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A 3D Monte Carlo calculation of the inverse Compton emission from the Sun and stars in presence of magnetic and electric fields

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The solar steady emission in gamma rays is due to the interactions of Galactic Cosmic Rays with the solar atmosphere and with the low-energy solar photon field via inverse Compton scattering. The emission is sensitive to the magnetic field nearby the Sun and to the cosmic-ray transport in the magnetic field in the inner solar system. Modeling the inverse Compton emission in the presence of a magnetic field is therefore crucial to better interpret the observations. In a previous work we have presented a comprehensive calculation of the secondary productions due to the collision of cosmic rays with the solar atmosphere in presence of magnetic fields. In this contribution, we present a general approach to calculate the (anisotropic) inverse Compton scattering in a 3D Monte Carlo simulation, also in presence of magnetic and electric fields. After a short review of the scattering process of photons with electrons, examples of inverse Compton emission are presented, including the predictions for the Sun.

Collaboration(s)

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