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A full solar cycle of proton and helium measurements

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Time-dependent energy spectra of galactic cosmic rays (GCRs) carry fundamental information regarding their origin and propagation. When observed at the Earth, these spectra are significantly affected by the solar wind and the imbedded solar magnetic field that permeates the heliosphere, changing significantly over an 11-year solar cycle. Energy spectra of GCRs measured during different epochs of solar activity provide crucial information for a thorough understanding of solar and heliospheric phenomena. The PAMELA experiment had collected data for almost ten years (15 June 2006 - 23 January 2016), including the minimum phase of solar cycle 23 and the maximum phase of solar cycle 24. Here, we present spectra for protons and helium nuclei measured by the PAMELA instrument from 2006 to 2014. Time profiles of the proton-to-helium flux ratio at various rigidities are also presented, allowing the study of all characteristic features resulting from their different mass-to-charge ratio and the difference in the shape of their respective local interstellar spectra.

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