

The many surprises from high-energy gamma-ray observations from the Sun

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Abstract content

I will discuss recent results on gamma-ray observations of the Sun with Fermi, which revealed many interesting and surprising features. These gamma rays are expected to be produced by hadronic interactions between cosmic rays and the solar atmosphere. The high flux of gamma rays observed from the Sun requires a large boost of gamma-ray production by some mechanism, which is likely related to solar magnetic fields. Our new results include the first resolved image of the Sun and a mysterious dip in the spectrum between 30-50 GeV. In particular, we also find that the solar gamma-ray spectrum during solar minimum is hard ($\sim E^{-2.1}$) and reaches at least 200 GeV. This suggests that ground based experiments like HAWC and LHAASO will be important for probing the Sun at TeV regime. Understanding solar gamma rays is crucial for predicting the solar atmospheric neutrino flux, which can realistically be detected by IceCube/KM3NeT, and is important for solar dark matter searches.

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