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A high performance computing approach to time-dependent cosmic-ray modulation

A simplified ab initio approach is followed to model cosmic-ray (CR) modulation from first principles, using a novel time-dependent three-dimensional stochastic solver of the Parker transport equation, taking into account the various processes that modulate the intensities of these cosmic rays on their way to the inner heliosphere, and thus to Earth. This approach focuses on the effects of temporal changes in both the larger scale quantities such as the heliospheric magnetic field, heliospheric tilt angle and the solar wind, and in the small scale quantities such as the magnetic variance and and correlation scales, on computed CR intensity spectra. This study systematically demonstrates how salient features in cosmic-ray modulation arise due to changes in these quantities, an approach that in its very nature lends itself to large-scale parallel computing. Preliminary results of this analysis, computed using the CHPC cluster, will be presented

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