}$
6.47 – 7.09	(2.393	0.031	0.112	0.015	0.005	0.113) $\times 10^{-3}$
7.09 – 7.76	(1.910	0.025	0.090	0.011	0.005	0.090) $\times 10^{-3}$
7.76 – 8.48	(1.531	0.021	0.072	0.008	0.004	0.073) $\times 10^{-3}$
8.48 – 9.26	(1.272	0.018	0.060	0.006	0.003	0.060) $\times 10^{-3}$
9.26 – 10.1	(1.010	0.015	0.048	0.005	0.003	0.048) $\times 10^{-3}$
10.1 – 11.0	(8.255	0.127	0.391	0.035	0.024	0.393) $\times 10^{-4}$
11.0 – 12.0	(6.783	0.108	0.322	0.027	0.020	0.323) $\times 10^{-4}$
12.0 – 13.0	(5.356	0.094	0.254	0.019	0.017	0.256) $\times 10^{-4}$
13.0 – 14.1	(4.477	0.081	0.213	0.015	0.014	0.214) $\times 10^{-4}$
14.1 – 15.3	(3.489	0.067	0.166	0.011	0.011	0.167) $\times 10^{-4}$
15.3 – 16.6	(2.932	0.057	0.140	0.008	0.010	0.140) $\times 10^{-4}$
16.6 – 18.0	(2.313	0.047	0.110	0.006	0.008	0.111) $\times 10^{-4}$
18.0 – 19.5	(1.865	0.039	0.089	0.005	0.007	0.089) $\times 10^{-4}$
19.5 – 21.1	(1.496	0.033	0.072	0.004	0.005	0.072) $\times 10^{-4}$
21.1 – 22.8	(1.305	0.028	0.062	0.003	0.005	0.063) $\times 10^{-4}$
22.8 – 24.7	(9.836	0.223	0.471	0.021	0.037	0.473) $\times 10^{-5}$
24.7 – 26.7	(8.057	0.190	0.386	0.016	0.031	0.388) $\times 10^{-5}$
26.7 – 28.8	(6.580	0.165	0.315	0.013	0.025	0.317) $\times 10^{-5}$
28.8 – 33.5	(4.656	0.091	0.223	0.009	0.018	0.224) $\times 10^{-5}$
33.5 – 38.9	(3.034	0.068	0.146	0.006	0.012	0.146) $\times 10^{-5}$
38.9 – 45.1	(2.111	0.054	0.102	0.004	0.009	0.102) $\times 10^{-5}$
45.1 – 52.2	(1.349	0.040	0.065	0.002	0.006	0.065) $\times 10^{-5}$
52.2 – 60.3	(9.255	0.307	0.448	0.018	0.043	0.451) $\times 10^{-6}$
60.3 – 69.7	(5.819	0.228	0.283	0.012	0.029	0.285) $\times 10^{-6}$
69.7 – 80.5	(3.788	0.172	0.185	0.008	0.020	0.187) $\times 10^{-6}$
80.5 – 93.0	(2.394	0.128	0.118	0.006	0.013	0.119) $\times 10^{-6}$
93.0 – 108	(1.647	0.096	0.082	0.004	0.010	0.083) $\times 10^{-6}$

Table continued

TABLE SII – (Continued).

Rigidity [GV]	Φ_{Cl}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
108 – 125	(9.844	0.695	0.496	0.028	0.065	0.501) $\times 10^{-7}$
125 – 147	(6.352	0.486	0.325	0.021	0.046	0.329) $\times 10^{-7}$
147 – 175	(4.348	0.359	0.227	0.017	0.035	0.231) $\times 10^{-7}$
175 – 211	(2.104	0.222	0.113	0.011	0.020	0.115) $\times 10^{-7}$
211 – 259	(1.737	0.175	0.096	0.013	0.019	0.099) $\times 10^{-7}$
259 – 330	(7.969	0.970	0.463	0.094	0.108	0.484) $\times 10^{-8}$
330 – 441	(3.098	0.489	0.191	0.060	0.056	0.208) $\times 10^{-8}$
441 – 660	(1.194	0.216	0.080	0.043	0.031	0.096) $\times 10^{-8}$
660 – 1200	(3.282	0.674	0.250	0.279	0.154	0.405) $\times 10^{-9}$

TABLE III: The Ar flux Φ_{Ar} as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_{Ar}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(1.403	0.029	0.075	0.153	0.007	0.170) $\times 10^{-2}$
2.40 – 2.67	(1.575	0.024	0.080	0.098	0.005	0.127) $\times 10^{-2}$
2.67 – 2.97	(1.502	0.021	0.074	0.050	0.003	0.090) $\times 10^{-2}$
2.97 – 3.29	(1.423	0.018	0.069	0.025	0.001	0.073) $\times 10^{-2}$
3.29 – 3.64	(1.370	0.016	0.065	0.015	0.000	0.067) $\times 10^{-2}$
3.64 – 4.02	(1.168	0.013	0.055	0.011	0.001	0.056) $\times 10^{-2}$
4.02 – 4.43	(9.919	0.110	0.463	0.086	0.009	0.471) $\times 10^{-3}$
4.43 – 4.88	(8.365	0.087	0.388	0.070	0.011	0.394) $\times 10^{-3}$
4.88 – 5.37	(7.020	0.072	0.324	0.056	0.011	0.329) $\times 10^{-3}$
5.37 – 5.90	(5.740	0.059	0.265	0.043	0.011	0.268) $\times 10^{-3}$
5.90 – 6.47	(4.834	0.049	0.223	0.034	0.010	0.225) $\times 10^{-3}$
6.47 – 7.09	(3.842	0.040	0.177	0.025	0.009	0.179) $\times 10^{-3}$
7.09 – 7.76	(3.136	0.033	0.144	0.019	0.008	0.146) $\times 10^{-3}$
7.76 – 8.48	(2.545	0.027	0.117	0.014	0.007	0.118) $\times 10^{-3}$
8.48 – 9.26	(2.074	0.023	0.095	0.011	0.006	0.096) $\times 10^{-3}$
9.26 – 10.1	(1.737	0.020	0.080	0.008	0.005	0.081) $\times 10^{-3}$
10.1 – 11.0	(1.405	0.017	0.065	0.006	0.004	0.065) $\times 10^{-3}$
11.0 – 12.0	(1.165	0.014	0.054	0.005	0.004	0.054) $\times 10^{-3}$
12.0 – 13.0	(9.207	0.125	0.425	0.033	0.029	0.427) $\times 10^{-4}$
13.0 – 14.1	(7.494	0.106	0.346	0.025	0.024	0.348) $\times 10^{-4}$
14.1 – 15.3	(6.219	0.090	0.288	0.019	0.020	0.289) $\times 10^{-4}$
15.3 – 16.6	(4.982	0.076	0.231	0.014	0.017	0.232) $\times 10^{-4}$
16.6 – 18.0	(4.016	0.064	0.186	0.010	0.014	0.187) $\times 10^{-4}$
18.0 – 19.5	(3.319	0.054	0.154	0.008	0.012	0.154) $\times 10^{-4}$
19.5 – 21.1	(2.702	0.045	0.125	0.006	0.010	0.126) $\times 10^{-4}$
21.1 – 22.8	(2.135	0.037	0.099	0.004	0.008	0.099) $\times 10^{-4}$
22.8 – 24.7	(1.736	0.030	0.081	0.003	0.006	0.081) $\times 10^{-4}$
24.7 – 26.7	(1.422	0.026	0.066	0.003	0.005	0.066) $\times 10^{-4}$
26.7 – 28.8	(1.166	0.023	0.054	0.002	0.004	0.054) $\times 10^{-4}$
28.8 – 33.5	(8.378	0.126	0.390	0.014	0.033	0.392) $\times 10^{-5}$
33.5 – 38.9	(5.504	0.095	0.257	0.009	0.022	0.258) $\times 10^{-5}$
38.9 – 45.1	(3.587	0.071	0.167	0.006	0.015	0.168) $\times 10^{-5}$
45.1 – 52.2	(2.413	0.055	0.113	0.004	0.011	0.113) $\times 10^{-5}$
52.2 – 60.3	(1.590	0.042	0.074	0.003	0.007	0.075) $\times 10^{-5}$
60.3 – 69.7	(1.090	0.032	0.051	0.002	0.005	0.051) $\times 10^{-5}$
69.7 – 80.5	(7.073	0.242	0.333	0.015	0.036	0.335) $\times 10^{-6}$
80.5 – 93.0	(4.688	0.183	0.222	0.011	0.026	0.223) $\times 10^{-6}$

Table continued

TABLE SIII – (Continued).

Rigidity [GV]	Φ_{Ar}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
93.0 – 108	(2.664	0.126	0.126	0.007	0.016	0.128) $\times 10^{-6}$
108 – 125	(1.984	0.102	0.095	0.006	0.013	0.096) $\times 10^{-6}$
125 – 147	(1.316	0.072	0.063	0.005	0.009	0.064) $\times 10^{-6}$
147 – 175	(8.236	0.516	0.399	0.034	0.062	0.405) $\times 10^{-7}$
175 – 211	(4.183	0.323	0.205	0.021	0.035	0.209) $\times 10^{-7}$
211 – 259	(2.215	0.200	0.110	0.014	0.021	0.113) $\times 10^{-7}$
259 – 330	(1.314	0.127	0.067	0.011	0.015	0.069) $\times 10^{-7}$
330 – 441	(7.308	0.767	0.381	0.082	0.105	0.403) $\times 10^{-8}$
441 – 660	(3.032	0.332	0.164	0.056	0.060	0.184) $\times 10^{-8}$
660 – 1200	(6.794	1.029	0.396	0.281	0.242	0.543) $\times 10^{-9}$
1200 – 3000	(0.877	0.544	0.077	0.024	0.050	0.095) $\times 10^{-9}$

TABLE SIV: The K flux Φ_K as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_K	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(1.213	0.040	0.072	0.564	0.006	0.568) $\times 10^{-2}$
2.40 – 2.67	(1.208	0.022	0.068	0.289	0.004	0.297) $\times 10^{-2}$
2.67 – 2.97	(1.228	0.019	0.066	0.134	0.002	0.149) $\times 10^{-2}$
2.97 – 3.29	(1.177	0.017	0.062	0.047	0.001	0.077) $\times 10^{-2}$
3.29 – 3.64	(1.076	0.014	0.055	0.014	0.000	0.057) $\times 10^{-2}$
3.64 – 4.02	(9.491	0.122	0.477	0.073	0.005	0.483) $\times 10^{-3}$
4.02 – 4.43	(7.779	0.098	0.387	0.074	0.007	0.394) $\times 10^{-3}$
4.43 – 4.88	(6.569	0.078	0.324	0.071	0.009	0.332) $\times 10^{-3}$
4.88 – 5.37	(5.413	0.064	0.266	0.061	0.009	0.273) $\times 10^{-3}$
5.37 – 5.90	(4.419	0.053	0.216	0.051	0.008	0.222) $\times 10^{-3}$
5.90 – 6.47	(3.631	0.044	0.178	0.040	0.008	0.182) $\times 10^{-3}$
6.47 – 7.09	(3.018	0.036	0.148	0.032	0.007	0.151) $\times 10^{-3}$
7.09 – 7.76	(2.469	0.029	0.121	0.024	0.006	0.123) $\times 10^{-3}$
7.76 – 8.48	(2.052	0.025	0.101	0.018	0.005	0.102) $\times 10^{-3}$
8.48 – 9.26	(1.622	0.021	0.080	0.012	0.004	0.081) $\times 10^{-3}$
9.26 – 10.1	(1.331	0.018	0.066	0.009	0.004	0.066) $\times 10^{-3}$
10.1 – 11.0	(1.087	0.015	0.054	0.006	0.003	0.054) $\times 10^{-3}$
11.0 – 12.0	(8.680	0.126	0.430	0.041	0.026	0.432) $\times 10^{-4}$
12.0 – 13.0	(7.054	0.112	0.350	0.028	0.022	0.352) $\times 10^{-4}$
13.0 – 14.1	(5.791	0.095	0.288	0.020	0.019	0.289) $\times 10^{-4}$
14.1 – 15.3	(4.687	0.080	0.233	0.013	0.015	0.234) $\times 10^{-4}$
15.3 – 16.6	(3.746	0.067	0.187	0.009	0.013	0.187) $\times 10^{-4}$
16.6 – 18.0	(2.993	0.056	0.149	0.006	0.010	0.150) $\times 10^{-4}$
18.0 – 19.5	(2.402	0.047	0.120	0.004	0.008	0.120) $\times 10^{-4}$
19.5 – 21.1	(1.938	0.039	0.097	0.002	0.007	0.097) $\times 10^{-4}$
21.1 – 22.8	(1.554	0.032	0.078	0.002	0.006	0.078) $\times 10^{-4}$
22.8 – 24.7	(1.254	0.027	0.063	0.001	0.005	0.063) $\times 10^{-4}$
24.7 – 26.7	(9.892	0.223	0.496	0.007	0.038	0.498) $\times 10^{-5}$
26.7 – 28.8	(8.027	0.193	0.403	0.006	0.031	0.404) $\times 10^{-5}$
28.8 – 33.5	(5.989	0.109	0.301	0.005	0.024	0.302) $\times 10^{-5}$
33.5 – 38.9	(3.823	0.082	0.193	0.004	0.016	0.194) $\times 10^{-5}$
38.9 – 45.1	(2.435	0.061	0.123	0.003	0.010	0.124) $\times 10^{-5}$
45.1 – 52.2	(1.603	0.046	0.081	0.003	0.007	0.082) $\times 10^{-5}$
52.2 – 60.3	(1.071	0.035	0.055	0.003	0.005	0.055) $\times 10^{-5}$
60.3 – 69.7	(6.610	0.259	0.338	0.024	0.033	0.341) $\times 10^{-6}$
69.7 – 80.5	(4.628	0.202	0.238	0.021	0.025	0.240) $\times 10^{-6}$
80.5 – 93.0	(2.958	0.151	0.153	0.017	0.018	0.155) $\times 10^{-6}$
93.0 – 108	(1.776	0.107	0.093	0.013	0.012	0.094) $\times 10^{-6}$

Table continued

TABLE SIV – (Continued).

Rigidity [GV]	Φ_K	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
108 – 125	(1.135	0.080	0.060	0.010	0.008	0.061) $\times 10^{-6}$
125 – 147	(8.002	0.586	0.428	0.081	0.066	0.441) $\times 10^{-7}$
147 – 175	(4.644	0.401	0.254	0.057	0.043	0.264) $\times 10^{-7}$
175 – 211	(2.621	0.265	0.147	0.040	0.028	0.155) $\times 10^{-7}$
211 – 259	(1.718	0.188	0.101	0.032	0.021	0.108) $\times 10^{-7}$
259 – 330	(6.768	0.977	0.422	0.164	0.101	0.464) $\times 10^{-8}$
330 – 441	(2.836	0.502	0.195	0.092	0.053	0.222) $\times 10^{-8}$
441 – 660	(1.536	0.233	0.124	0.072	0.040	0.149) $\times 10^{-8}$
660 – 1200	(2.837	0.697	0.302	0.225	0.117	0.395) $\times 10^{-9}$

TABLE SV: The Ca flux Φ_{Ca} as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_{Ca}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(2.370	0.062	0.134	0.429	0.012	0.450) $\times 10^{-2}$
2.40 – 2.67	(2.357	0.031	0.127	0.231	0.007	0.263) $\times 10^{-2}$
2.67 – 2.97	(2.341	0.027	0.121	0.113	0.004	0.166) $\times 10^{-2}$
2.97 – 3.29	(2.262	0.024	0.114	0.049	0.002	0.125) $\times 10^{-2}$
3.29 – 3.64	(2.039	0.020	0.101	0.022	0.000	0.104) $\times 10^{-2}$
3.64 – 4.02	(1.832	0.018	0.090	0.016	0.001	0.091) $\times 10^{-2}$
4.02 – 4.43	(1.536	0.014	0.074	0.013	0.001	0.076) $\times 10^{-2}$
4.43 – 4.88	(1.311	0.012	0.063	0.011	0.002	0.064) $\times 10^{-2}$
4.88 – 5.37	(1.083	0.009	0.052	0.009	0.002	0.053) $\times 10^{-2}$
5.37 – 5.90	(8.907	0.077	0.427	0.075	0.017	0.433) $\times 10^{-3}$
5.90 – 6.47	(7.483	0.064	0.358	0.061	0.016	0.364) $\times 10^{-3}$
6.47 – 7.09	(6.067	0.052	0.290	0.047	0.014	0.295) $\times 10^{-3}$
7.09 – 7.76	(5.075	0.043	0.243	0.037	0.012	0.246) $\times 10^{-3}$
7.76 – 8.48	(4.221	0.036	0.203	0.029	0.011	0.205) $\times 10^{-3}$
8.48 – 9.26	(3.465	0.030	0.166	0.022	0.009	0.168) $\times 10^{-3}$
9.26 – 10.1	(2.824	0.026	0.136	0.017	0.008	0.137) $\times 10^{-3}$
10.1 – 11.0	(2.299	0.022	0.111	0.013	0.007	0.112) $\times 10^{-3}$
11.0 – 12.0	(1.908	0.019	0.092	0.010	0.006	0.093) $\times 10^{-3}$
12.0 – 13.0	(1.541	0.017	0.074	0.007	0.005	0.075) $\times 10^{-3}$
13.0 – 14.1	(1.316	0.014	0.064	0.006	0.004	0.064) $\times 10^{-3}$
14.1 – 15.3	(1.062	0.012	0.051	0.004	0.003	0.052) $\times 10^{-3}$
15.3 – 16.6	(8.626	0.103	0.418	0.031	0.029	0.420) $\times 10^{-4}$
16.6 – 18.0	(7.116	0.088	0.345	0.023	0.024	0.346) $\times 10^{-4}$
18.0 – 19.5	(5.808	0.074	0.282	0.017	0.020	0.283) $\times 10^{-4}$
19.5 – 21.1	(4.756	0.062	0.231	0.013	0.017	0.232) $\times 10^{-4}$
21.1 – 22.8	(3.839	0.052	0.186	0.009	0.014	0.187) $\times 10^{-4}$
22.8 – 24.7	(3.164	0.043	0.154	0.007	0.012	0.154) $\times 10^{-4}$
24.7 – 26.7	(2.565	0.037	0.125	0.005	0.010	0.125) $\times 10^{-4}$
26.7 – 28.8	(2.149	0.032	0.104	0.004	0.008	0.105) $\times 10^{-4}$
28.8 – 33.5	(1.578	0.018	0.077	0.003	0.006	0.077) $\times 10^{-4}$
33.5 – 38.9	(1.042	0.014	0.051	0.002	0.004	0.051) $\times 10^{-4}$
38.9 – 45.1	(7.053	0.105	0.344	0.010	0.029	0.345) $\times 10^{-5}$
45.1 – 52.2	(4.644	0.080	0.227	0.007	0.020	0.228) $\times 10^{-5}$
52.2 – 60.3	(3.125	0.061	0.153	0.005	0.014	0.154) $\times 10^{-5}$
60.3 – 69.7	(2.143	0.047	0.105	0.005	0.010	0.106) $\times 10^{-5}$
69.7 – 80.5	(1.339	0.035	0.066	0.003	0.007	0.066) $\times 10^{-5}$
80.5 – 93.0	(9.348	0.272	0.462	0.030	0.050	0.466) $\times 10^{-6}$

Table continued

TABLE SV – (Continued).

Rigidity [GV]	Φ_{Ca}	$\sigma_{stat.}$	$\sigma_{acc.}$	$\sigma_{unf.}$	σ_{scale}	$\sigma_{syst.}$
93.0 – 108	(6.429	0.207	0.319	0.026	0.037	0.323) $\times 10^{-6}$
108 – 125	(4.456	0.162	0.223	0.022	0.028	0.226) $\times 10^{-6}$
125 – 147	(2.699	0.111	0.136	0.017	0.019	0.139) $\times 10^{-6}$
147 – 175	(1.772	0.080	0.091	0.014	0.014	0.093) $\times 10^{-6}$
175 – 211	(9.719	0.527	0.504	0.095	0.087	0.520) $\times 10^{-7}$
211 – 259	(6.072	0.359	0.321	0.075	0.062	0.335) $\times 10^{-7}$
259 – 330	(3.113	0.214	0.169	0.049	0.038	0.180) $\times 10^{-7}$
330 – 441	(1.509	0.119	0.085	0.032	0.023	0.093) $\times 10^{-7}$
441 – 660	(5.569	0.506	0.327	0.168	0.117	0.386) $\times 10^{-8}$
660 – 1200	(1.292	0.147	0.082	0.067	0.046	0.116) $\times 10^{-8}$
1200 – 3000	(2.941	1.080	0.254	0.082	0.167	0.314) $\times 10^{-9}$

TABLE SVI: The Si flux Φ_{Si} as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_{Si}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(1.953	0.008	0.083	0.092	0.009	0.124) $\times 10^{-1}$
2.40 – 2.67	(1.884	0.007	0.077	0.043	0.006	0.089) $\times 10^{-1}$
2.67 – 2.97	(1.772	0.006	0.071	0.023	0.003	0.074) $\times 10^{-1}$
2.97 – 3.29	(1.612	0.005	0.063	0.017	0.001	0.065) $\times 10^{-1}$
3.29 – 3.64	(1.434	0.005	0.055	0.013	0.000	0.057) $\times 10^{-1}$
3.64 – 4.02	(1.259	0.004	0.048	0.010	0.001	0.049) $\times 10^{-1}$
4.02 – 4.43	(1.087	0.003	0.041	0.008	0.001	0.042) $\times 10^{-1}$
4.43 – 4.88	(9.279	0.026	0.346	0.060	0.012	0.351) $\times 10^{-2}$
4.88 – 5.37	(7.837	0.022	0.291	0.045	0.013	0.294) $\times 10^{-2}$
5.37 – 5.90	(6.584	0.018	0.244	0.034	0.012	0.246) $\times 10^{-2}$
5.90 – 6.47	(5.554	0.015	0.205	0.026	0.012	0.207) $\times 10^{-2}$
6.47 – 7.09	(4.620	0.012	0.170	0.020	0.010	0.172) $\times 10^{-2}$
7.09 – 7.76	(3.892	0.010	0.144	0.016	0.009	0.145) $\times 10^{-2}$
7.76 – 8.48	(3.219	0.009	0.119	0.013	0.008	0.120) $\times 10^{-2}$
8.48 – 9.26	(2.672	0.007	0.099	0.010	0.007	0.099) $\times 10^{-2}$
9.26 – 10.1	(2.234	0.006	0.082	0.008	0.006	0.083) $\times 10^{-2}$
10.1 – 11.0	(1.840	0.005	0.068	0.006	0.005	0.068) $\times 10^{-2}$
11.0 – 12.0	(1.522	0.005	0.056	0.005	0.005	0.057) $\times 10^{-2}$
12.0 – 13.0	(1.249	0.004	0.046	0.004	0.004	0.046) $\times 10^{-2}$
13.0 – 14.1	(1.043	0.004	0.038	0.003	0.003	0.039) $\times 10^{-2}$
14.1 – 15.3	(8.571	0.030	0.316	0.027	0.028	0.319) $\times 10^{-3}$
15.3 – 16.6	(7.079	0.025	0.261	0.022	0.024	0.263) $\times 10^{-3}$
16.6 – 18.0	(5.809	0.021	0.214	0.018	0.020	0.216) $\times 10^{-3}$
18.0 – 19.5	(4.782	0.018	0.177	0.015	0.017	0.178) $\times 10^{-3}$
19.5 – 21.1	(3.949	0.015	0.146	0.012	0.014	0.147) $\times 10^{-3}$
21.1 – 22.8	(3.236	0.013	0.120	0.010	0.012	0.121) $\times 10^{-3}$
22.8 – 24.7	(2.654	0.010	0.098	0.008	0.010	0.099) $\times 10^{-3}$
24.7 – 26.7	(2.186	0.009	0.081	0.007	0.008	0.081) $\times 10^{-3}$
26.7 – 28.8	(1.802	0.008	0.067	0.006	0.007	0.067) $\times 10^{-3}$
28.8 – 33.5	(1.363	0.004	0.050	0.004	0.005	0.051) $\times 10^{-3}$
33.5 – 38.9	(9.275	0.034	0.344	0.032	0.037	0.347) $\times 10^{-4}$
38.9 – 45.1	(6.312	0.026	0.235	0.022	0.026	0.237) $\times 10^{-4}$
45.1 – 52.2	(4.309	0.020	0.161	0.016	0.018	0.162) $\times 10^{-4}$
52.2 – 60.3	(2.950	0.016	0.110	0.011	0.013	0.112) $\times 10^{-4}$
60.3 – 69.7	(2.005	0.012	0.075	0.008	0.009	0.076) $\times 10^{-4}$
69.7 – 80.5	(1.356	0.009	0.051	0.006	0.006	0.052) $\times 10^{-4}$
80.5 – 93.0	(9.386	0.072	0.354	0.040	0.047	0.359) $\times 10^{-5}$
93.0 – 108	(6.245	0.053	0.236	0.028	0.033	0.240) $\times 10^{-5}$

Table continued

TABLE SVI – (Continued).

Rigidity [GV]	Φ_{Si}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
108 – 125	(4.160	0.041	0.158	0.019	0.023	0.161) $\times 10^{-5}$
125 – 147	(2.669	0.029	0.101	0.013	0.016	0.104) $\times 10^{-5}$
147 – 175	(1.720	0.021	0.066	0.009	0.011	0.067) $\times 10^{-5}$
175 – 211	(1.055	0.014	0.040	0.006	0.008	0.042) $\times 10^{-5}$
211 – 259	(6.038	0.093	0.233	0.038	0.052	0.241) $\times 10^{-6}$
259 – 330	(3.339	0.057	0.130	0.026	0.035	0.137) $\times 10^{-6}$
330 – 441	(1.663	0.032	0.065	0.017	0.022	0.071) $\times 10^{-6}$
441 – 660	(6.599	0.142	0.263	0.099	0.126	0.308) $\times 10^{-7}$
660 – 1200	(1.752	0.045	0.073	0.047	0.060	0.105) $\times 10^{-7}$
1200 – 3000	(2.350	0.244	0.123	0.043	0.135	0.188) $\times 10^{-8}$

TABLE SVII: The F flux Φ_F as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_F	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(2.649	0.030	0.097	0.046	0.013	0.108) $\times 10^{-2}$
2.40 – 2.67	(2.603	0.026	0.092	0.034	0.008	0.098) $\times 10^{-2}$
2.67 – 2.97	(2.477	0.023	0.085	0.026	0.004	0.089) $\times 10^{-2}$
2.97 – 3.29	(2.289	0.020	0.077	0.020	0.002	0.080) $\times 10^{-2}$
3.29 – 3.64	(2.022	0.017	0.067	0.015	0.000	0.069) $\times 10^{-2}$
3.64 – 4.02	(1.758	0.014	0.058	0.011	0.001	0.059) $\times 10^{-2}$
4.02 – 4.43	(1.499	0.012	0.049	0.008	0.001	0.050) $\times 10^{-2}$
4.43 – 4.88	(1.238	0.009	0.040	0.006	0.002	0.041) $\times 10^{-2}$
4.88 – 5.37	(1.038	0.008	0.034	0.004	0.002	0.034) $\times 10^{-2}$
5.37 – 5.90	(8.593	0.063	0.279	0.031	0.016	0.281) $\times 10^{-3}$
5.90 – 6.47	(7.097	0.052	0.230	0.023	0.015	0.232) $\times 10^{-3}$
6.47 – 7.09	(5.797	0.043	0.188	0.017	0.013	0.189) $\times 10^{-3}$
7.09 – 7.76	(4.753	0.035	0.154	0.013	0.011	0.155) $\times 10^{-3}$
7.76 – 8.48	(3.902	0.029	0.127	0.011	0.010	0.128) $\times 10^{-3}$
8.48 – 9.26	(3.202	0.025	0.104	0.009	0.009	0.105) $\times 10^{-3}$
9.26 – 10.1	(2.613	0.021	0.085	0.007	0.007	0.086) $\times 10^{-3}$
10.1 – 11.0	(2.150	0.018	0.070	0.006	0.006	0.070) $\times 10^{-3}$
11.0 – 12.0	(1.703	0.015	0.055	0.005	0.005	0.056) $\times 10^{-3}$
12.0 – 13.0	(1.382	0.013	0.045	0.004	0.004	0.045) $\times 10^{-3}$
13.0 – 14.1	(1.124	0.011	0.037	0.003	0.004	0.037) $\times 10^{-3}$
14.1 – 15.3	(9.086	0.095	0.296	0.027	0.030	0.299) $\times 10^{-4}$
15.3 – 16.6	(7.496	0.080	0.245	0.023	0.025	0.247) $\times 10^{-4}$
16.6 – 18.0	(5.902	0.067	0.193	0.019	0.020	0.195) $\times 10^{-4}$
18.0 – 19.5	(4.686	0.055	0.153	0.015	0.017	0.155) $\times 10^{-4}$
19.5 – 21.1	(3.842	0.046	0.126	0.013	0.014	0.127) $\times 10^{-4}$
21.1 – 22.8	(3.031	0.038	0.100	0.011	0.011	0.101) $\times 10^{-4}$
22.8 – 24.7	(2.409	0.031	0.079	0.009	0.009	0.080) $\times 10^{-4}$
24.7 – 26.7	(1.924	0.026	0.064	0.007	0.007	0.064) $\times 10^{-4}$
26.7 – 28.8	(1.573	0.022	0.052	0.006	0.006	0.053) $\times 10^{-4}$
28.8 – 33.5	(1.111	0.012	0.037	0.005	0.004	0.038) $\times 10^{-4}$
33.5 – 38.9	(7.042	0.091	0.237	0.031	0.029	0.241) $\times 10^{-5}$
38.9 – 45.1	(4.617	0.069	0.157	0.022	0.020	0.160) $\times 10^{-5}$
45.1 – 52.2	(3.016	0.052	0.104	0.015	0.014	0.106) $\times 10^{-5}$
52.2 – 60.3	(1.906	0.039	0.066	0.010	0.009	0.067) $\times 10^{-5}$
60.3 – 69.7	(1.221	0.029	0.043	0.007	0.006	0.044) $\times 10^{-5}$
69.7 – 80.5	(8.048	0.217	0.285	0.049	0.043	0.292) $\times 10^{-6}$
80.5 – 93.0	(5.152	0.162	0.184	0.033	0.030	0.189) $\times 10^{-6}$
93.0 – 108	(3.202	0.117	0.115	0.021	0.020	0.119) $\times 10^{-6}$

Table continued

TABLE SVII – (Continued).

Rigidity [GV]	Φ_F	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
108 – 125	(2.123	0.089	0.077	0.015	0.014	0.080) $\times 10^{-6}$
125 – 147	(1.391	0.063	0.051	0.010	0.010	0.053) $\times 10^{-6}$
147 – 175	(8.420	0.431	0.313	0.069	0.071	0.328) $\times 10^{-7}$
175 – 211	(4.381	0.276	0.165	0.042	0.042	0.176) $\times 10^{-7}$
211 – 259	(2.663	0.186	0.102	0.032	0.030	0.111) $\times 10^{-7}$
259 – 330	(1.483	0.113	0.058	0.024	0.021	0.066) $\times 10^{-7}$
330 – 441	(6.107	0.590	0.245	0.147	0.112	0.307) $\times 10^{-8}$
441 – 660	(2.361	0.250	0.099	0.093	0.061	0.149) $\times 10^{-8}$
660 – 1200	(4.563	0.717	0.214	0.353	0.194	0.456) $\times 10^{-9}$
1200 – 3000	(1.177	0.516	0.092	0.082	0.087	0.151) $\times 10^{-9}$

TABLE SVIII: The S flux Φ_S as a function of rigidity at the top of AMS in units of $[\text{m}^2 \cdot \text{sr} \cdot \text{s} \cdot \text{GV}]^{-1}$ including errors due to statistics (stat.); contributions to the systematic error from the trigger, background, and acceptance (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The contributions of individual sources to the systematic error are added in quadrature to arrive at the total systematic error.

Rigidity [GV]	Φ_S	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	(3.518	0.039	0.172	0.505	0.017	0.533) $\times 10^{-2}$
2.40 – 2.67	(3.542	0.033	0.166	0.303	0.011	0.346) $\times 10^{-2}$
2.67 – 2.97	(3.441	0.029	0.156	0.159	0.006	0.223) $\times 10^{-2}$
2.97 – 3.29	(3.268	0.026	0.145	0.079	0.002	0.165) $\times 10^{-2}$
3.29 – 3.64	(2.978	0.022	0.130	0.041	0.000	0.136) $\times 10^{-2}$
3.64 – 4.02	(2.622	0.019	0.113	0.026	0.001	0.116) $\times 10^{-2}$
4.02 – 4.43	(2.242	0.016	0.096	0.019	0.002	0.098) $\times 10^{-2}$
4.43 – 4.88	(1.930	0.013	0.082	0.015	0.003	0.083) $\times 10^{-2}$
4.88 – 5.37	(1.624	0.010	0.069	0.011	0.003	0.070) $\times 10^{-2}$
5.37 – 5.90	(1.357	0.009	0.057	0.008	0.003	0.058) $\times 10^{-2}$
5.90 – 6.47	(1.151	0.007	0.049	0.006	0.002	0.049) $\times 10^{-2}$
6.47 – 7.09	(9.529	0.059	0.402	0.047	0.022	0.405) $\times 10^{-3}$
7.09 – 7.76	(7.914	0.049	0.334	0.036	0.019	0.337) $\times 10^{-3}$
7.76 – 8.48	(6.541	0.041	0.276	0.028	0.017	0.278) $\times 10^{-3}$
8.48 – 9.26	(5.403	0.035	0.228	0.022	0.015	0.230) $\times 10^{-3}$
9.26 – 10.1	(4.490	0.030	0.190	0.018	0.013	0.191) $\times 10^{-3}$
10.1 – 11.0	(3.766	0.026	0.159	0.015	0.011	0.160) $\times 10^{-3}$
11.0 – 12.0	(3.021	0.022	0.128	0.011	0.009	0.129) $\times 10^{-3}$
12.0 – 13.0	(2.478	0.019	0.105	0.009	0.008	0.105) $\times 10^{-3}$
13.0 – 14.1	(2.039	0.016	0.086	0.007	0.007	0.087) $\times 10^{-3}$
14.1 – 15.3	(1.686	0.014	0.071	0.006	0.006	0.072) $\times 10^{-3}$
15.3 – 16.6	(1.378	0.012	0.058	0.005	0.005	0.059) $\times 10^{-3}$
16.6 – 18.0	(1.118	0.010	0.047	0.004	0.004	0.048) $\times 10^{-3}$
18.0 – 19.5	(9.256	0.084	0.392	0.030	0.032	0.394) $\times 10^{-4}$
19.5 – 21.1	(7.590	0.070	0.321	0.025	0.027	0.323) $\times 10^{-4}$
21.1 – 22.8	(6.229	0.059	0.264	0.020	0.023	0.265) $\times 10^{-4}$
22.8 – 24.7	(4.969	0.048	0.210	0.016	0.018	0.212) $\times 10^{-4}$
24.7 – 26.7	(4.194	0.042	0.178	0.013	0.016	0.179) $\times 10^{-4}$
26.7 – 28.8	(3.462	0.036	0.147	0.011	0.013	0.148) $\times 10^{-4}$
28.8 – 33.5	(2.557	0.021	0.108	0.008	0.010	0.109) $\times 10^{-4}$
33.5 – 38.9	(1.739	0.016	0.074	0.005	0.007	0.074) $\times 10^{-4}$
38.9 – 45.1	(1.192	0.012	0.051	0.004	0.005	0.051) $\times 10^{-4}$
45.1 – 52.2	(7.835	0.092	0.335	0.025	0.033	0.338) $\times 10^{-5}$
52.2 – 60.3	(5.441	0.072	0.233	0.018	0.024	0.235) $\times 10^{-5}$
60.3 – 69.7	(3.616	0.054	0.156	0.012	0.017	0.157) $\times 10^{-5}$
69.7 – 80.5	(2.423	0.042	0.105	0.008	0.012	0.106) $\times 10^{-5}$
80.5 – 93.0	(1.675	0.032	0.073	0.006	0.009	0.074) $\times 10^{-5}$
93.0 – 108	(1.146	0.024	0.050	0.004	0.006	0.051) $\times 10^{-5}$

Table continued

TABLE SVIII – (Continued).

Rigidity [GV]	Φ_S	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
108 – 125	(7.286	0.182	0.319	0.027	0.043	0.323) $\times 10^{-6}$
125 – 147	(4.910	0.132	0.216	0.019	0.031	0.219) $\times 10^{-6}$
147 – 175	(3.133	0.093	0.139	0.013	0.022	0.141) $\times 10^{-6}$
175 – 211	(1.847	0.063	0.083	0.009	0.014	0.084) $\times 10^{-6}$
211 – 259	(1.099	0.042	0.050	0.006	0.010	0.051) $\times 10^{-6}$
259 – 330	(5.736	0.250	0.262	0.042	0.062	0.273) $\times 10^{-7}$
330 – 441	(2.742	0.138	0.127	0.029	0.037	0.136) $\times 10^{-7}$
441 – 660	(1.107	0.061	0.053	0.019	0.021	0.060) $\times 10^{-7}$
660 – 1200	(2.821	0.188	0.140	0.107	0.095	0.200) $\times 10^{-8}$
1200 – 3000	(5.682	1.289	0.353	0.158	0.322	0.503) $\times 10^{-9}$

TABLE SIX: The phosphorus to sulfur flux ratio Φ_P/Φ_S as a function of rigidity including errors due to statistics (stat.); contributions to the systematic error from the trigger, acceptance, and background (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The statistical errors are the sum in quadrature of the ratios of phosphorus and sulfur flux statistical errors to the corresponding flux values, multiplied by Φ_P/Φ_S . The systematic errors from the background subtraction, the trigger, and the event reconstruction and selection are likewise added in quadrature. The correlations in the systematic errors from the uncertainty in nuclear interaction cross sections, the unfolding and the absolute rigidity scale between the phosphorus and sulfur fluxes have been taken into account in calculating the corresponding systematic errors of Φ_P/Φ_S . The contribution of individual sources to the systematic error are added in quadrature to arrive at the total systematic uncertainty.

Rigidity [GV]	Φ_P/Φ_S	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	0.2164	0.0055	0.0101	0.0287	0.0000	0.0304
2.40 – 2.67	0.2341	0.0049	0.0105	0.0180	0.0000	0.0208
2.67 – 2.97	0.2523	0.0047	0.0110	0.0103	0.0000	0.0151
2.97 – 3.29	0.2711	0.0045	0.0116	0.0057	0.0000	0.0129
3.29 – 3.64	0.2760	0.0043	0.0117	0.0033	0.0000	0.0121
3.64 – 4.02	0.2713	0.0041	0.0114	0.0024	0.0000	0.0116
4.02 – 4.43	0.2746	0.0040	0.0115	0.0023	0.0000	0.0117
4.43 – 4.88	0.2602	0.0037	0.0108	0.0020	0.0000	0.0110
4.88 – 5.37	0.2570	0.0036	0.0107	0.0019	0.0000	0.0109
5.37 – 5.90	0.2471	0.0035	0.0103	0.0017	0.0000	0.0105
5.90 – 6.47	0.2291	0.0033	0.0096	0.0015	0.0000	0.0097
6.47 – 7.09	0.2306	0.0033	0.0097	0.0014	0.0000	0.0098
7.09 – 7.76	0.2246	0.0032	0.0094	0.0013	0.0000	0.0095
7.76 – 8.48	0.2259	0.0032	0.0095	0.0012	0.0000	0.0096
8.48 – 9.26	0.2153	0.0032	0.0091	0.0010	0.0000	0.0091
9.26 – 10.1	0.2095	0.0033	0.0089	0.0009	0.0000	0.0089
10.1 – 11.0	0.2012	0.0033	0.0085	0.0008	0.0000	0.0086
11.0 – 12.0	0.2012	0.0035	0.0085	0.0007	0.0000	0.0086
12.0 – 13.0	0.2052	0.0038	0.0087	0.0007	0.0000	0.0087
13.0 – 14.1	0.1965	0.0038	0.0084	0.0006	0.0000	0.0084
14.1 – 15.3	0.1951	0.0039	0.0083	0.0006	0.0000	0.0083
15.3 – 16.6	0.1937	0.0041	0.0083	0.0006	0.0000	0.0083
16.6 – 18.0	0.1930	0.0042	0.0083	0.0006	0.0000	0.0083
18.0 – 19.5	0.1824	0.0041	0.0078	0.0005	0.0000	0.0078
19.5 – 21.1	0.1782	0.0041	0.0077	0.0005	0.0000	0.0077
21.1 – 22.8	0.1756	0.0042	0.0076	0.0005	0.0000	0.0076
22.8 – 24.7	0.1792	0.0043	0.0077	0.0005	0.0000	0.0077
24.7 – 26.7	0.1677	0.0043	0.0072	0.0005	0.0000	0.0073
26.7 – 28.8	0.1610	0.0044	0.0070	0.0004	0.0001	0.0070
28.8 – 33.5	0.1568	0.0033	0.0068	0.0004	0.0001	0.0068
33.5 – 38.9	0.1582	0.0038	0.0069	0.0004	0.0001	0.0069
38.9 – 45.1	0.1451	0.0041	0.0064	0.0004	0.0001	0.0064

Table continued

TABLE SIX – (Continued).

Rigidity [GV]	Φ_P/Φ_S	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
45.1 – 52.2	0.1523	0.0048	0.0067	0.0004	0.0001	0.0068
52.2 – 60.3	0.1329	0.0050	0.0059	0.0004	0.0001	0.0059
60.3 – 69.7	0.1335	0.0057	0.0060	0.0004	0.0001	0.0060
69.7 – 80.5	0.1323	0.0065	0.0060	0.0004	0.0001	0.0060
80.5 – 93.0	0.1270	0.0071	0.0058	0.0004	0.0001	0.0058
93.0 – 108	0.1155	0.0074	0.0053	0.0004	0.0001	0.0053
108 – 125	0.1132	0.0086	0.0053	0.0004	0.0001	0.0053
125 – 147	0.1122	0.0092	0.0053	0.0005	0.0001	0.0053
147 – 175	0.0953	0.0093	0.0046	0.0004	0.0001	0.0046
175 – 211	0.1008	0.0111	0.0049	0.0006	0.0002	0.0050
211 – 259	0.1010	0.0124	0.0051	0.0007	0.0002	0.0052
259 – 330	0.0824	0.0127	0.0044	0.0009	0.0002	0.0045
330 – 441	0.0922	0.0156	0.0053	0.0015	0.0003	0.0055
441 – 660	0.0694	0.0151	0.0046	0.0021	0.0004	0.0050
660 – 1200	0.0844	0.0212	0.0072	0.0057	0.0008	0.0092

TABLE SX: The chlorine to argon flux ratio $\Phi_{\text{Cl}}/\Phi_{\text{Ar}}$ as a function of rigidity including errors due to statistics (stat.); contributions to the systematic error from the trigger, acceptance, and background (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The statistical errors are the sum in quadrature of the ratios of chlorine and argon flux statistical errors to the corresponding flux values, multiplied by $\Phi_{\text{Cl}}/\Phi_{\text{Ar}}$. The systematic errors from the background subtraction, the trigger, and the event reconstruction and selection are likewise added in quadrature. The correlations in the systematic errors from the uncertainty in nuclear interaction cross sections, the unfolding and the absolute rigidity scale between the chlorine and argon fluxes have been taken into account in calculating the corresponding systematic errors of $\Phi_{\text{Cl}}/\Phi_{\text{Ar}}$. The contribution of individual sources to the systematic error are added in quadrature to arrive at the total systematic uncertainty.

Rigidity [GV]	$\Phi_{\text{Cl}}/\Phi_{\text{Ar}}$	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	0.6177	0.0203	0.0311	0.0704	0.0001	0.0769
2.40 – 2.67	0.5688	0.0139	0.0271	0.0368	0.0001	0.0457
2.67 – 2.97	0.5870	0.0131	0.0269	0.0202	0.0000	0.0336
2.97 – 3.29	0.6029	0.0122	0.0269	0.0109	0.0000	0.0290
3.29 – 3.64	0.5771	0.0109	0.0253	0.0064	0.0000	0.0261
3.64 – 4.02	0.6055	0.0111	0.0263	0.0055	0.0000	0.0268
4.02 – 4.43	0.6227	0.0110	0.0268	0.0054	0.0000	0.0274
4.43 – 4.88	0.6262	0.0105	0.0269	0.0052	0.0000	0.0274
4.88 – 5.37	0.6324	0.0103	0.0271	0.0050	0.0000	0.0276
5.37 – 5.90	0.6246	0.0103	0.0268	0.0046	0.0000	0.0272
5.90 – 6.47	0.5801	0.0097	0.0249	0.0040	0.0000	0.0253
6.47 – 7.09	0.6230	0.0103	0.0269	0.0040	0.0000	0.0272
7.09 – 7.76	0.6092	0.0102	0.0264	0.0037	0.0000	0.0266
7.76 – 8.48	0.6014	0.0103	0.0261	0.0033	0.0000	0.0264
8.48 – 9.26	0.6131	0.0108	0.0268	0.0031	0.0000	0.0270
9.26 – 10.1	0.5813	0.0108	0.0255	0.0027	0.0000	0.0256
10.1 – 11.0	0.5874	0.0115	0.0259	0.0025	0.0000	0.0260
11.0 – 12.0	0.5824	0.0117	0.0257	0.0023	0.0000	0.0258
12.0 – 13.0	0.5817	0.0129	0.0258	0.0021	0.0000	0.0259
13.0 – 14.1	0.5974	0.0137	0.0265	0.0020	0.0000	0.0266
14.1 – 15.3	0.5609	0.0135	0.0250	0.0017	0.0000	0.0250
15.3 – 16.6	0.5885	0.0145	0.0263	0.0017	0.0000	0.0263
16.6 – 18.0	0.5760	0.0149	0.0258	0.0015	0.0000	0.0258
18.0 – 19.5	0.5618	0.0149	0.0252	0.0014	0.0000	0.0252
19.5 – 21.1	0.5538	0.0151	0.0249	0.0013	0.0000	0.0249
21.1 – 22.8	0.6114	0.0170	0.0275	0.0013	0.0000	0.0275
22.8 – 24.7	0.5666	0.0162	0.0255	0.0011	0.0000	0.0255
24.7 – 26.7	0.5667	0.0169	0.0255	0.0011	0.0000	0.0256
26.7 – 28.8	0.5641	0.0179	0.0255	0.0010	0.0000	0.0255
28.8 – 33.5	0.5555	0.0138	0.0251	0.0010	0.0000	0.0251
33.5 – 38.9	0.5505	0.0157	0.0250	0.0009	0.0000	0.0250
38.9 – 45.1	0.5851	0.0190	0.0266	0.0010	0.0000	0.0267

Table continued

TABLE SX – (Continued).

Rigidity [GV]	$\Phi_{\text{Cl}}/\Phi_{\text{Ar}}$	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
45.1 – 52.2	0.5581	0.0209	0.0255	0.0010	0.0000	0.0255
52.2 – 60.3	0.5782	0.0248	0.0266	0.0011	0.0000	0.0266
60.3 – 69.7	0.5321	0.0263	0.0246	0.0011	0.0001	0.0246
69.7 – 80.5	0.5343	0.0305	0.0249	0.0012	0.0001	0.0250
80.5 – 93.0	0.5081	0.0337	0.0240	0.0012	0.0001	0.0240
93.0 – 108	0.6182	0.0467	0.0296	0.0017	0.0001	0.0297
108 – 125	0.4951	0.0437	0.0241	0.0015	0.0002	0.0242
125 – 147	0.4825	0.0464	0.0241	0.0016	0.0002	0.0241
147 – 175	0.5014	0.0537	0.0257	0.0021	0.0003	0.0258
175 – 211	0.5031	0.0662	0.0268	0.0026	0.0005	0.0269
211 – 259	0.7606	0.1057	0.0423	0.0054	0.0011	0.0427
259 – 330	0.6043	0.0956	0.0356	0.0063	0.0014	0.0362
330 – 441	0.4190	0.0802	0.0265	0.0071	0.0016	0.0275
441 – 660	0.2878	0.0721	0.0200	0.0090	0.0018	0.0220
660 – 1200	0.4794	0.1316	0.0384	0.0353	0.0054	0.0525

TABLE SXI: The potassium to calcium flux ratio Φ_K/Φ_{Ca} as a function of rigidity including errors due to statistics (stat.); contributions to the systematic error from the trigger, acceptance, and background (acc.); the rigidity resolution function and unfolding (unf.); the absolute rigidity scale (scale); and the total systematic error (syst.). The statistical errors are the sum in quadrature of the ratios of potassium and calcium flux statistical errors to the corresponding flux values, multiplied by Φ_K/Φ_{Ca} . The systematic errors from the background subtraction, the trigger, and the event reconstruction and selection are likewise added in quadrature. The correlations in the systematic errors from the uncertainty in nuclear interaction cross sections, the unfolding and the absolute rigidity scale between the potassium and calcium fluxes have been taken into account in calculating the corresponding systematic errors of Φ_K/Φ_{Ca} . The contribution of individual sources to the systematic error are added in quadrature to arrive at the total systematic uncertainty.

Rigidity [GV]	Φ_K/Φ_{Ca}	$\sigma_{\text{stat.}}$	$\sigma_{\text{acc.}}$	$\sigma_{\text{unf.}}$	σ_{scale}	$\sigma_{\text{syst.}}$
2.15 – 2.40	0.5120	0.0217	0.0273	0.2076	0.0000	0.2094
2.40 – 2.67	0.5125	0.0113	0.0258	0.1069	0.0000	0.1100
2.67 – 2.97	0.5247	0.0101	0.0254	0.0495	0.0000	0.0556
2.97 – 3.29	0.5203	0.0091	0.0244	0.0180	0.0000	0.0304
3.29 – 3.64	0.5276	0.0087	0.0243	0.0062	0.0000	0.0251
3.64 – 4.02	0.5180	0.0083	0.0235	0.0042	0.0000	0.0239
4.02 – 4.43	0.5064	0.0080	0.0228	0.0046	0.0000	0.0233
4.43 – 4.88	0.5010	0.0074	0.0225	0.0050	0.0000	0.0230
4.88 – 5.37	0.5000	0.0073	0.0224	0.0051	0.0000	0.0230
5.37 – 5.90	0.4962	0.0073	0.0222	0.0051	0.0000	0.0228
5.90 – 6.47	0.4852	0.0071	0.0218	0.0048	0.0000	0.0223
6.47 – 7.09	0.4975	0.0073	0.0224	0.0047	0.0000	0.0229
7.09 – 7.76	0.4865	0.0071	0.0220	0.0042	0.0000	0.0224
7.76 – 8.48	0.4862	0.0072	0.0221	0.0039	0.0000	0.0225
8.48 – 9.26	0.4681	0.0072	0.0214	0.0033	0.0000	0.0217
9.26 – 10.1	0.4713	0.0076	0.0216	0.0030	0.0000	0.0218
10.1 – 11.0	0.4727	0.0080	0.0218	0.0026	0.0000	0.0220
11.0 – 12.0	0.4549	0.0080	0.0211	0.0022	0.0000	0.0212
12.0 – 13.0	0.4579	0.0088	0.0213	0.0020	0.0000	0.0214
13.0 – 14.1	0.4401	0.0087	0.0205	0.0017	0.0000	0.0206
14.1 – 15.3	0.4415	0.0091	0.0206	0.0015	0.0001	0.0207
15.3 – 16.6	0.4343	0.0094	0.0204	0.0013	0.0001	0.0204
16.6 – 18.0	0.4206	0.0094	0.0198	0.0012	0.0001	0.0198
18.0 – 19.5	0.4135	0.0096	0.0195	0.0010	0.0001	0.0195
19.5 – 21.1	0.4074	0.0097	0.0192	0.0009	0.0001	0.0192
21.1 – 22.8	0.4047	0.0101	0.0191	0.0008	0.0001	0.0191
22.8 – 24.7	0.3964	0.0100	0.0188	0.0008	0.0001	0.0188
24.7 – 26.7	0.3857	0.0103	0.0183	0.0007	0.0001	0.0183
26.7 – 28.8	0.3735	0.0106	0.0177	0.0006	0.0001	0.0178
28.8 – 33.5	0.3795	0.0082	0.0181	0.0005	0.0001	0.0181
33.5 – 38.9	0.3666	0.0092	0.0175	0.0005	0.0001	0.0175
38.9 – 45.1	0.3446	0.0101	0.0165	0.0005	0.0001	0.0165

Table continued

TABLE SXI – (Continued).

Rigidity [GV]	Φ_K/Φ_{Ca}	$\sigma_{stat.}$	$\sigma_{acc.}$	$\sigma_{unf.}$	σ_{scale}	$\sigma_{syst.}$
45.1 – 52.2	0.3445	0.0116	0.0166	0.0006	0.0001	0.0166
52.2 – 60.3	0.3425	0.0132	0.0166	0.0008	0.0002	0.0166
60.3 – 69.7	0.3082	0.0139	0.0151	0.0010	0.0002	0.0151
69.7 – 80.5	0.3452	0.0177	0.0170	0.0014	0.0003	0.0171
80.5 – 93.0	0.3162	0.0186	0.0158	0.0016	0.0003	0.0159
93.0 – 108	0.2758	0.0189	0.0139	0.0017	0.0003	0.0140
108 – 125	0.2547	0.0204	0.0131	0.0019	0.0003	0.0132
125 – 147	0.2955	0.0253	0.0155	0.0026	0.0004	0.0158
147 – 175	0.2616	0.0257	0.0142	0.0028	0.0004	0.0145
175 – 211	0.2679	0.0312	0.0151	0.0036	0.0005	0.0156
211 – 259	0.2810	0.0353	0.0168	0.0047	0.0006	0.0174
259 – 330	0.2147	0.0346	0.0138	0.0046	0.0006	0.0146
330 – 441	0.1877	0.0368	0.0135	0.0054	0.0007	0.0145
441 – 660	0.2536	0.0523	0.0215	0.0105	0.0012	0.0239
660 – 1200	0.2154	0.0629	0.0240	0.0151	0.0013	0.0283

TABLE SXII. Fit parameters for Φ_P/Φ_F , Φ_{Cl}/Φ_F , and Φ_K/Φ_F using Eq. (2). As seen, $\Delta_2 \neq 0$ and, therefore, the rigidity dependencies of Φ_P , Φ_{Cl} , and Φ_K are different from that of Φ_F .

Nuclei	k	R_0 [GV]	Δ_1	Δ_2	$\chi^2/\text{d.o.f.}$
P	0.36 ± 0.01	11 ± 1	-0.11 ± 0.02	0.041 ± 0.013	16/40
Cl	0.38 ± 0.01	12 ± 2	-0.09 ± 0.04	0.111 ± 0.015	14/37
K	0.51 ± 0.02	8 ± 2	-0.06 ± 0.03	0.031 ± 0.011	12/40

TABLE SXIII. Fit parameters for Φ_P/Φ_F , Φ_{Cl}/Φ_F , Φ_K/Φ_F , Φ_{Ar}/Φ_F , and Φ_{Ca}/Φ_F using Eq. (3).

Nuclei	Fit Range [GV]	p	k	R_0 [GV]	Δ_1	$\chi^2/\text{d.o.f.}$
P	2.97–1200	$(3.5 \pm 1.4) \times 10^{-3}$	0.33 ± 0.01	11 ± 1	-0.13 ± 0.03	15/40
Cl	4.02–1200	$(10.1 \pm 1.3) \times 10^{-3}$	0.30 ± 0.02	10 ± 1	-0.17 ± 0.06	14/37
K	2.97–1200	$(4.2 \pm 1.4) \times 10^{-3}$	0.47 ± 0.02	8 ± 1	-0.07 ± 0.03	11/40
Ar	2.15–3000	$(2.14 \pm 0.05) \times 10^{-2}$	0.49 ± 0.02	3 ± 1	0.001 ± 0.010	22/44
	4.02–3000	$(2.25 \pm 0.21) \times 10^{-2}$	0.47 ± 0.03	9 ± 2	-0.12 ± 0.07	12/38
Ca	2.15–3000	$(7.6 \pm 0.3) \times 10^{-2}$	0.45 ± 0.02	2 ± 1	0.01 ± 0.02	15/44
	4.02–3000	$(7.6 \pm 0.3) \times 10^{-2}$	0.45 ± 0.02	4 ± 1	0 ± 0.02	10/38

TABLE SXIV. The P/Si, S/Si, Cl/Si, Ar/Si, K/Si, and Ca/Si abundance ratios at the source. The AMS data are from Table I. For Ref. [6] ratio values and errors were calculated from their Table 6. For errors "Combined Errors" column was used. Errors were propagated in quadrature. For Ref. [34] ratio values and errors were calculated from their Table 1 "This work, Calculated GCR Source" column. Errors were propagated in quadrature. For Ref. [35] ratio values and errors were calculated from their Table 5. For values "Mean" column was used. For errors "Variance" column was used. Errors were propagated in quadrature. For Ref. [36] ratio values and errors were calculated from their Table 2. For errors "Total Statistical & Systematic" column was used. Errors were propagated in quadrature. For Ref. [37] ratio values and errors were calculated from their Table 1. For values "Average" column was used. For errors "Std. Dev." column was used. Errors were propagated in quadrature.

Abundance Ratio	AMS	Ref. [6]	Ref. [34]	Ref. [35]	Ref. [36]	Ref. [37]
Φ_P/Φ_{Si}	0.003 ± 0.001	0.008 ± 0.003	$0.0033^{+0.0033}_{-0.0027}$	0.007 ± 0.002		0.010 ± 0.001
Φ_S/Φ_{Si}	0.161 ± 0.005	0.131 ± 0.009	0.131 ± 0.002	0.131 ± 0.002	0.129 ± 0.019	0.123 ± 0.008
Φ_{Cl}/Φ_{Si}	0.010 ± 0.002		0.001 ± 0.001	0.003 ± 0.002		0.006 ± 0.001
Φ_{Ar}/Φ_{Si}	0.022 ± 0.002	0.022 ± 0.006	0.022 ± 0.012	0.021 ± 0.003	0.019 ± 0.020	0.018 ± 0.001
Φ_K/Φ_{Si}	0.005 ± 0.002	0.004 ± 0.003	$0.003^{+0.002}_{-0.003}$	0.003 ± 0.001		0.007 ± 0.001
Φ_{Ca}/Φ_{Si}	0.077 ± 0.003	0.060 ± 0.009	0.065 ± 0.012	0.065 ± 0.004	0.081 ± 0.035	0.062 ± 0.005

TABLE SXV. The primary and secondary components of C ($Z=6$), N ($Z=7$), Ne ($Z=10$), Na ($Z=11$), Mg ($Z=12$), and Al ($Z=13$) fluxes, their primary fractions at 10 GV, 100 GV, and 1 TV; and the $\chi^2/d.o.f.$ values of the flux fits with a linear combination of primary and secondary components.

Nuclei Flux	Primary	Secondary	Primary Fraction, %			$\chi^2/d.o.f.$
			10 GV	100 GV	1 TV	
Φ_C	$(0.840 \pm 0.025) \times \Phi_O$	$(0.70 \pm 0.02) \times \Phi_B$	80 ± 1	91 ± 0.5	95 ± 0.5	45/65
Φ_N	$(0.091 \pm 0.002) \times \Phi_O$	$(0.61 \pm 0.02) \times \Phi_B$	34 ± 1	55 ± 1	70 ± 1	37/64
Φ_{Ne}	$(0.823 \pm 0.025) \times \Phi_{Si}$	$(1.97 \pm 0.13) \times \Phi_F$	78 ± 1.5	89 ± 1	92 ± 0.6	19/47
Φ_{Na}	$(0.039 \pm 0.003) \times \Phi_{Si}$	$(1.31 \pm 0.04) \times \Phi_F$	20 ± 1	36 ± 2	46 ± 3	19/36
Φ_{Mg}	$(0.996 \pm 0.029) \times \Phi_{Si}$	$(2.45 \pm 0.17) \times \Phi_F$	78 ± 1.5	89 ± 1	92 ± 0.5	14/47
Φ_{Al}	$(0.108 \pm 0.004) \times \Phi_{Si}$	$(1.01 \pm 0.04) \times \Phi_F$	48 ± 1	67 ± 1	75 ± 2	9/36

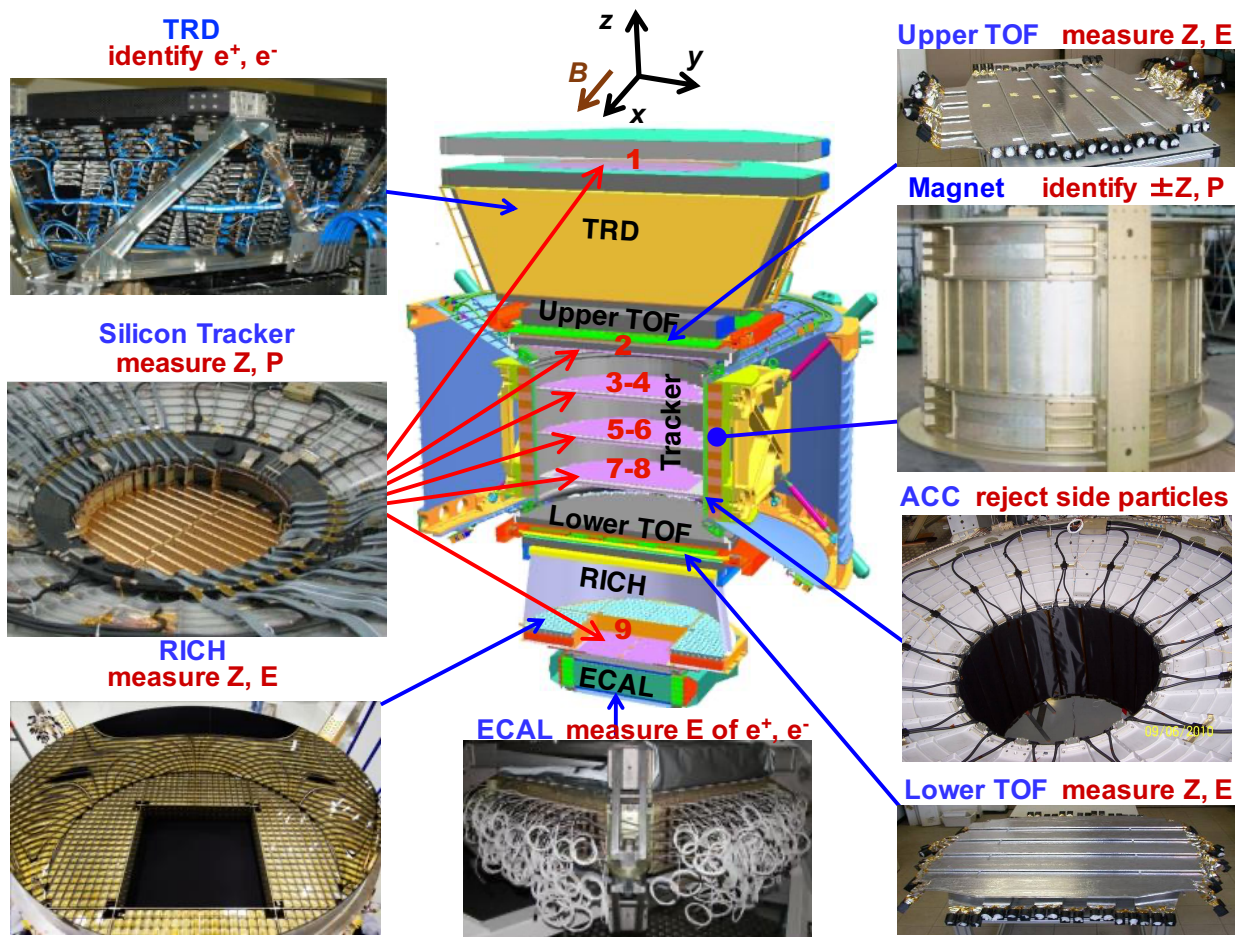


FIG. S1. The AMS detector showing the main elements and their functions. AMS is a TeV precision, multipurpose particle physics magnetic spectrometer in space. It identifies particles and nuclei by their charge Z , energy E and momentum p or rigidity ($R = p/Z$), which are measured independently by the Tracker, TOF, RICH and ECAL. The ACC counters, located in the magnet bore, are used to reject particles entering AMS from the side. The AMS coordinate system is also shown. The x axis is parallel to the main component of the magnetic field and the z axis is pointing vertically with $z = 0$ at the center of the magnet.

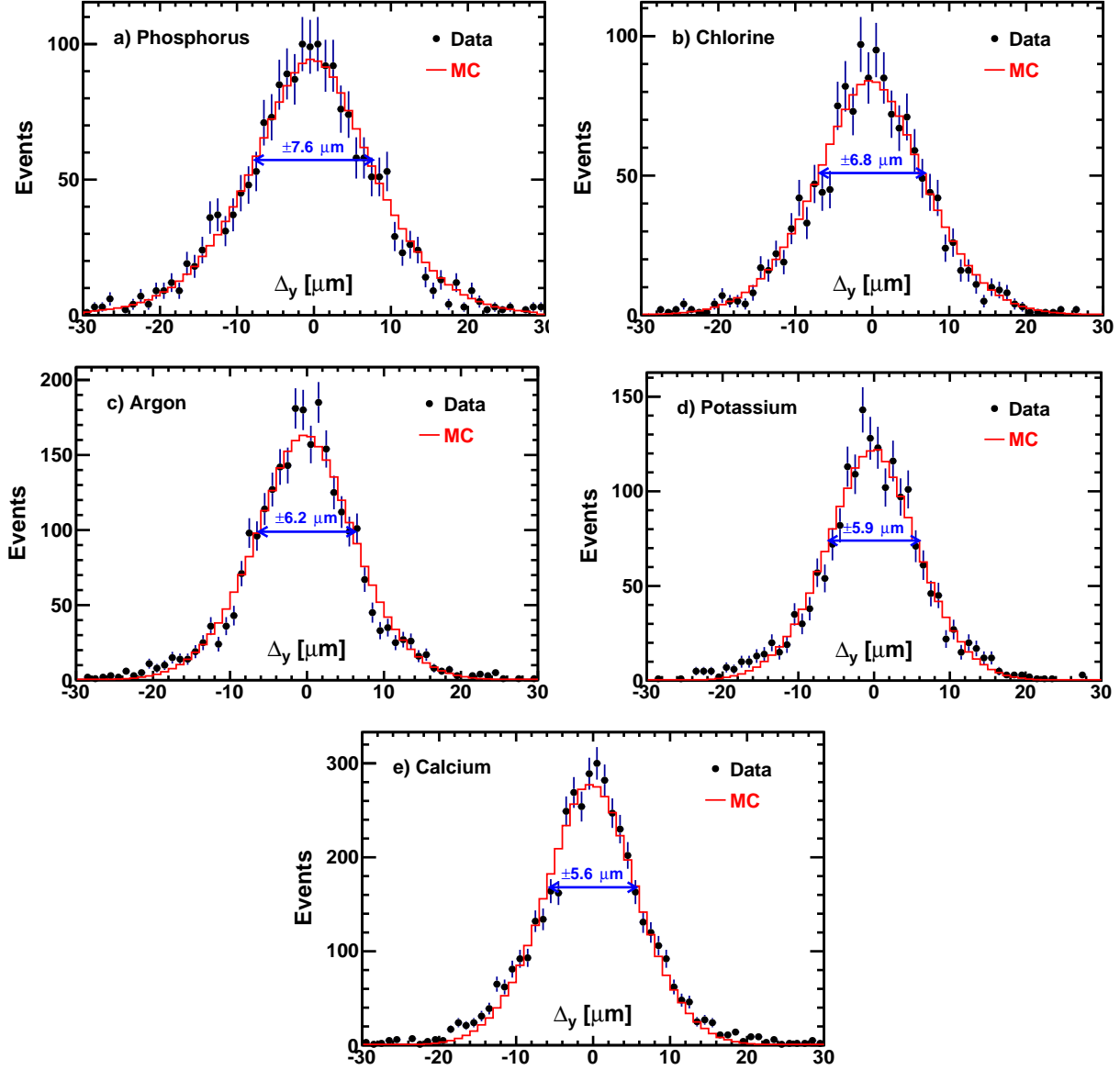


FIG. S2. Comparison of the differences of the coordinates measured in $L3$ or $L5$ to those obtained from the track fit using the measurements from $L1$, $L2$, $L4$, $L6$, $L7$, and $L8$ between data and Monte Carlo simulation in the rigidity range $R > 50$ GV for a) P, b) Cl, c) Ar, d) K, and e) Ca nuclei. As seen, the data and the MC simulations are in a good agreement for all nuclei.

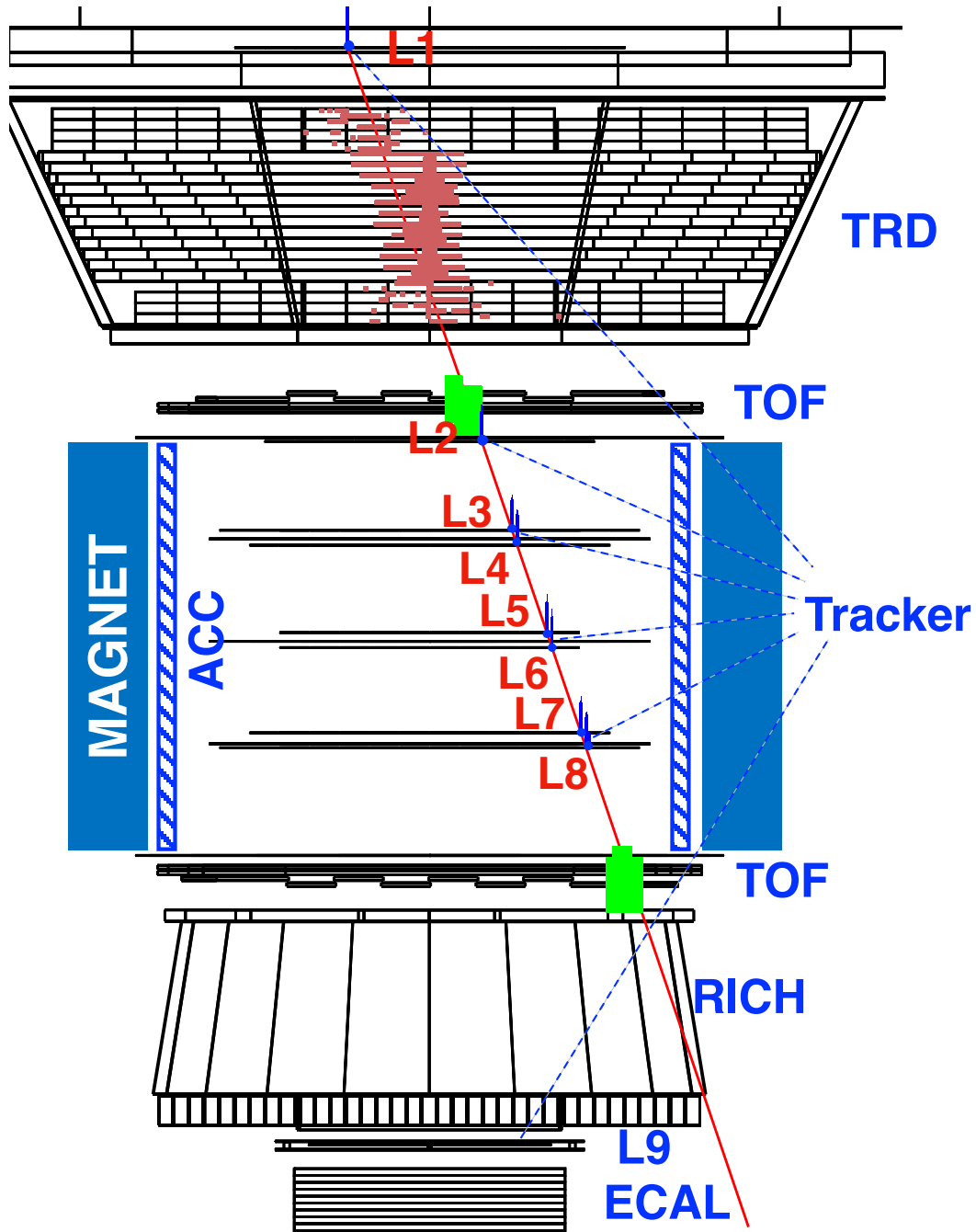


FIG. S3. A display of a P nucleus event in the bending plane. The red line indicates the reconstructed trajectory. The dark red spread in TRD shows the dE/dx measurements in different TRD layers, green areas in upper and lower TOF carry the information of the dE/dx as well as the coordinate and time measurements. The coordinate along the TOF paddles is reconstructed using the time measurements. The vertical blue lines in the tracker layers carry the information of coordinates and dE/dx or pulse heights. This downward-going event is identified as a P nucleus ($Z=15$) with $R = 22$ GV.

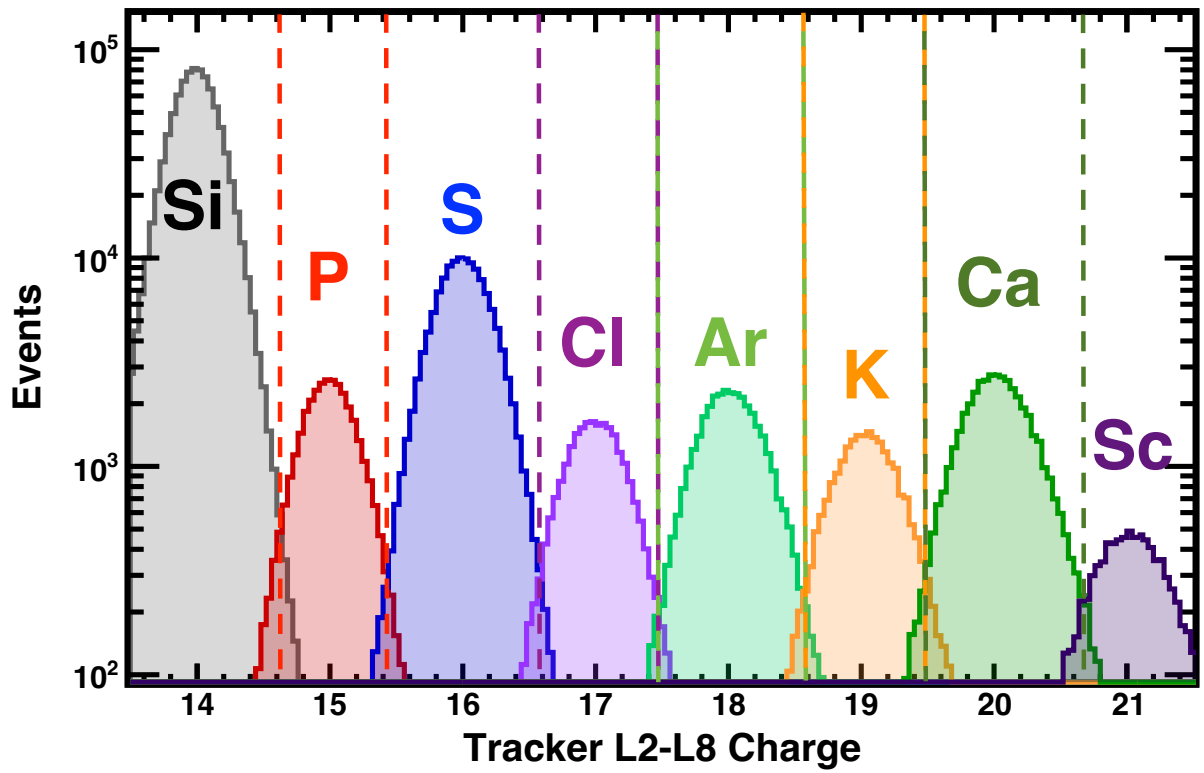


FIG. S4. Charge distributions measured by inner tracker $L2-L8$ for samples from $Z = 14$ to $Z = 21$ selected by the combined charge measured with $L1$, the upper TOF, and the lower TOF for rigidities above 4 GV. The vertical dashed lines correspond to the charge selection in the inner tracker for P, Cl, Ar, K, and Ca.

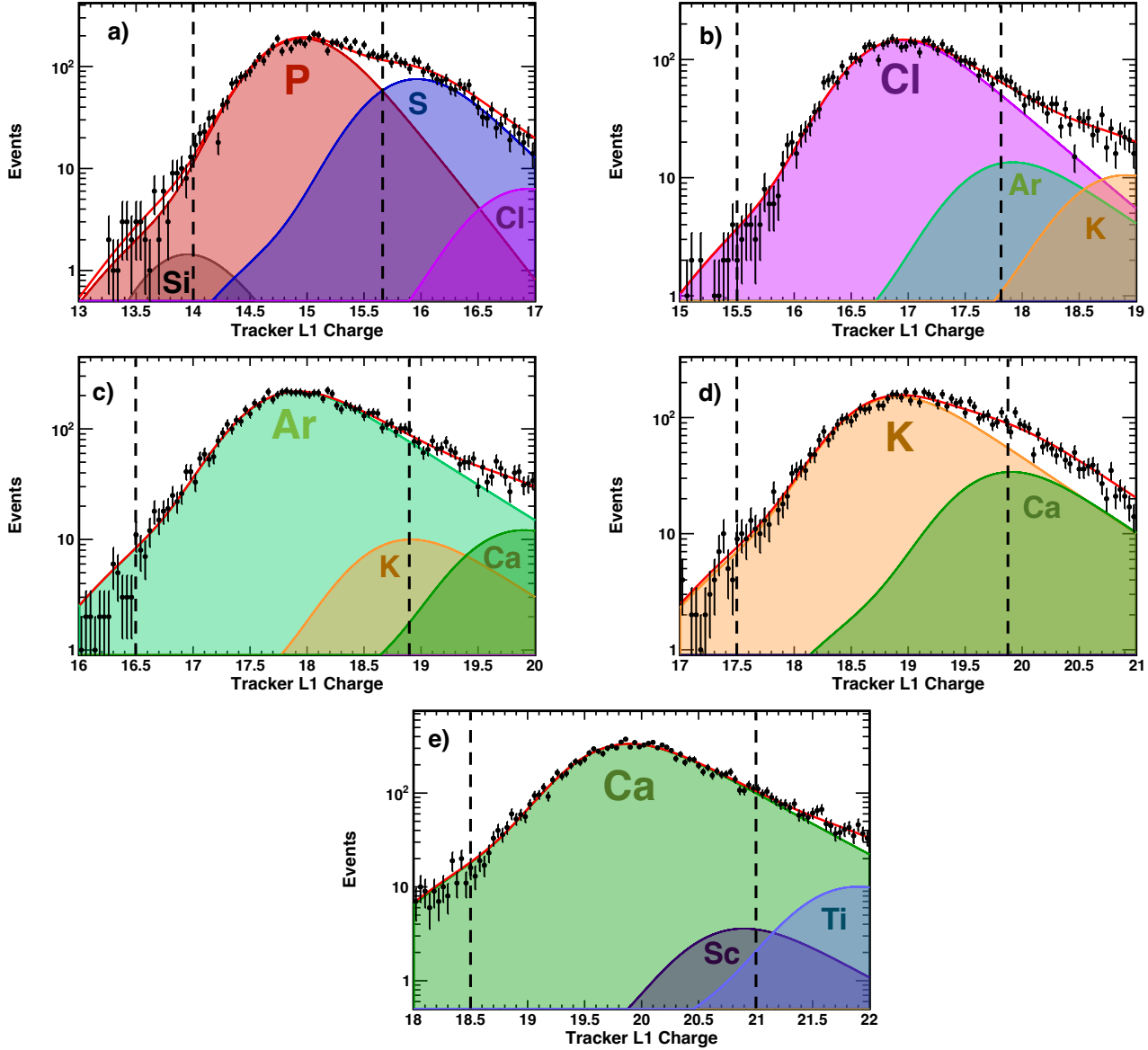


FIG. S5. Charge distributions measured by tracker $L1$ for a) P, b) Cl, c) Ar, d) K, and e) Ca events selected by the inner tracker $L2-L8$ in the rigidity range between 9 and 10 GV (black dots). The solid red curves show the fits to the data of the sum of Si, P, S, Cl, Ar, K, Ca, Sc, and Ti charge distribution templates correspondingly. The charge distribution templates are obtained from a selection of non-interacting samples at $L2$ by requiring that $L1$, upper TOF, and $L3-L8$ measure the same charge value. The charge selections applied on tracker $L1$ are shown as vertical dashed lines.

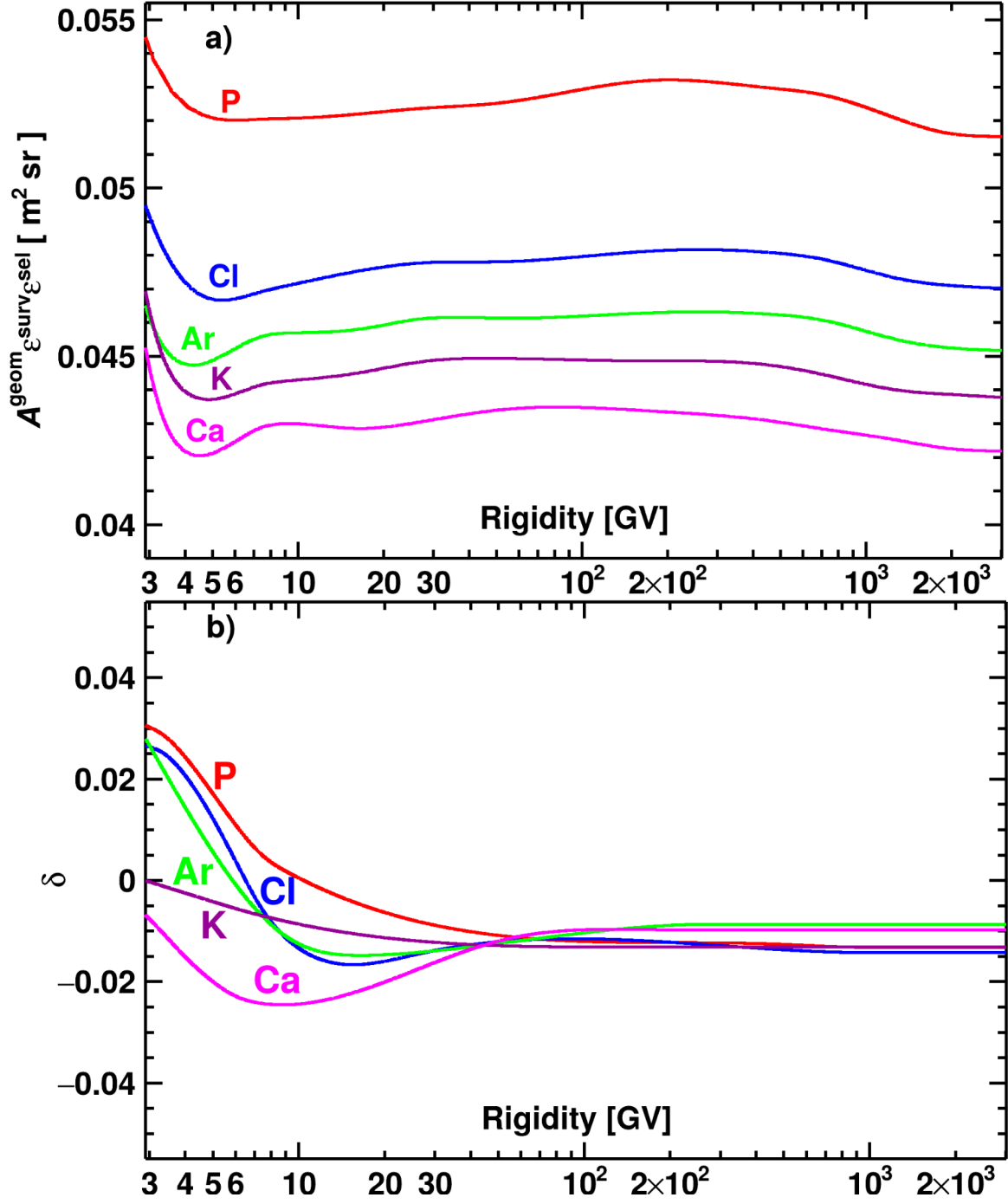


FIG. S6. a) The product $A^{\text{geom}}_{\epsilon^{\text{surv}}\epsilon^{\text{sel}}}$ obtained from MC simulations as function of the rigidity for P, Cl, Ar, K, and Ca nuclei. b) The overall correction $\delta = \prod_{k=1}^4 (1 + \delta_i^k) - 1$ as a function of rigidity for P, Cl, Ar, K, and Ca nuclei.

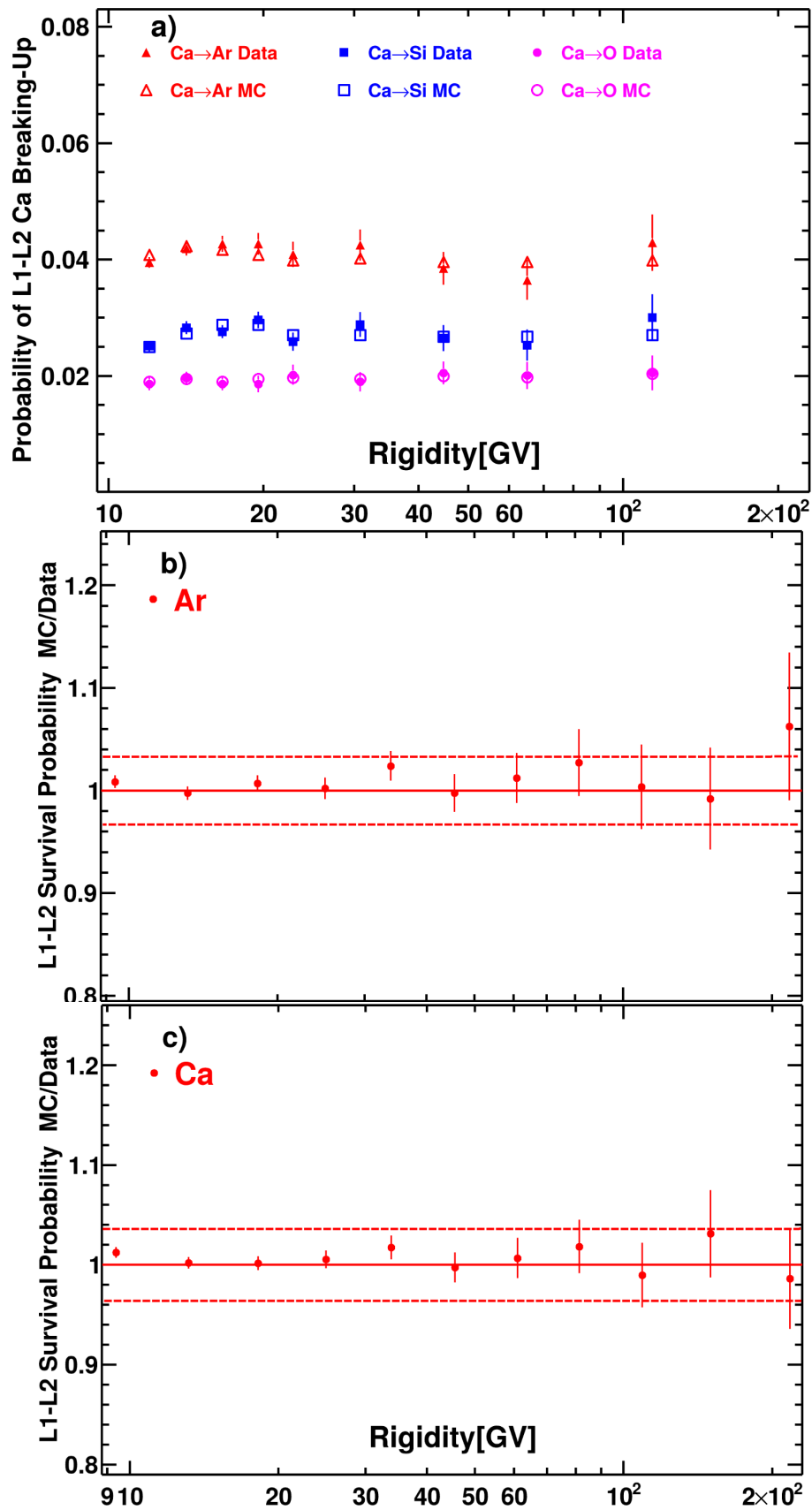


FIG. S7. a) Comparison of the simulated and measured $\text{Ca} \rightarrow \text{Ar} + \text{X}$, $\text{Ca} \rightarrow \text{Si} + \text{X}$, and $\text{Ca} \rightarrow \text{O} + \text{X}$ break-up probabilities between $L1$ and $L2$. b) The MC to data ratio of the Ar survival probability between $L1$ and $L2$. c) The MC to data ratio of the Ca survival probability between $L1$ and $L2$. In b) and c) the solid red lines show the average constant fit value and the red dashed lines indicate the estimated systematic 1σ error ranges. The Ar and Ca survival probabilities between $L1$ and $L2$ are 52% and 49%, respectively.

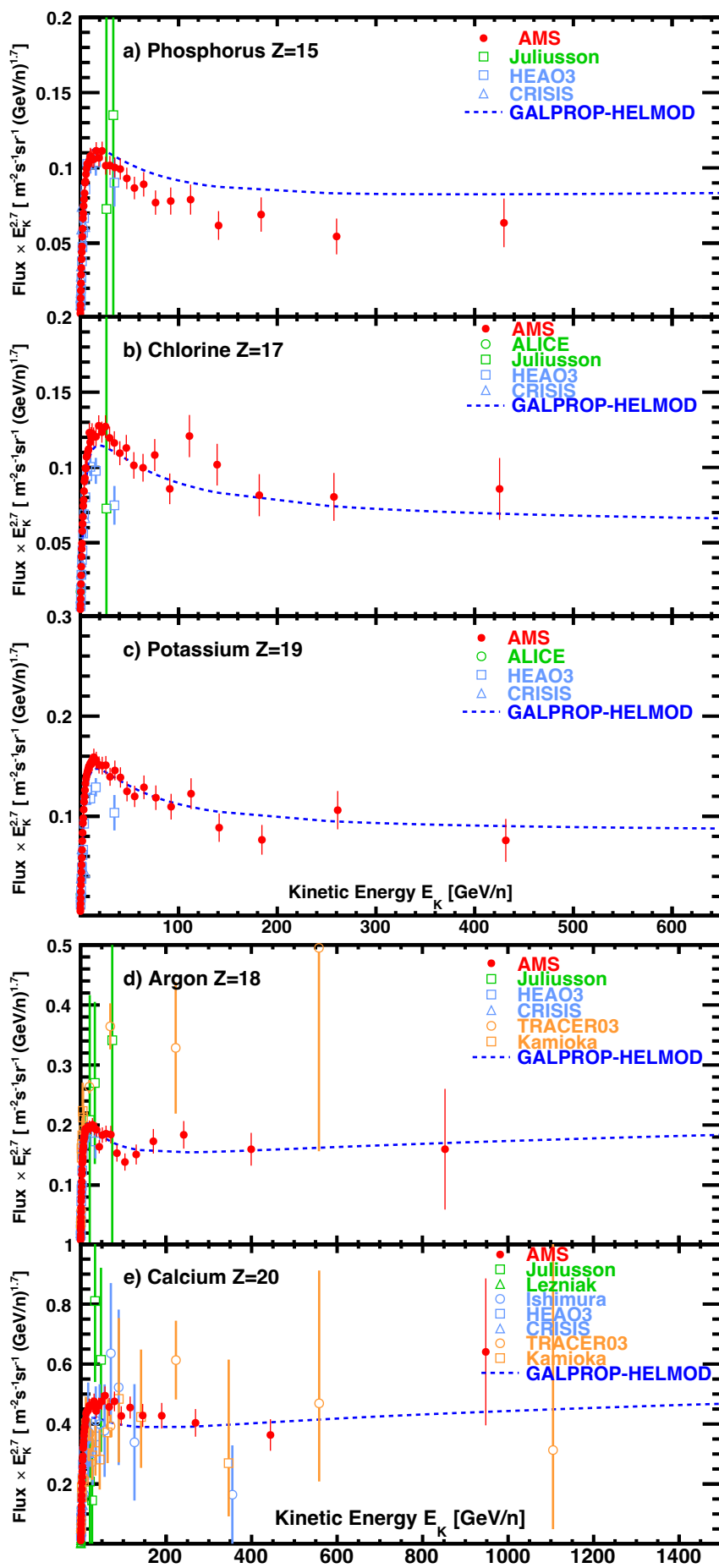


FIG. S8. The AMS (a) P, (b) Cl, (c) K, (d) Ar, and (e) Ca fluxes as a function of kinetic energy per nucleon E_K multiplied by $E_K^{2.7}$ together with other measurements [6–13] and with the predictions of the most recent cosmic ray model GALPROP-HELMOD [31].

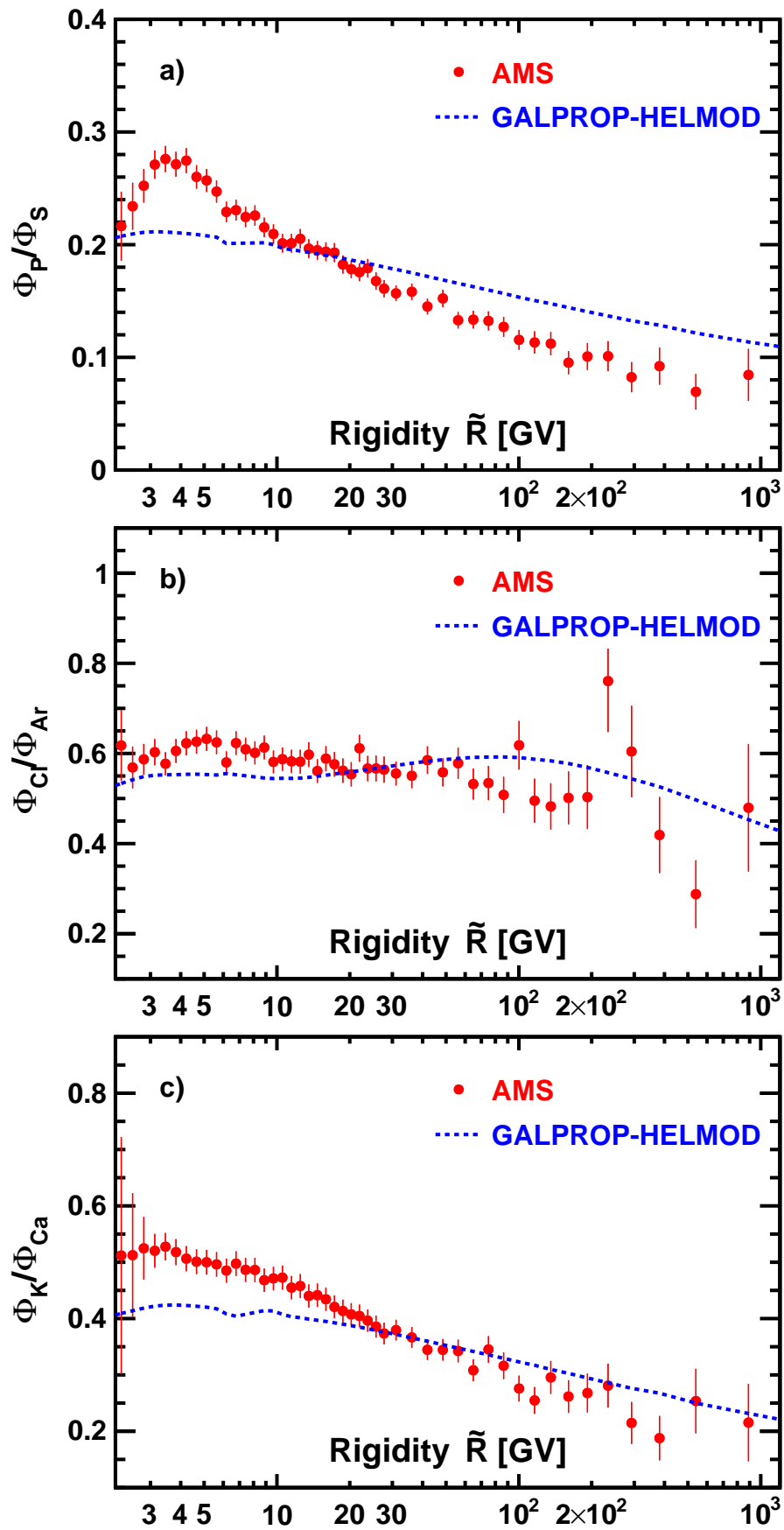


FIG. S9. The rigidity dependence of the AMS (a) Φ_P/Φ_S , (b) Φ_{Cl}/Φ_{Ar} , and (c) Φ_K/Φ_{Ca} together with the predictions of the most recent cosmic ray model GALPROP-HELMOD [31].

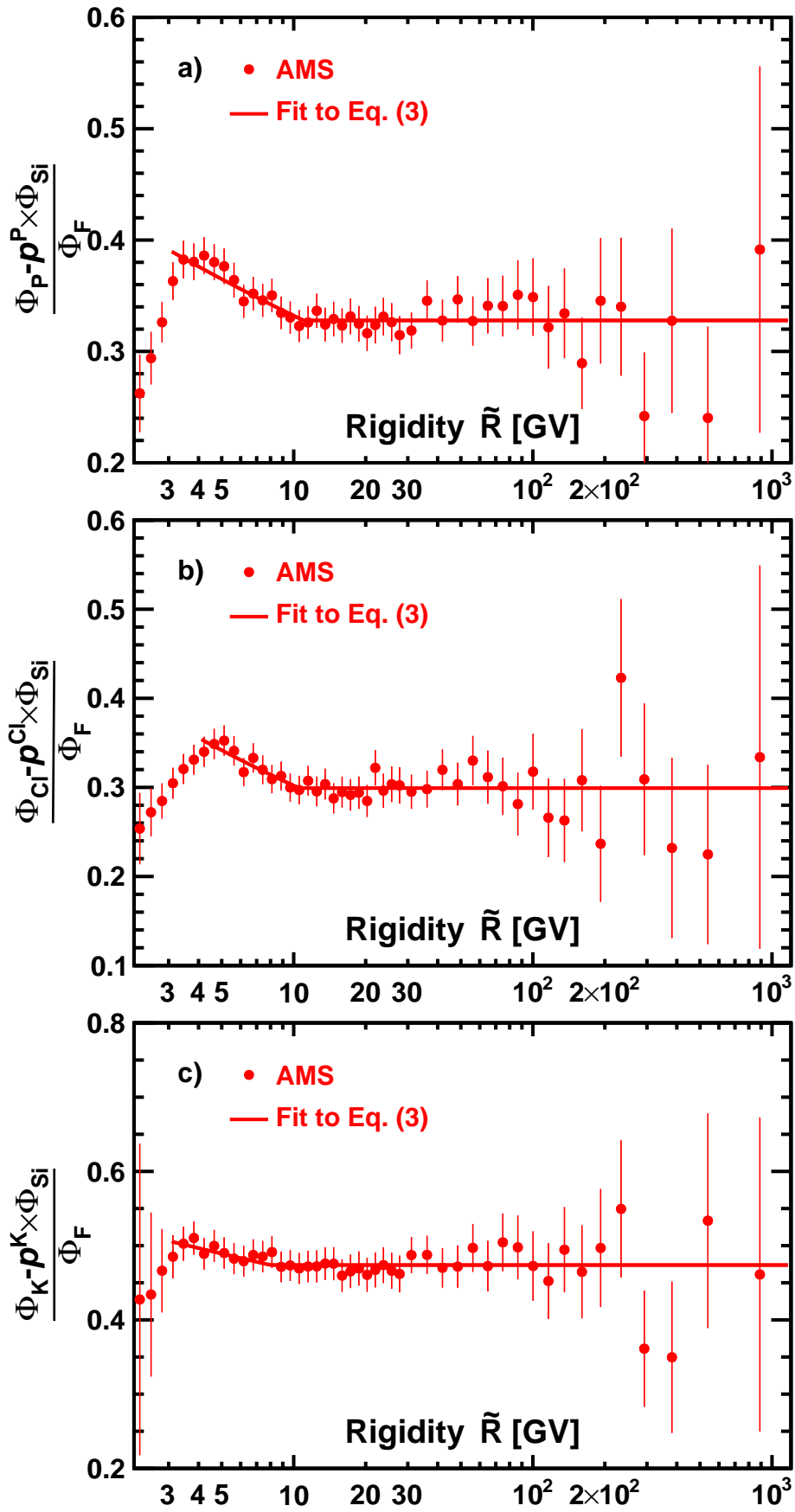


FIG. S10. The rigidity dependence of the (a) $(\Phi_P - p^P \Phi_{Si})/\Phi_F$, (b) $(\Phi_{Cl} - p^{Cl} \Phi_{Si})/\Phi_F$, and (c) $(\Phi_K - p^K \Phi_{Si})/\Phi_F$ together with the Eq. (3) fit results. As seen, above ~ 10 GV the P, Cl, and K fluxes could be presented as sum of primary component (proportional to Φ_{Si}) and secondary component (proportional to Φ_F).

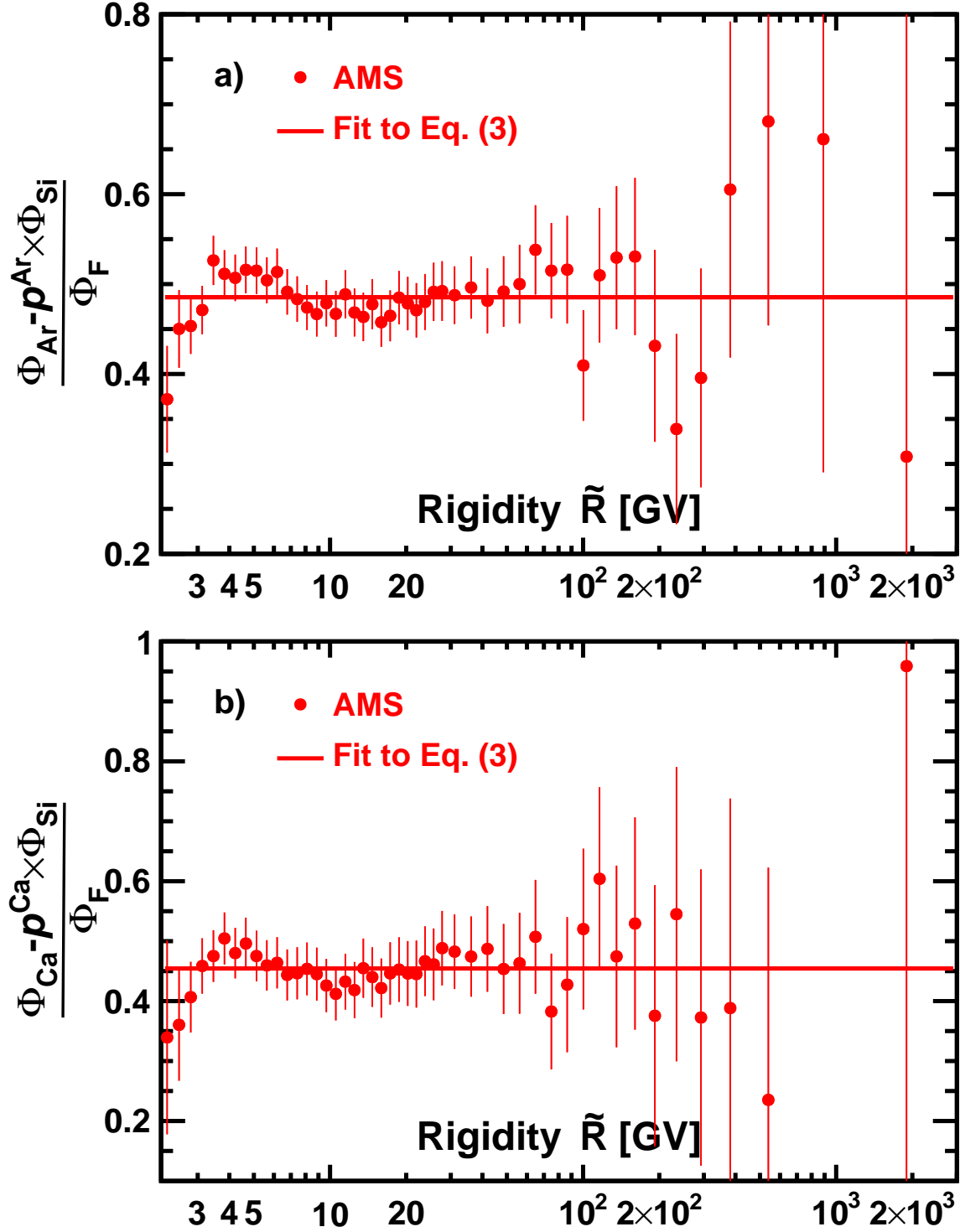


FIG. S11. The rigidity dependence of the (a) $(\Phi_{\text{Ar}} - p^{\text{Ar}}\Phi_{\text{Si}})/\Phi_{\text{F}}$ and (b) $(\Phi_{\text{Ca}} - p^{\text{Ca}}\Phi_{\text{Si}})/\Phi_{\text{F}}$ together with the Eq. (3) fit results. As seen, over entire rigidity range the Ar and Ca fluxes could be presented as sum of primary component (proportional to Φ_{Si}) and secondary component (proportional to Φ_{F}).

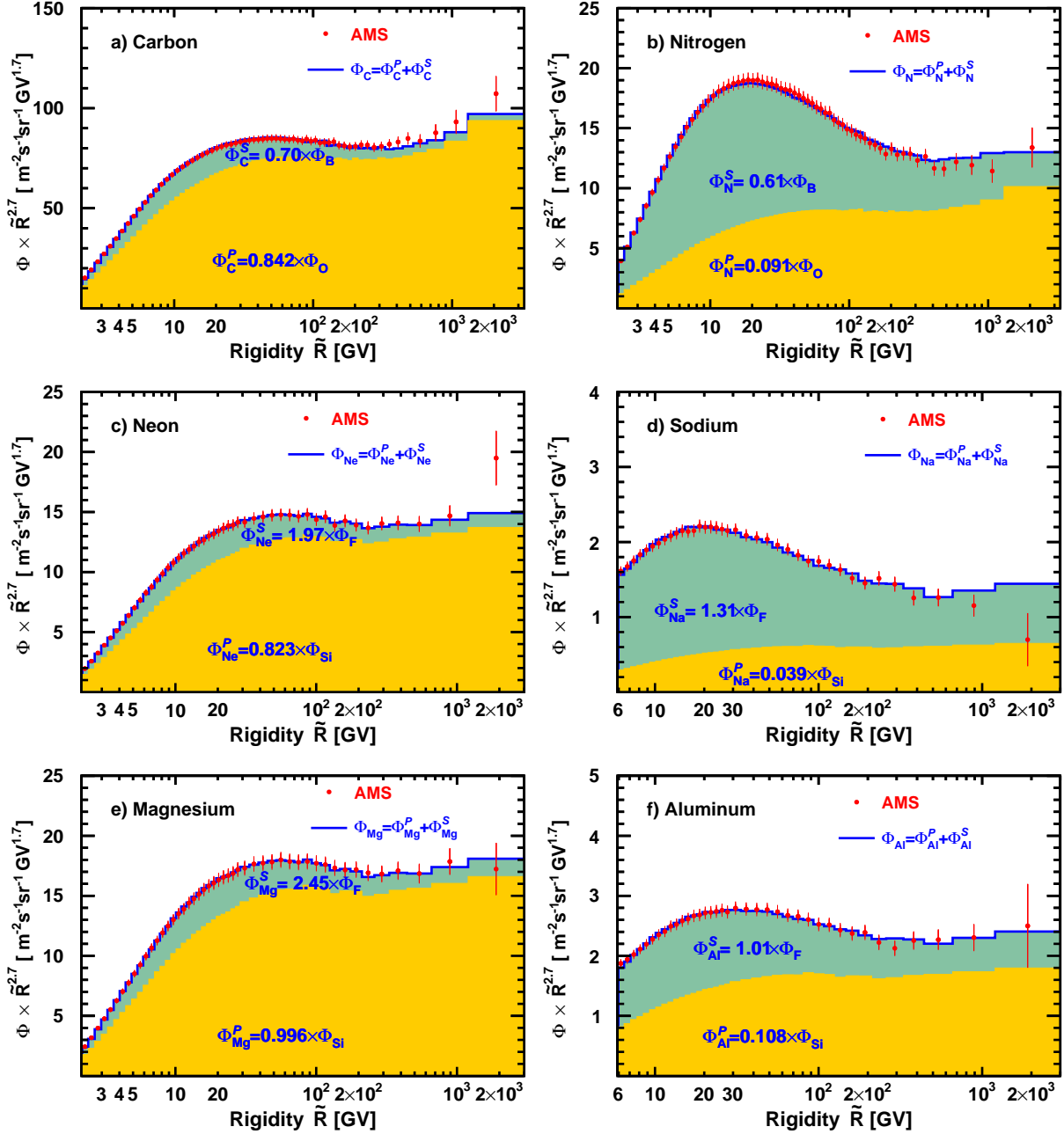


FIG. S12. The AMS (a) C, (b) N, (c) Ne, (d) Na, (e) Mg, and (f) Al fluxes fit to the weighted sum of primary O, Si and secondary B, F fluxes above 2.15 GV for (a-c,e) and above 6 GV for (d,f). The contributions of the primary and secondary components are indicated by the shading (yellow and green, respectively). See also Table SXV.