

Cosmic-Ray Modulation After the Next Solar Maximum Suggested by the CALET Experiment

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The CALorimetric Electron Telescope (CALET) installed on the International Space Station has been measuring high-energy cosmic rays (CRs) and gamma rays to understand the cosmic-ray acceleration and propagation. Using a low-energy electron trigger mode working at high geomagnetic latitude, the CALET has observed a charge-sign dependent solar modulation of the galactic cosmic rays [1]. As shown in Figure 1, the observed variation of the electron count rate is significantly larger than the proton count rate, which is reproduced by a numerical drift model of the low-energy CR transport in the heliosphere [2,3]. This clear signature showing the drift effect on the long-term solar modulation suggests that the solar modulation after the next solar maximum will have different variations from the last 11 years. In this talk, we present the charge-sign dependent solar modulation observed by CALET from October 2015 to May 2021, discussing the drift effect on the solar modulation. We also discuss the possible solar modulation after the next solar maximum in which the polarity of the solar magnetic field is reversed to the negative polarity, with the numerical drift model.

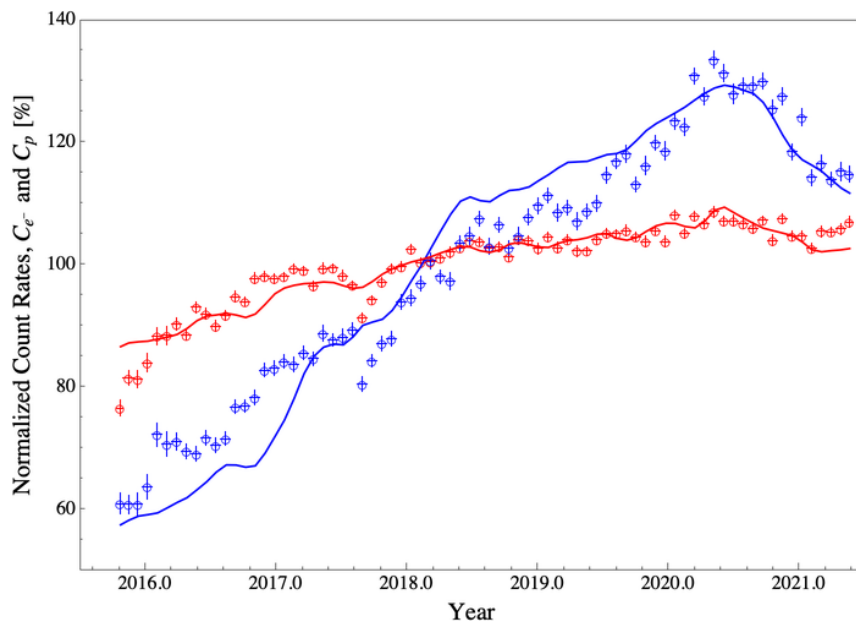


Figure 1. Time profile of the normalized count rates of electrons (blue open circles) and protons (red open circles) at an average rigidity of 3.8 GV for each Carrington rotation. The blue and red curves show the reproduced count rates of electrons and protons, respectively.

References

- [1] O. Adriani et al. (CALET Collaboration), *Physical Review Letters*, 130, 211001 (2023) [Erratum 131, 109902 (2023)]. DOI: <https://doi.org/10.1103/PhysRevLett.130.211001>.
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