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Overview of galactic cosmic ray solar modulation in the AMS-02 era

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Abstract

A new era in cosmic rays physics has started thanks to the precise and continuous observations from space experiments such as PAMELA and AMS-02. Invaluable results are coming out from these new data that are rewriting the theory of acceleration and propagation of cosmic rays. Both at high energies, where several new behaviors have been measured, challenging the accuracy of theoretical models, and also at low energies, in the region affected by the solar modulation. Precise measurements are increasing our knowledge of the effects of solar modulation on low energy cosmic rays, allowing a detailed study of propagation and composition as it has never been done before. These measurements will serve as a high-precision baseline for continued studies of GCR composition, GCR modulation over the solar cycle, space radiation hazards, and other topics.

In this review paper, the status of the latest measurements of the cosmic rays in the context of solar modulation are presented together with the current open questions and the future prospects. How new measurements from the AMS-02 experiment will address these questions is also discussed.

Keywords: cosmic rays; solar modulation; space instruments; diffusion; drift.

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