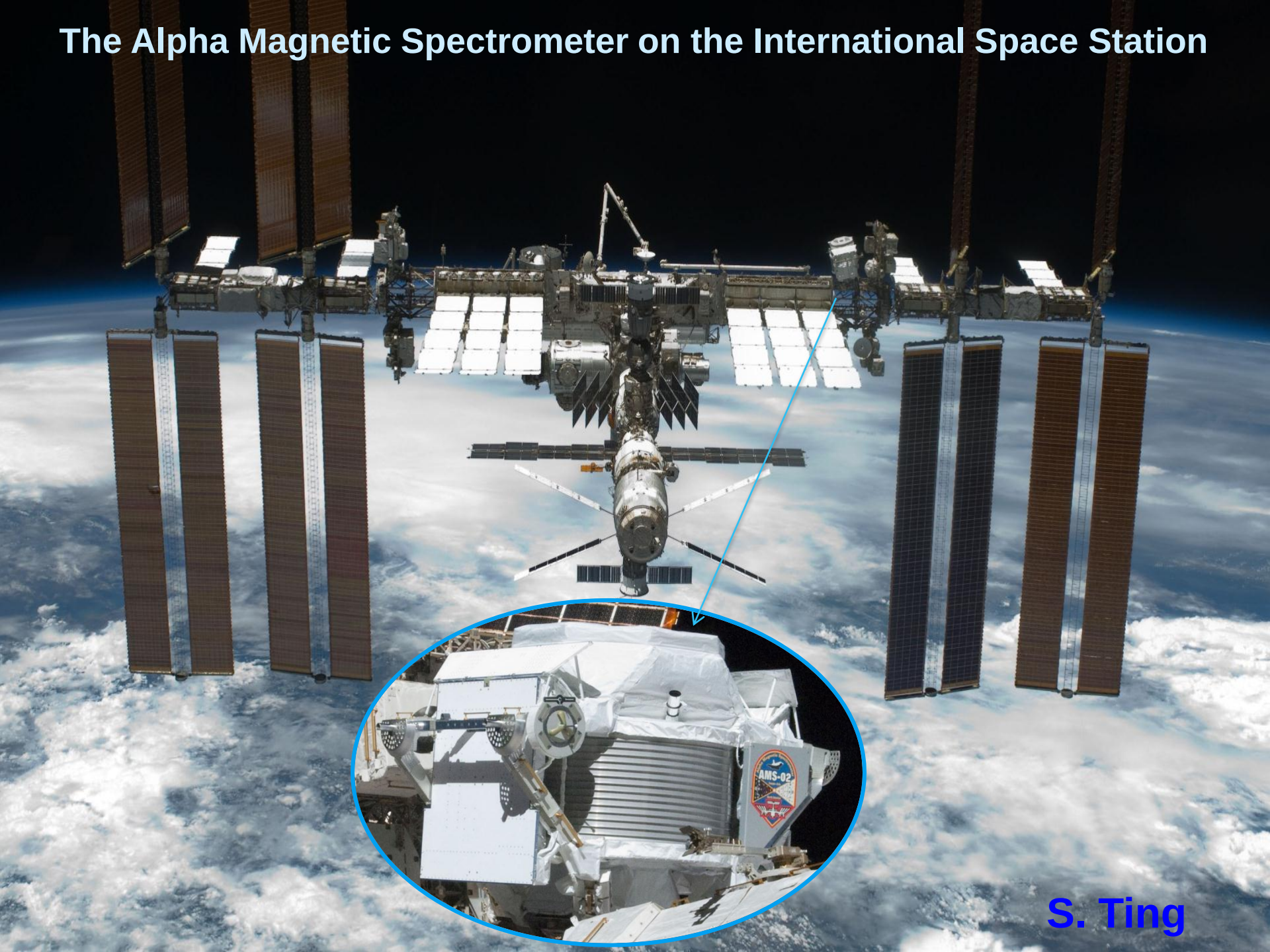
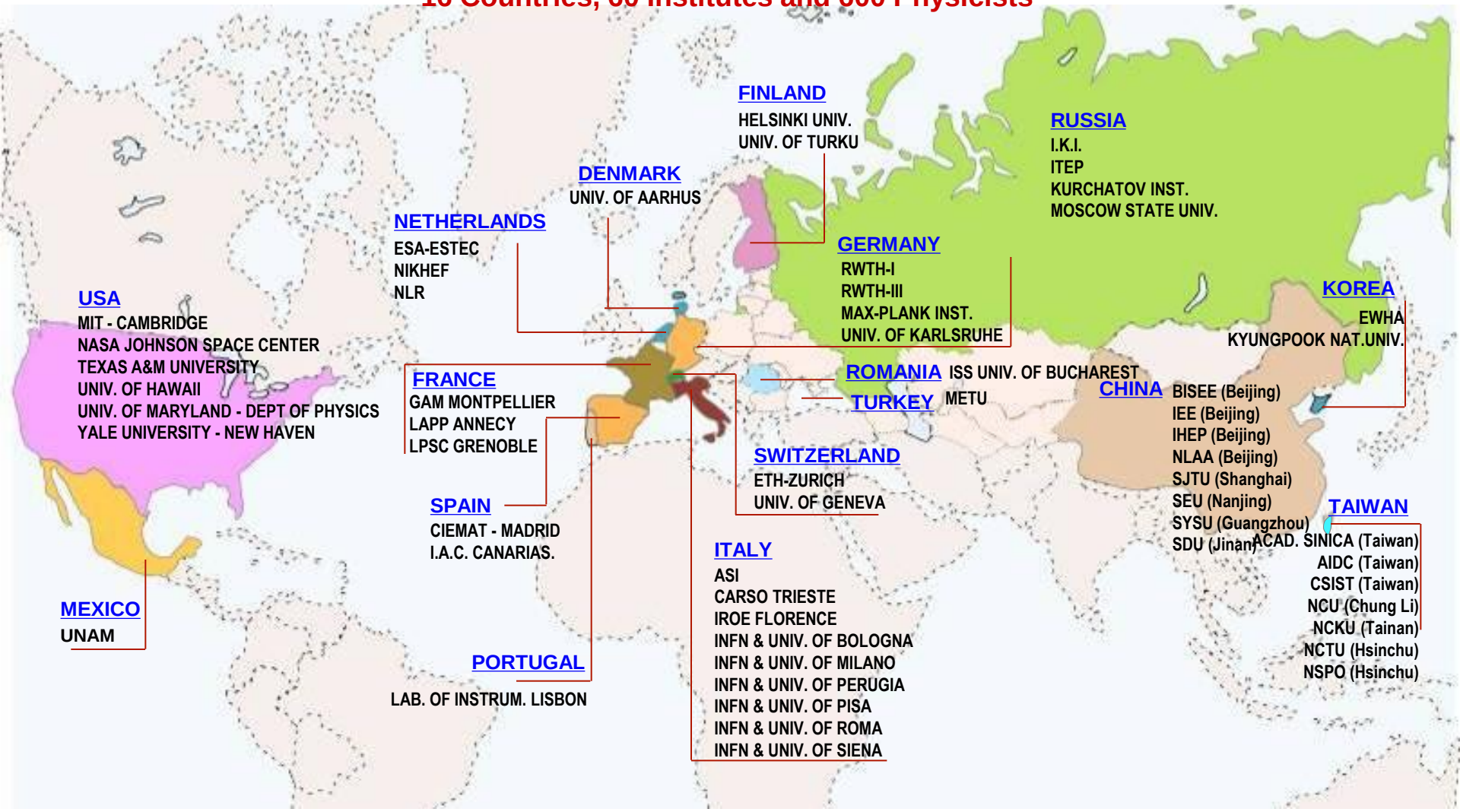
The Alpha Magnetic Spectrometer on the International Space Station



S. Ting

AMS: a U.S. DOE sponsored international collaboration

16 Countries, 60 Institutes and 600 Physicists



Strong support from

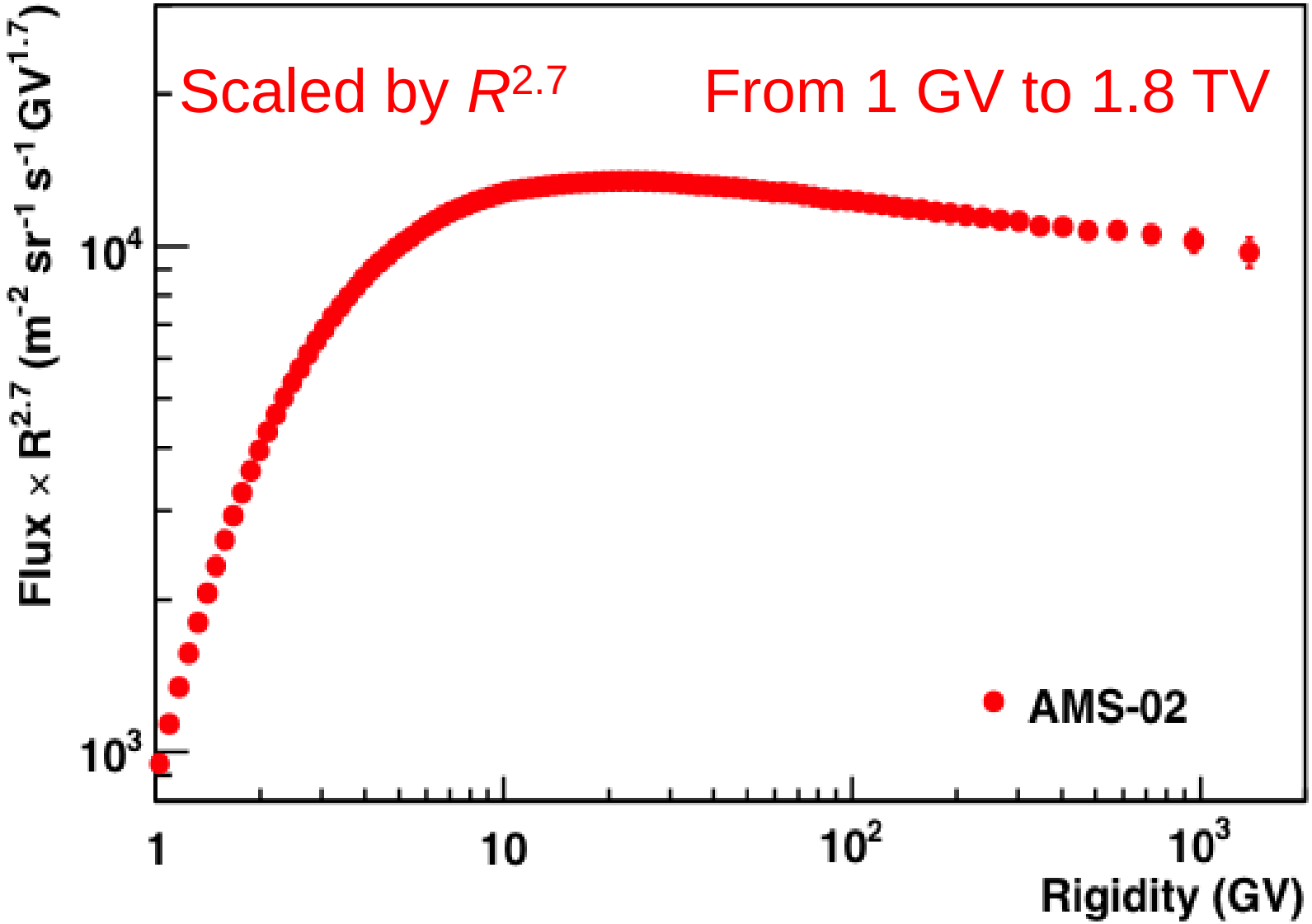
NASA (D. Goldin, C. Bolden, L. Garver, G. Abbey, W. Gerstenmaier, M. Sistilli, T. Martin, K. Bollweg, …)

and DOE (J. Siegrist, M. Salamon, D.Kovar, S. Gonzalez, R. Staffin, J. O'Fallon, …)

New results from the first 2 years of AMS

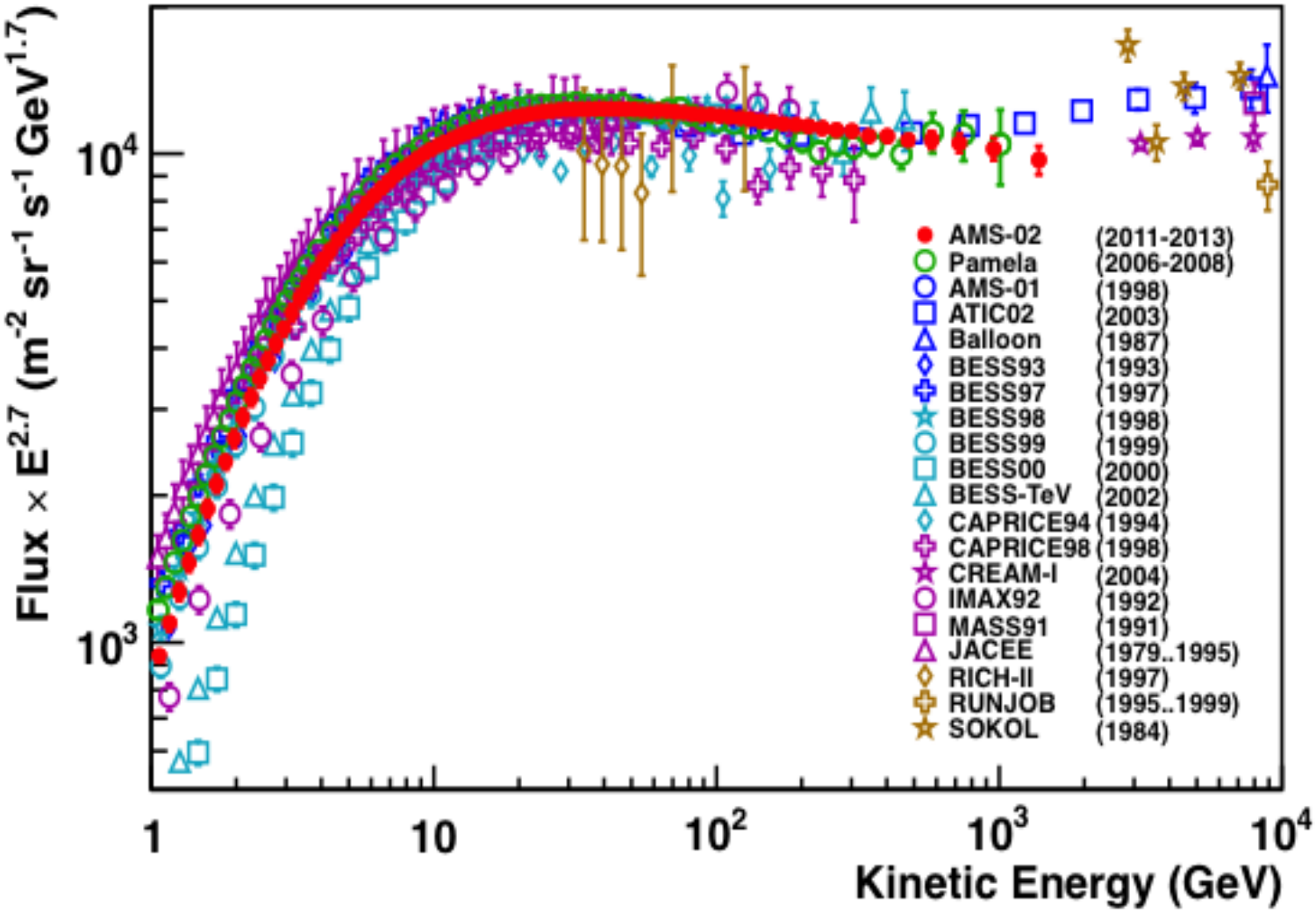
New results from AMS

1) Proton flux



Proton flux

Comparison with past measurements



Science AAAS

PAMELA Measurements of Cosmic-Ray Proton and Helium Spectra
O. Adriani *et al.*
Science **332**, 69 (2011);
DOI: 10.1126/science.1199172

PAMELA Measurements of Cosmic-Ray Proton and Helium Spectra

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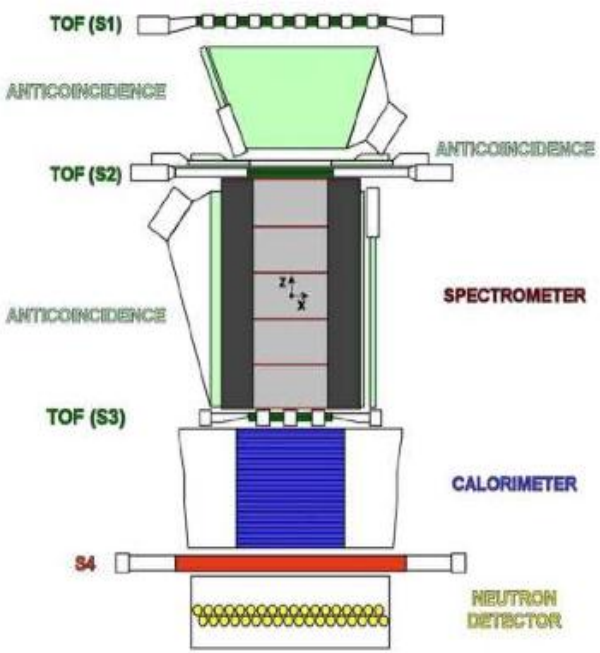


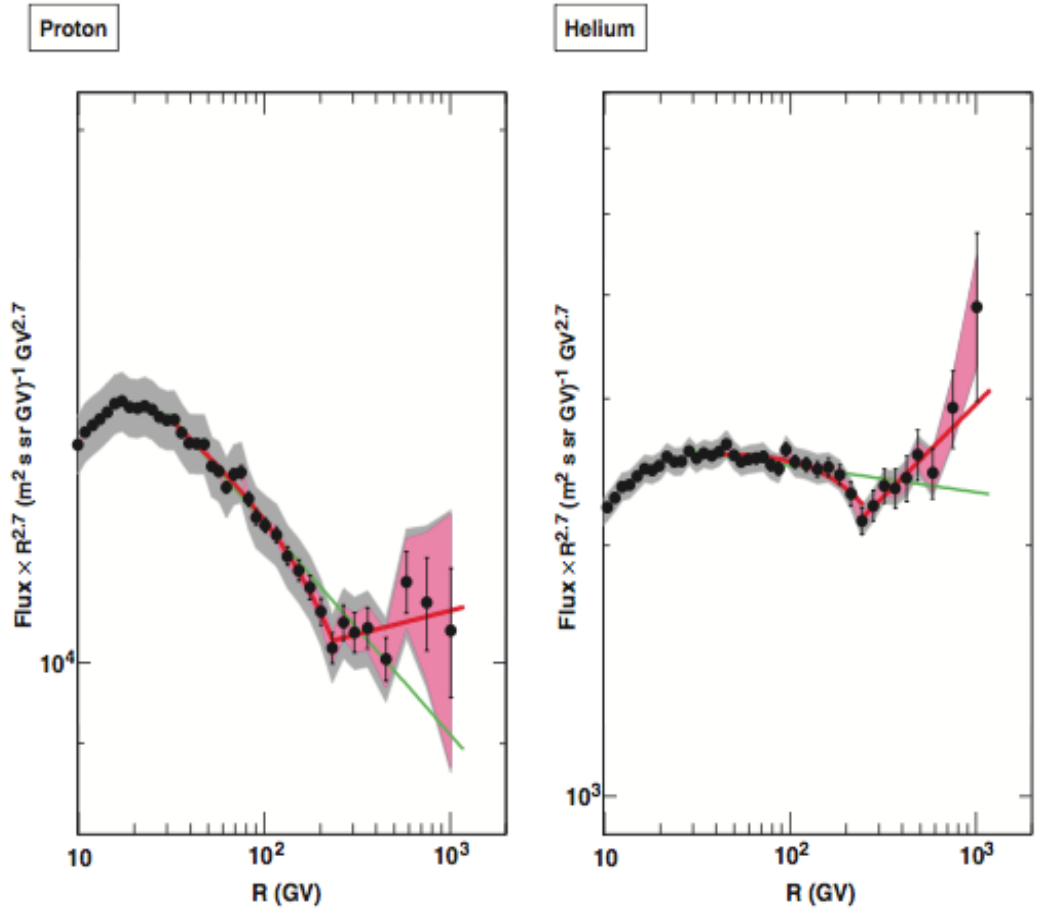
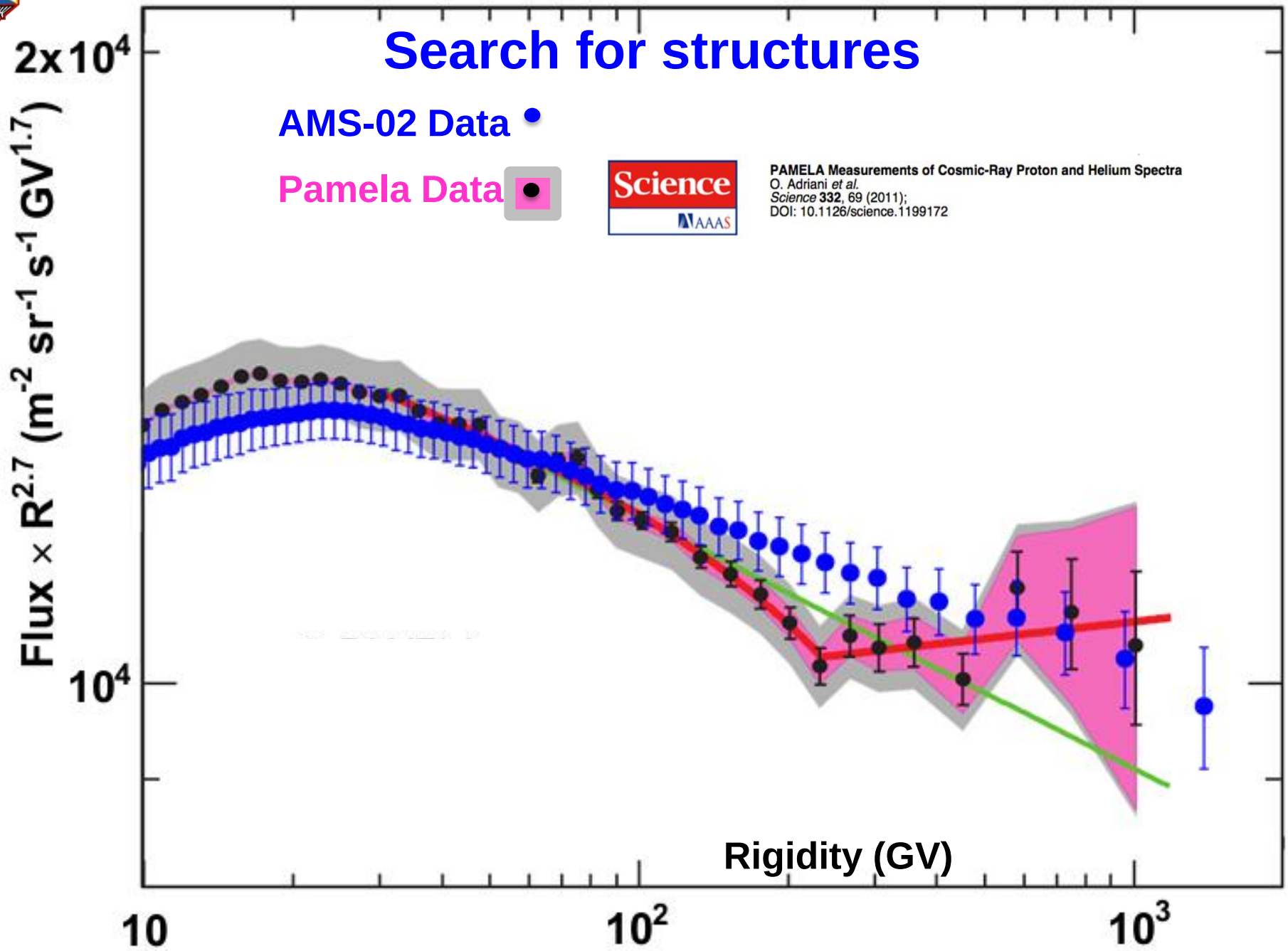


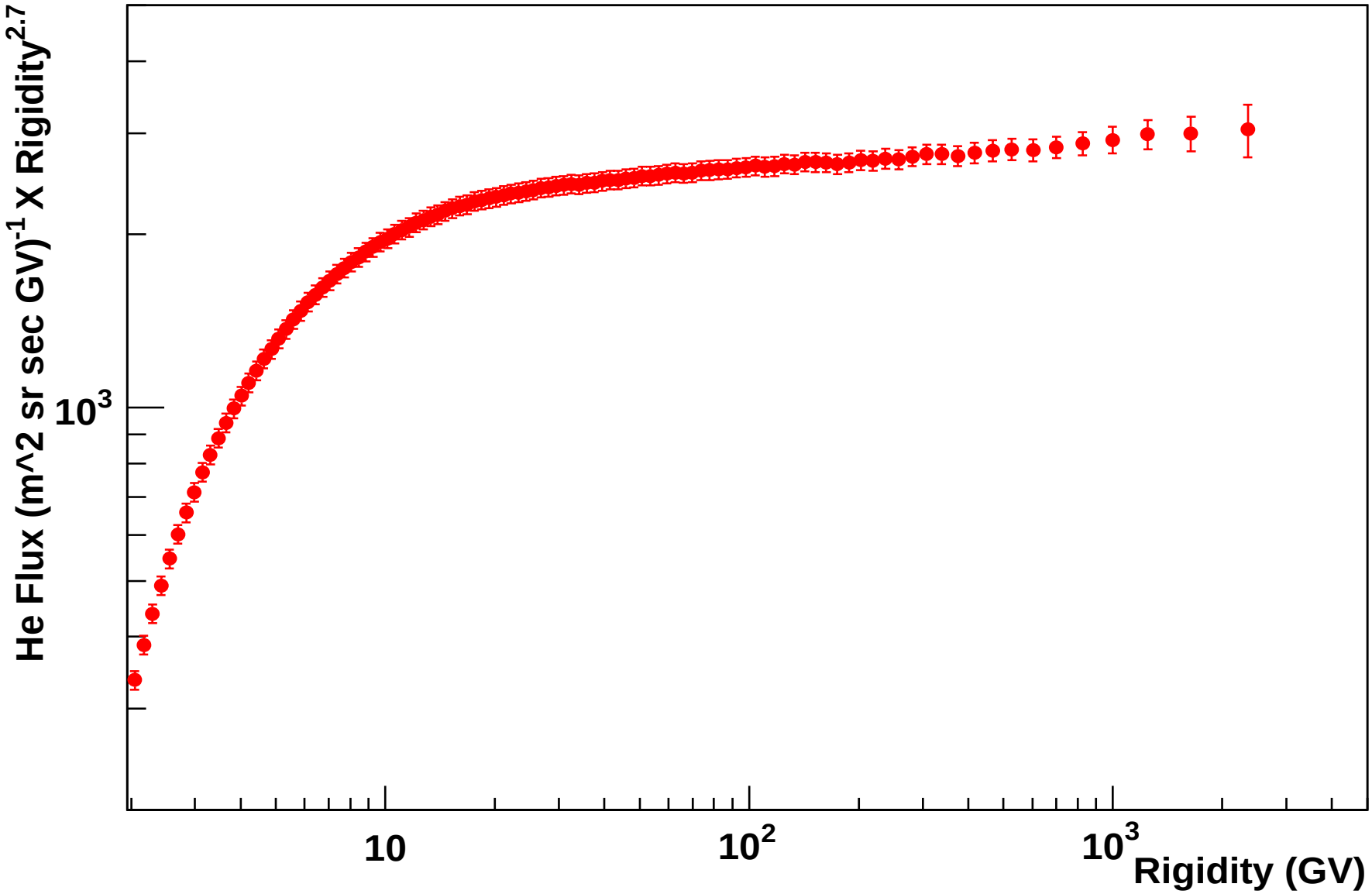
Fig. 4. Proton (**left**) and helium (**right**) spectra in the range 10 GV to 1.2 TV. The gray shaded area represents the estimated systematic uncertainty, and the pink shaded area represents the contribution due to tracker alignment. The green lines represent fits with a single power law in the rigidity range 30 to 240 GV. The red curves represent the fit with a rigidity-dependent power law (30 to 240 GV) and with a single power law above 240 GV.

Proton flux


Search for structures
AMS-02 Data
Pamela Data
Science
AAAS
PAMELA Measurements of Cosmic-Ray Proton and Helium Spectra
O. Adriani et al.
Science 332, 69 (2011);
DOI: 10.1126/science.1199172
Flux × R^2.7 (m^-2 sr^-1 s^-1 GV^1.7)
2x10^4
10^4
Rigidity (GV)
10
10^2
10^3

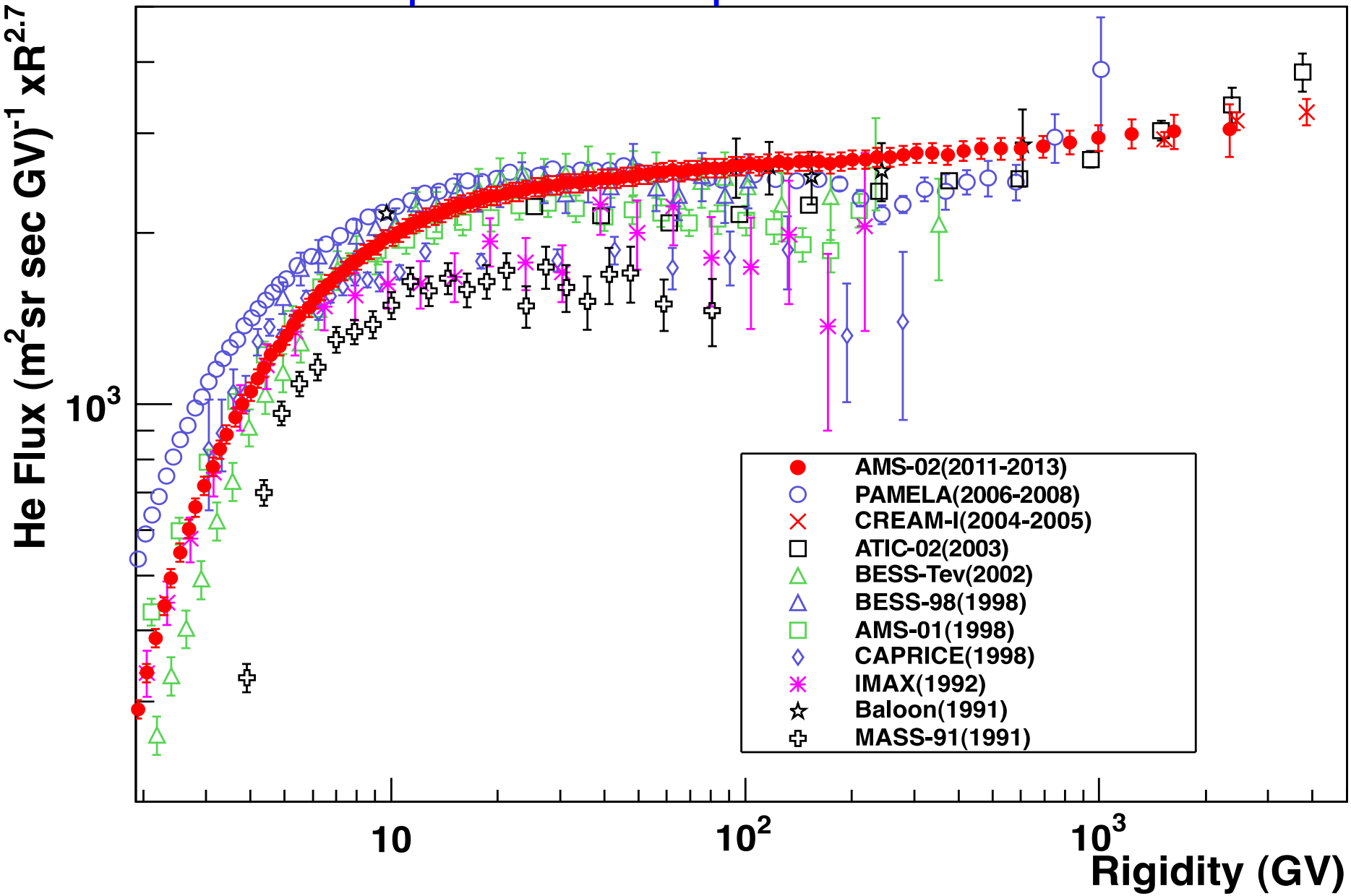
New Results from AMS

2) Helium spectrum , 2GV to 3TV

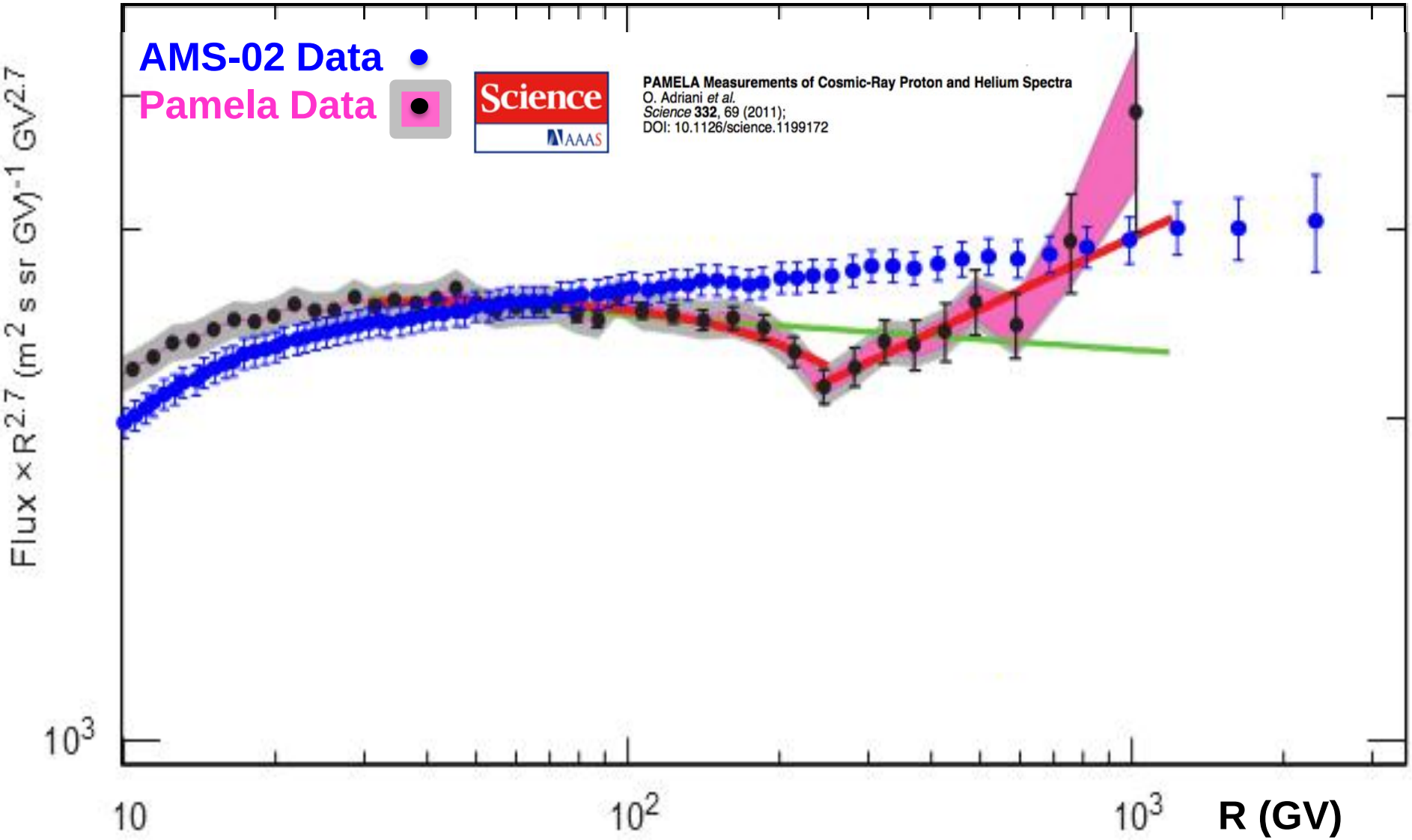


Helium flux

Comparison with past measurements

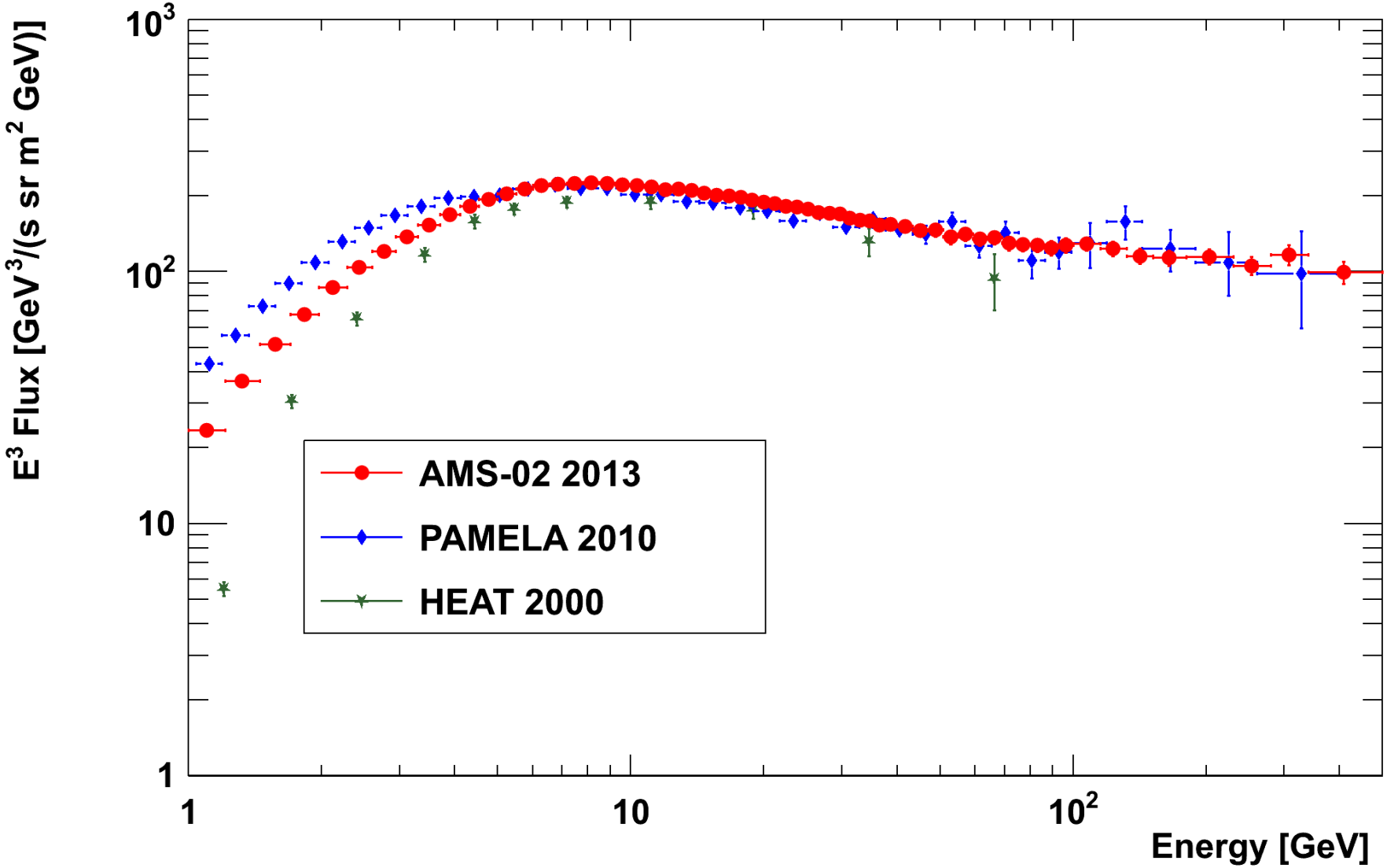


Helium flux
Search for structures



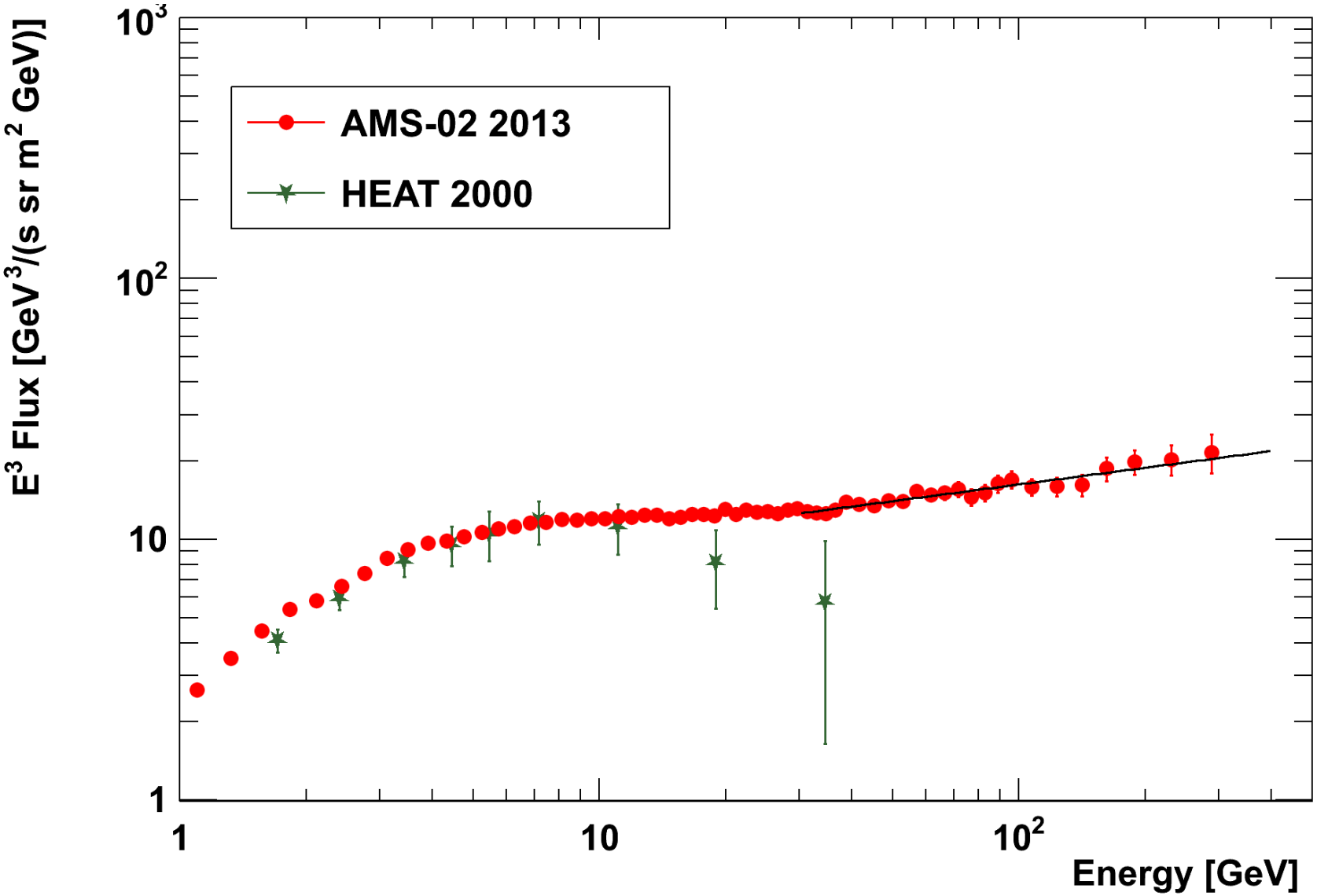
New results from AMS

3) Electron Spectrum , 1GeV to 500GeV



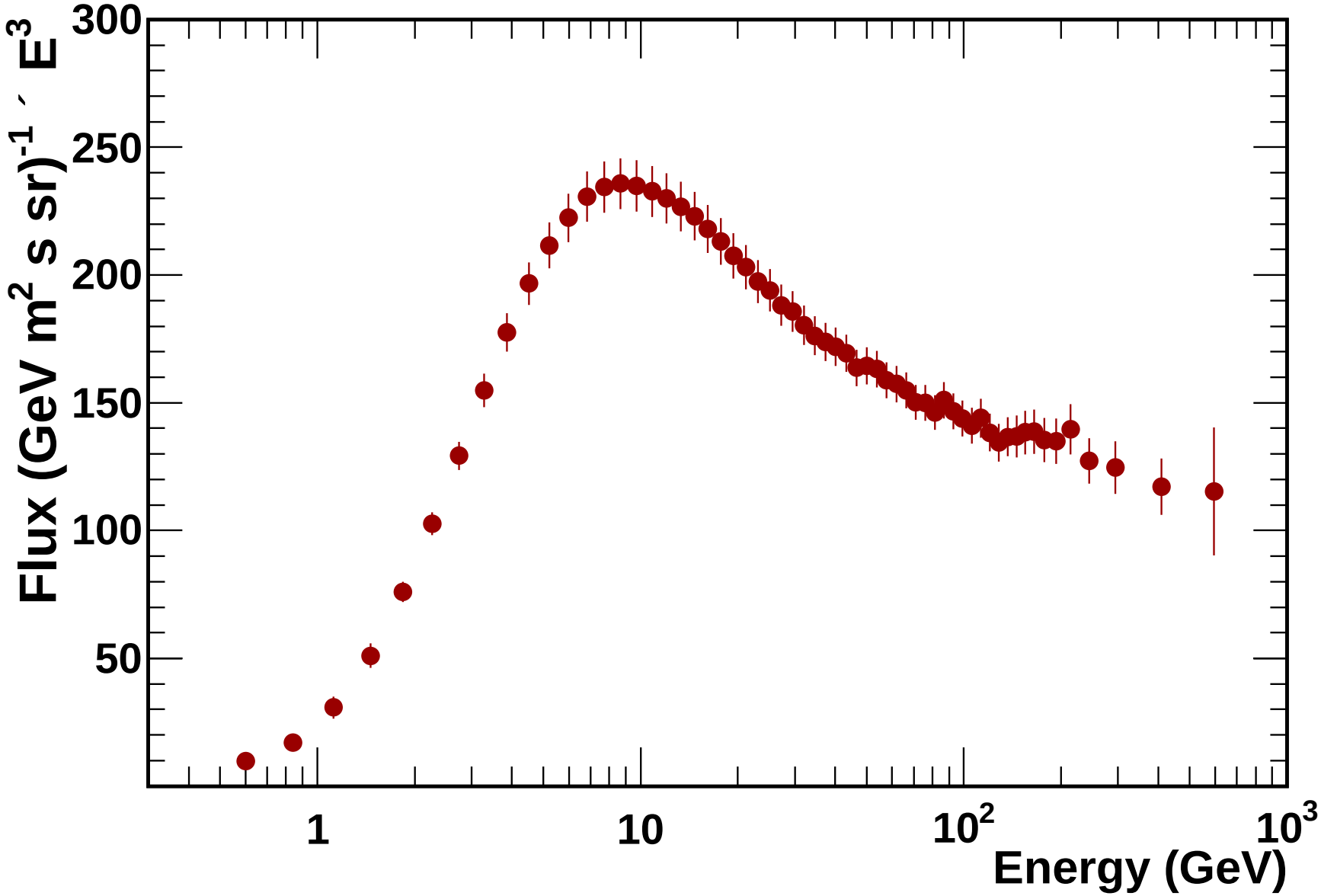
New results from AMS

4) Positron Spectrum, 1GeV to 350GeV

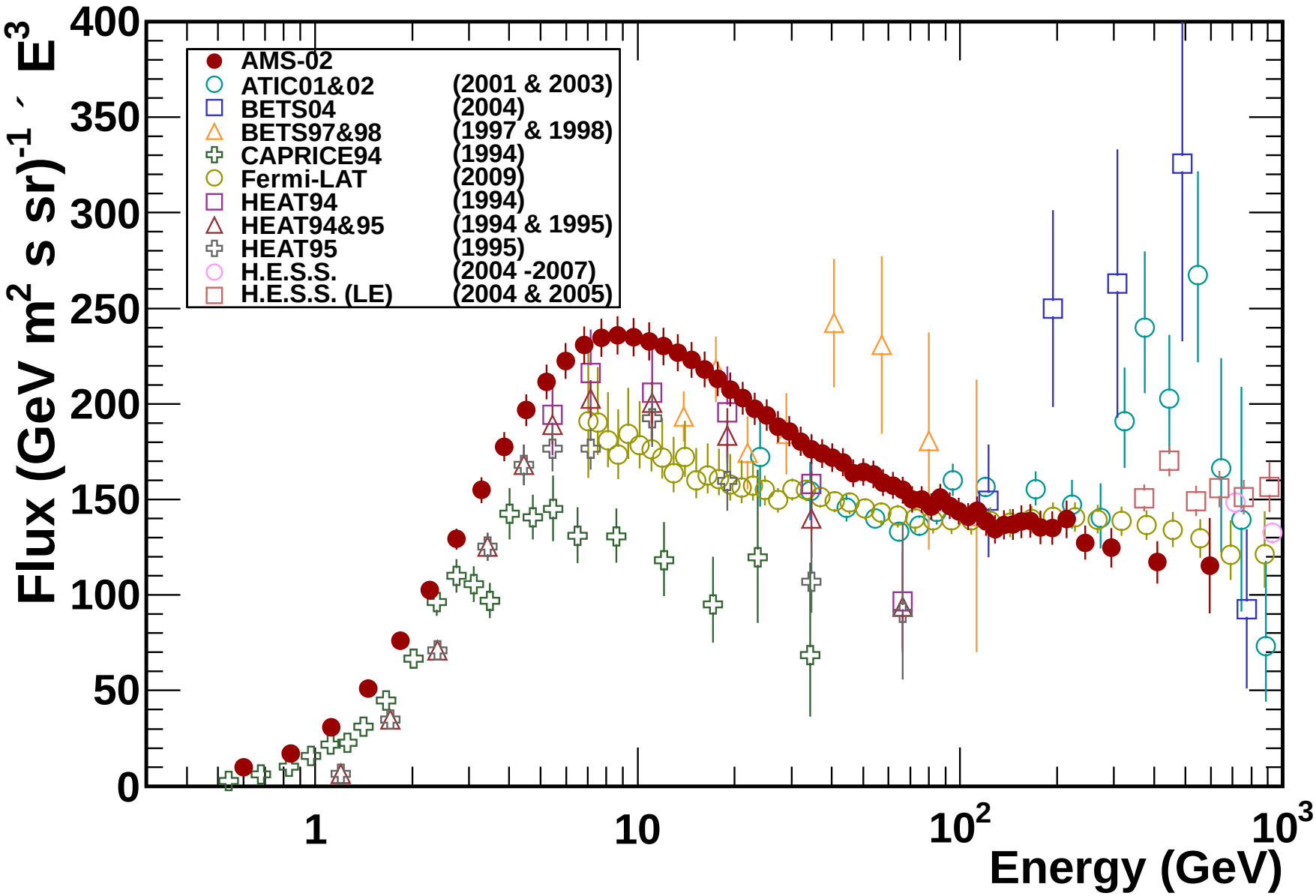


New results from AMS

5) All Electron Spectrum, 0.5GeV to 700GeV

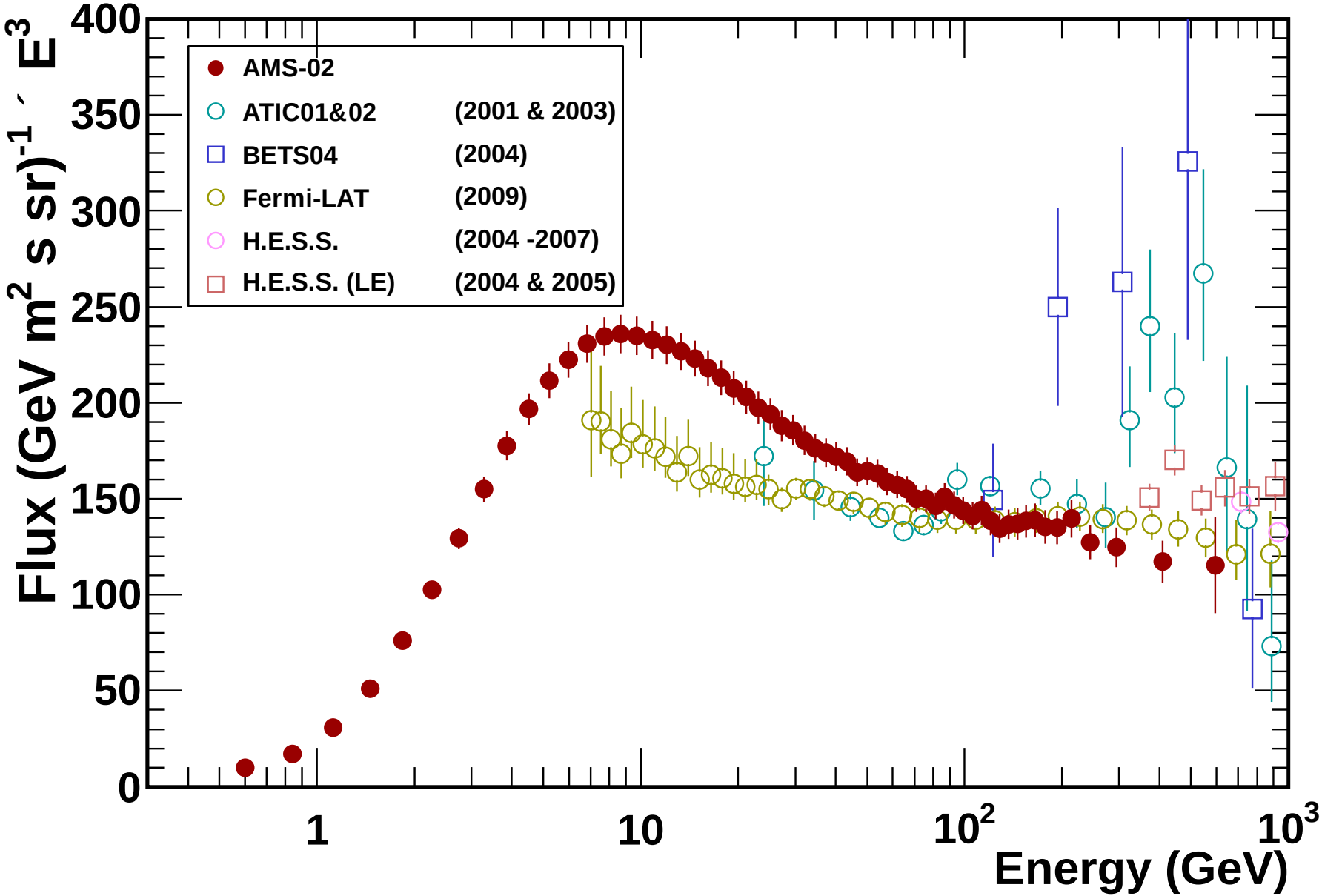


(Electron plus Positron) Spectrum



(Electron plus Positron) Spectrum

comparison with recent measurements

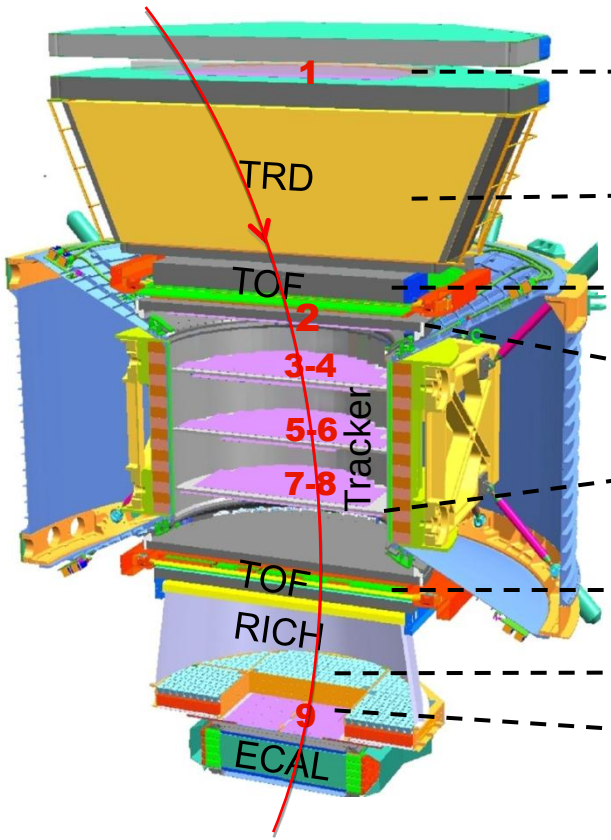


New results from AMS

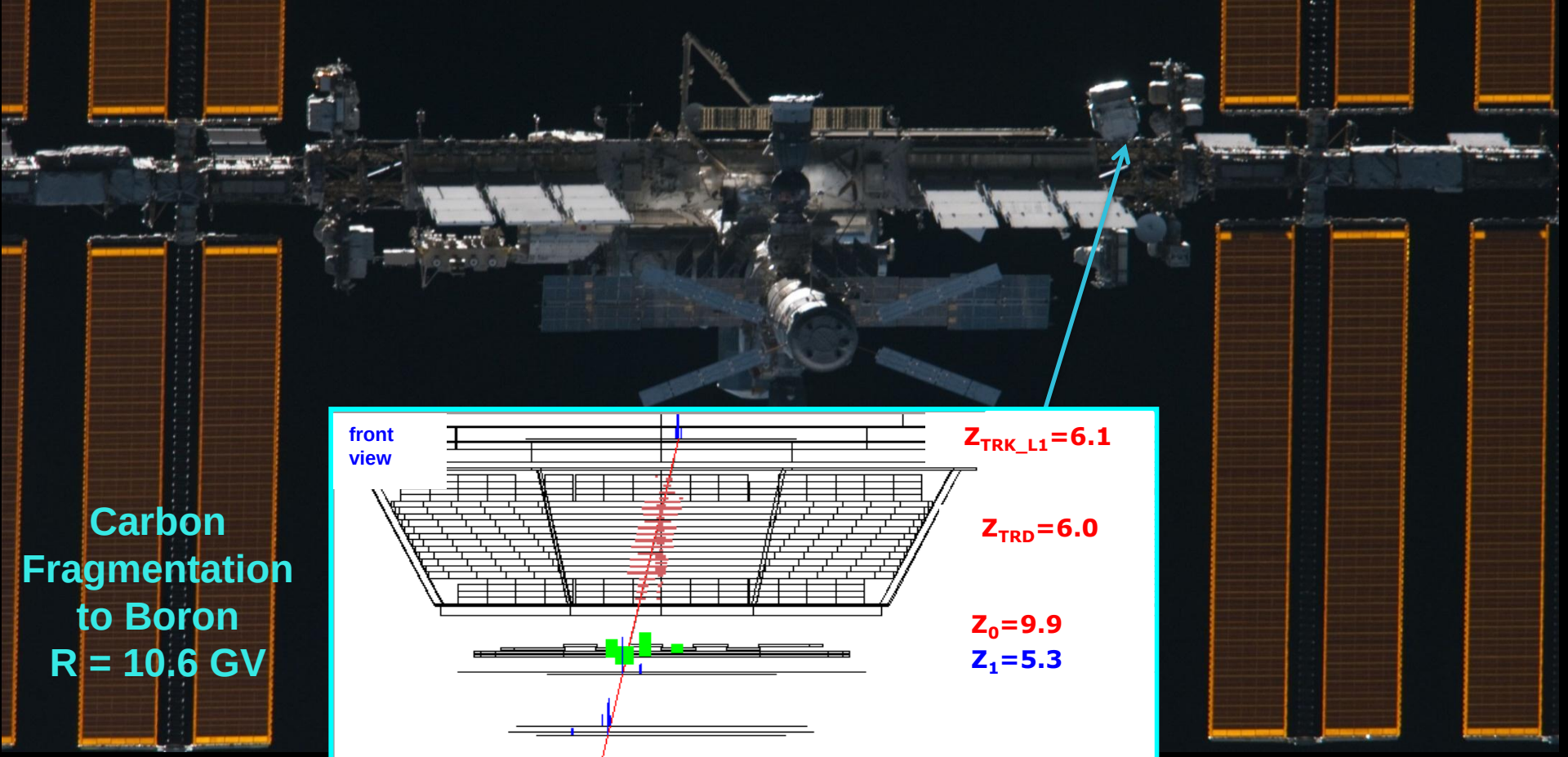
6) Boron-to-Carbon ratio, 5GV to 500GV

Precise measurement of the energy spectra of B/C provides information on Cosmic Ray Interactions and Propagation

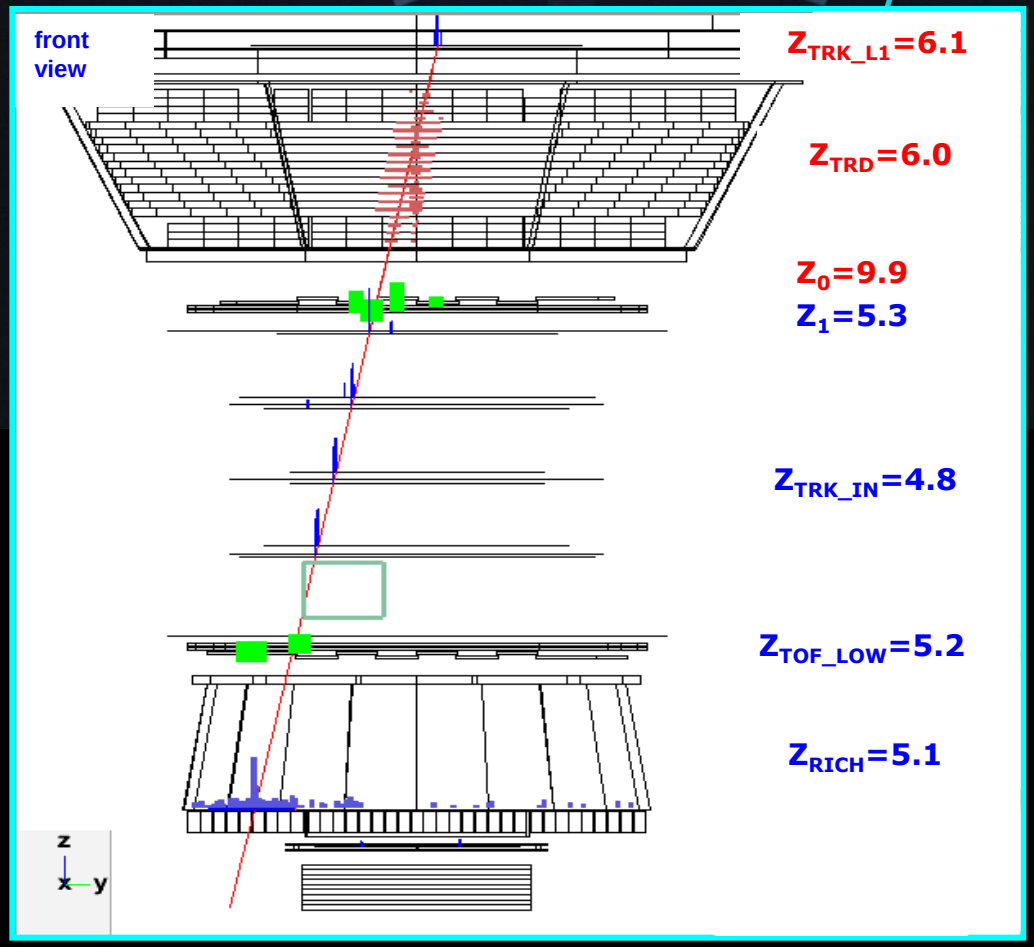
AMS: Multiple Independent Measurements of the Charge (|Z|)



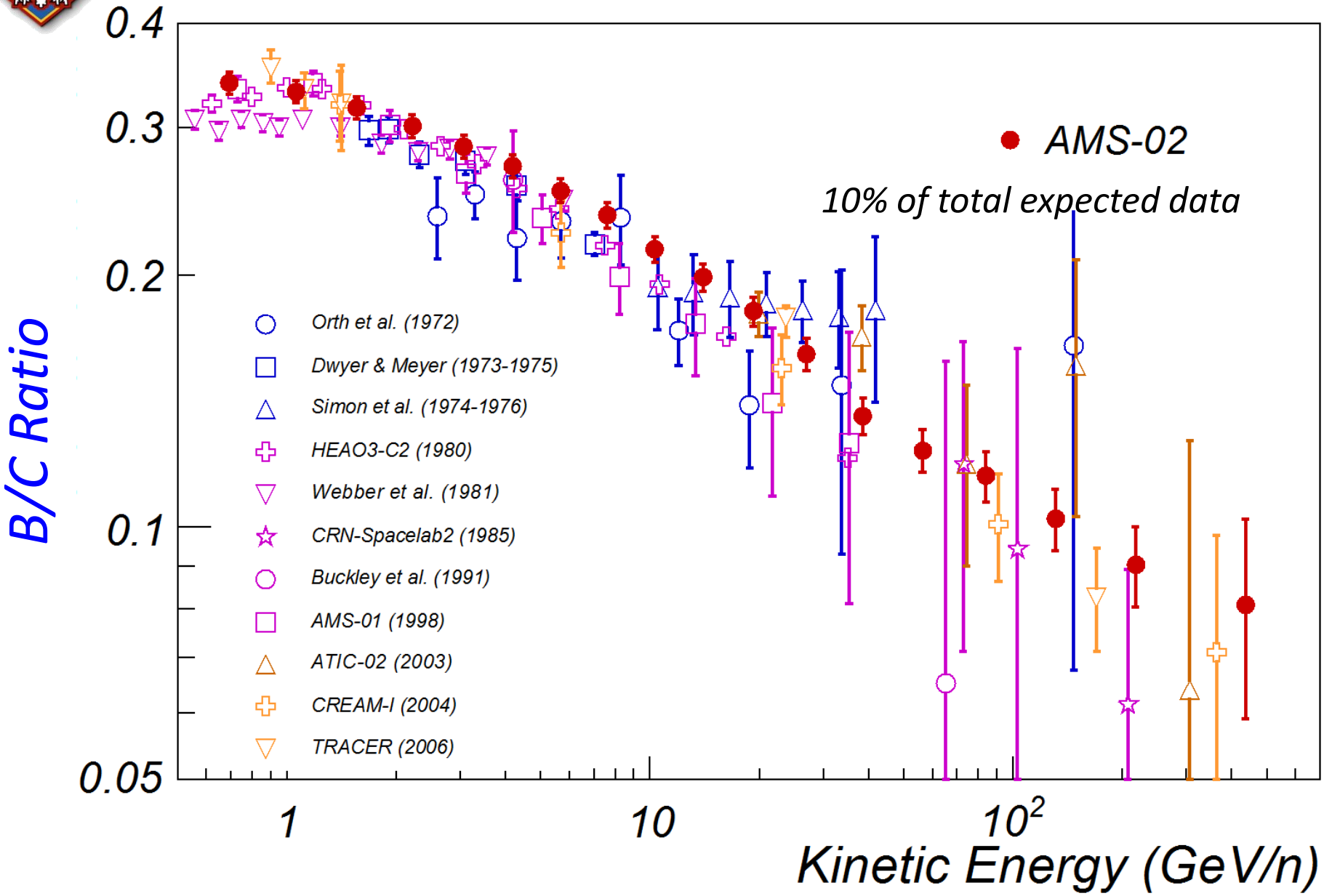
	Carbon (Z=6) ΔZ (cu)
1. Tracker Plane 1	0.30
2. TRD	0.33
3. Upper TOF (1 counter)	0.16
4. Tracker Planes 2-8	0.12
5. Lower TOF (1 counter)	0.16
6. RICH	0.32
7. Tracker Plane 9	0.30



# Carbon Fragmentation to Boron
R = 10.6 GV

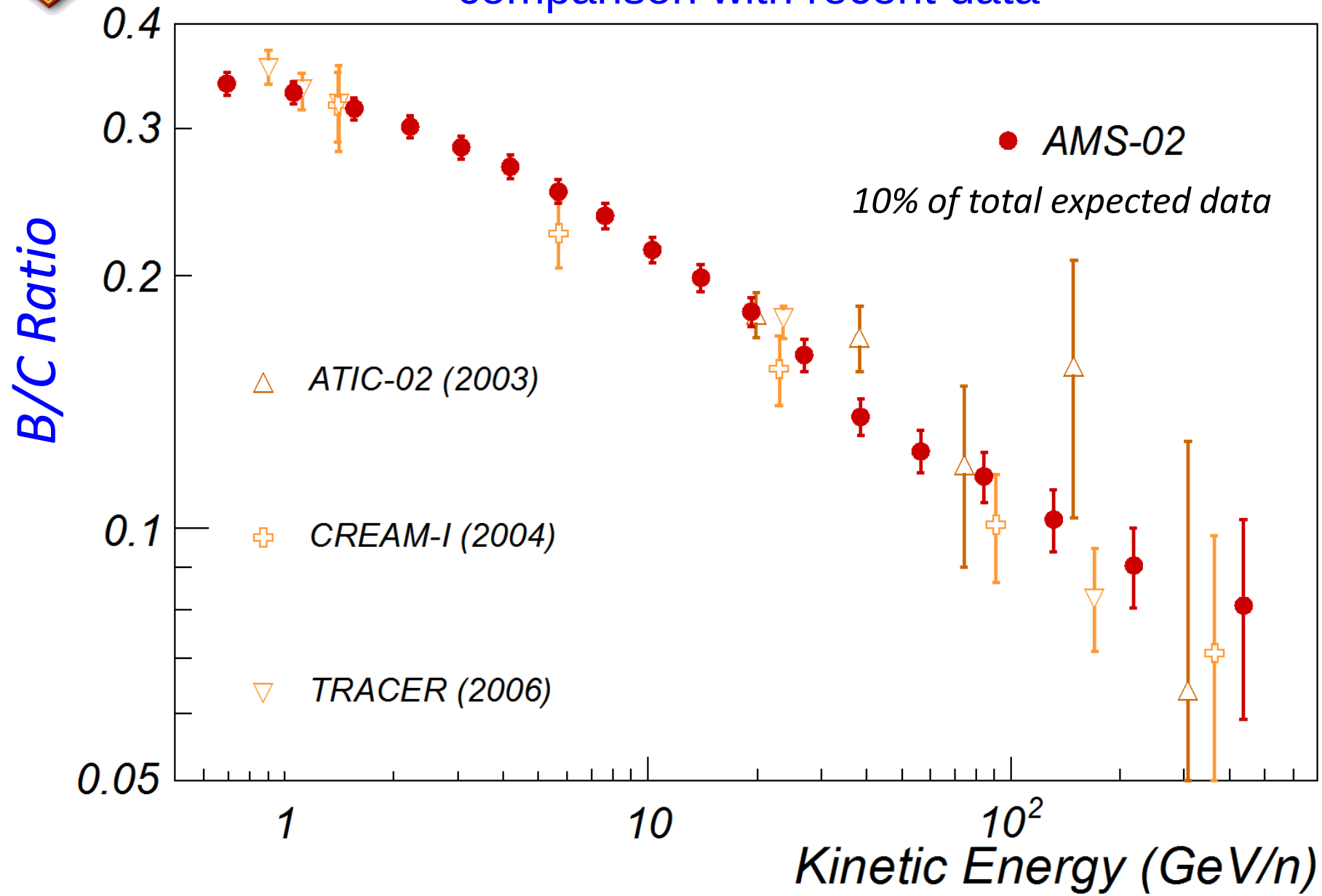


Boron-to-Carbon ratio

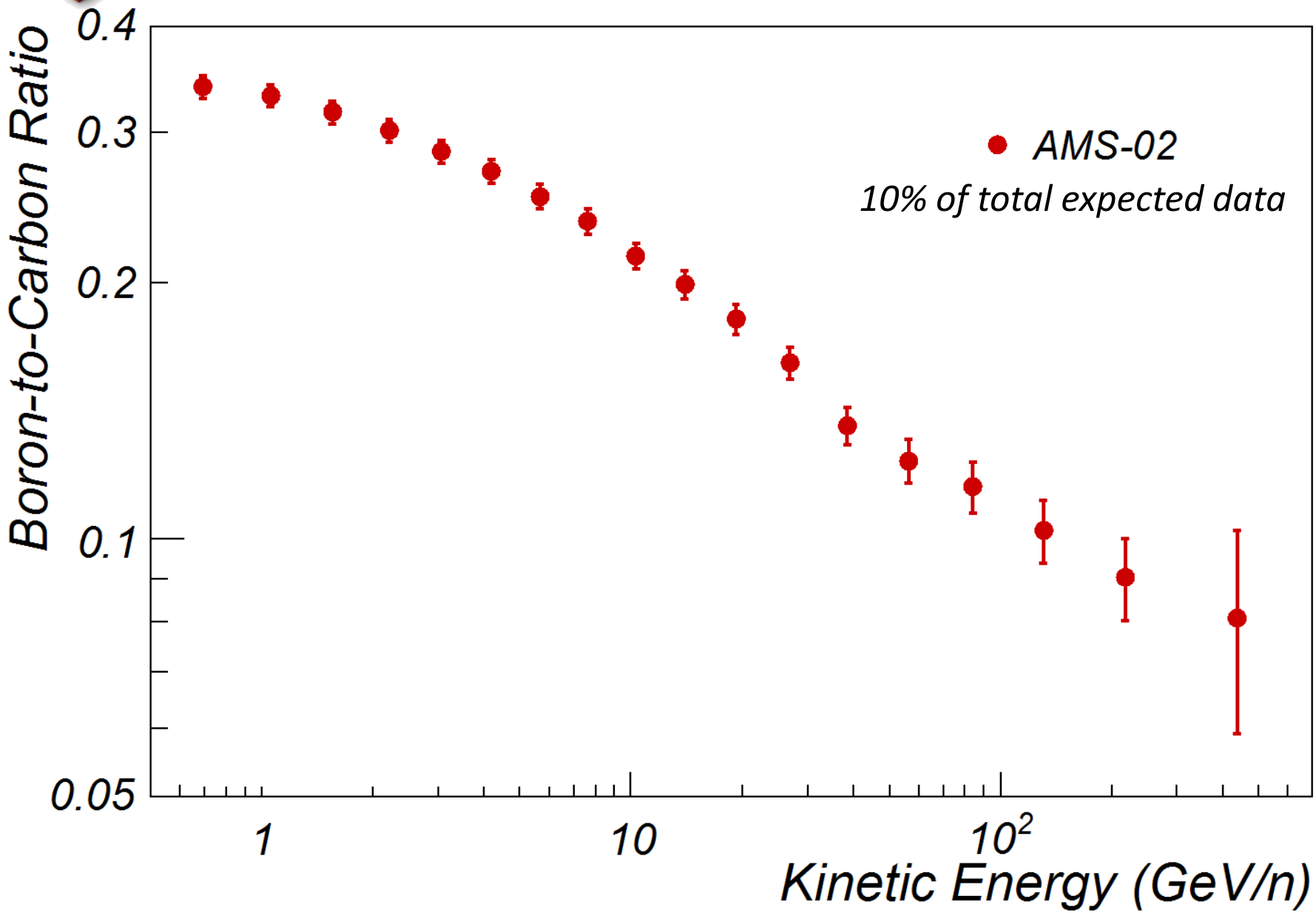


Boron-to-Carbon ratio

comparison with recent data

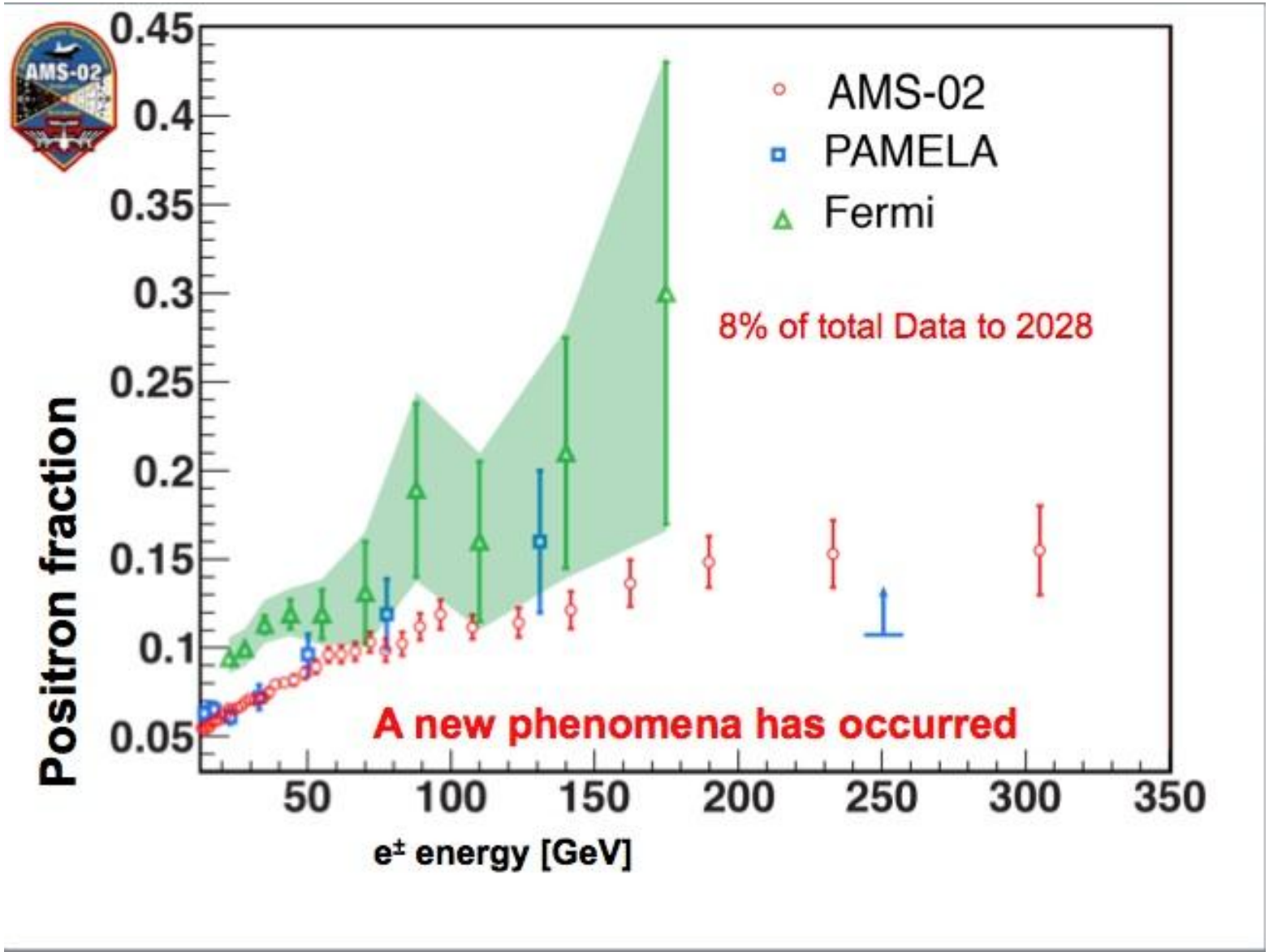


Boron-to-Carbon ratio



New results from AMS

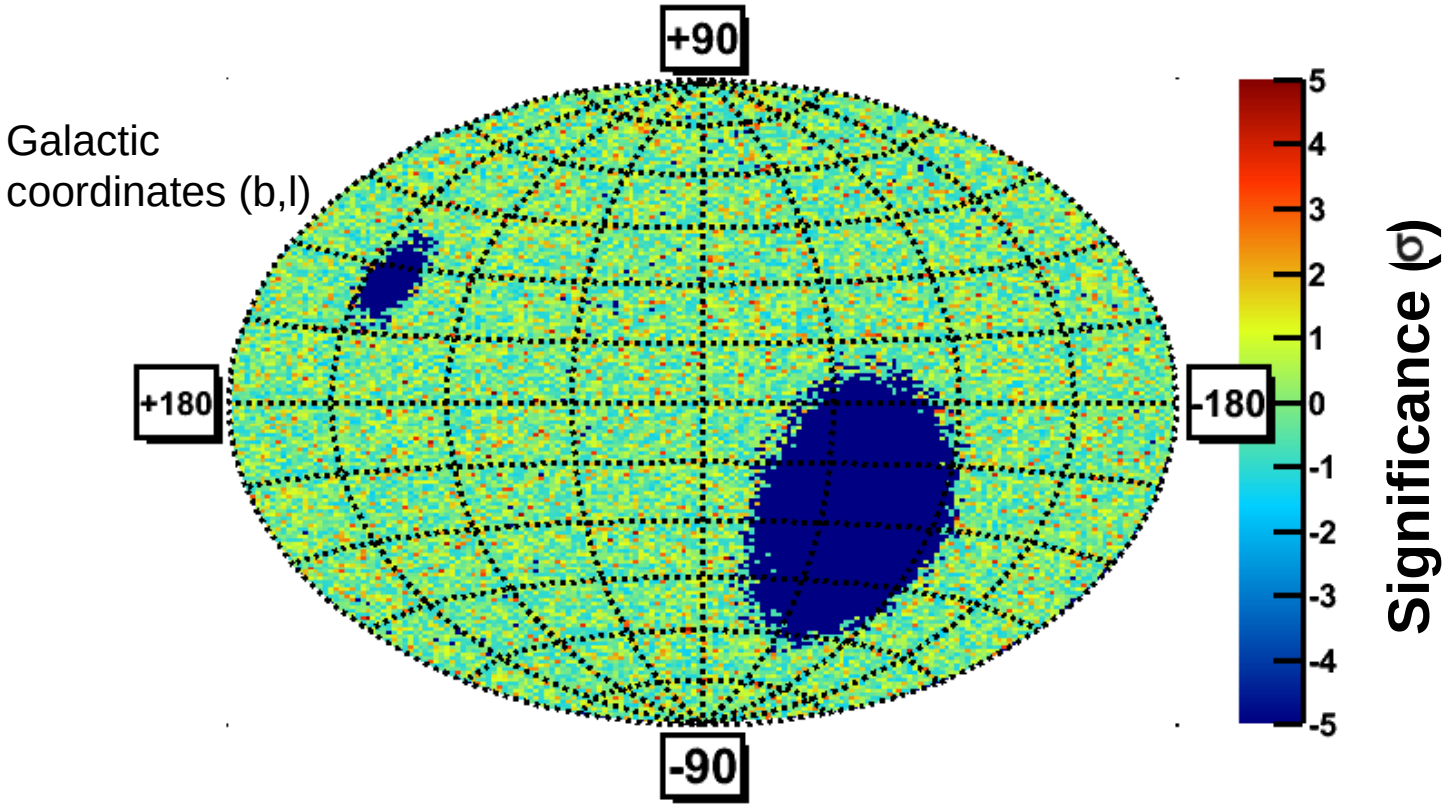
7) Positron ratio anisotropy (update)



New results from AMS

ICRC2013: On the origin of excess positrons

If the excess has a particle physics origin, it should be isotropic



The fluctuations of the positron ratio e^+/e^- are isotropic

On the origin of excess positrons

Limits on the amplitude of a dipole anisotropy in any axis in galactic coordinates on the positron to electron ratio

$\delta \leq 0.030$ at the 95% confidence level