

## Cosmic-ray interactions with the Sun

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### Executive summary

Cosmic rays reaching the Sun and the planets in the Solar system can produce secondary particles, such as gamma rays and neutrinos, due to their interactions with the surfaces or the atmospheres of the bodies.

The solar disk is a bright gamma-ray source in the sky due to the interactions of cosmic rays with the solar atmosphere produce secondary particles which can reach the Earth.

In this work we present a comprehensive calculation of the yields of secondary particles such as gamma-rays, electrons, positrons, neutrons and neutrinos, performed with the FLUKA code.

We also estimate the intensity at the Sun and the fluxes at the Earth of these secondary particles by folding their yields with the intensities of cosmic rays impinging on the solar surface. The results are sensitive to the assumptions on the magnetic field near the Sun and to the cosmic-ray transport in the magnetic field in the inner solar system.

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