Study of cosmic ray propagation using GALPROP

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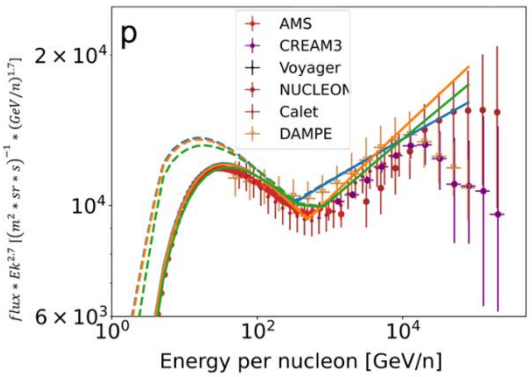
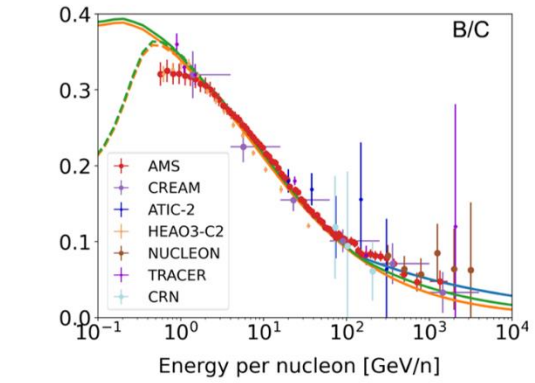
Problem

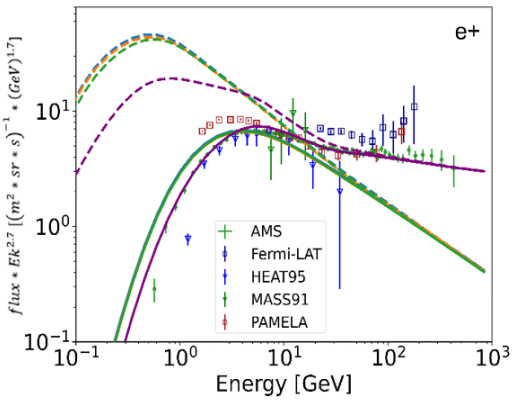
- Recent high-accuracy measurements reveals spectral deviation from a single power law.
- The phenomenon may reflect the corresponding breaks of the source spectra and/or the diffusion coefficient.
- It could also be an effect of new cosmic ray sources.



Methods

- We use GALPROP to calculate the cosmic ray propagation and present results of 3 cases:
  - Case 1 includes only a diffusion coefficient break.
  - Case 2 includes only source breaks. We make different source changes to different elements.
  - Case 3 includes both diffusion coefficient and source breaks.
- The source abundance settings are identical in all three cases and a primary Li source is considered.
- To study a significant disagreement with e+ data, we made a power-law fit to the difference between the GALPROP result and data.
- We also investigate the effect of an extra e+ source by adding a primary e+ source.





Results

- All three cases give reasonable fits to the B/C ratio, the p/He ratio, and the e-, Ne, Mg, Si, and Fe spectra.
- Case 1 produces contradicting spectral breaks in p and p- and does not produce enough hardening in the C and O spectra.
- Case 2 does not produce enough hardening in the B and Be spectra.
- Data shows preference for Case 3 over Case 2 and Case 1.
- By adding a Li source injection spectrum, GALPROP produces Li in agreement with the data.
- The hardening in the e+ spectrum can be fitted by adding a primary e+ source.