

# **A numerical description of the anomalous cosmic ray spectra observed with Voyager 1 at and beyond the solar wind termination shock**

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A numerical modulation model is used with an asymmetrical heliospheric geometry and heliosheath, also containing diffusive shock acceleration of cosmic rays as applied to the solar wind termination shock. Three reasonable scenarios are presented as possible explanations for the anomalous component spectra (protons, helium and oxygen) and galactic cosmic ray spectra observed when the Voyager 1 spacecraft crossed into the heliosheath. First, the latitudinal dependence of the compression ratio of the termination shock is studied. Second, the modulation effects are studied of a more effective injection efficiency of these anomalous particles at the termination shock, but restricted to the equatorial regions of the heliosphere. Third, changing of the solar wind velocity in the heliosheath is studied in order to establish the modulation effects of additional particle acceleration in the heliosheath. Combining these prominent features may explain the observed intensities of the mentioned cosmic ray species in the heliosheath.