SPACE AND COSMIC RAY PHYSICS SEMINAR

University of Maryland
Computer & Space Sciences Building, Rm 2400
4:30 PM Monday, April 5, 2004
Tea & cookies 4:00-4:30 PM

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Galactic Cosmic Ray Modulation During Solar Minimum Conditions

This work studies the radial intensity profiles of galactic cosmic ray protons (H) and α particles (He) during the solar minimum periods of 1987 (the so-called negative drift state) and 1977/1997 (both positive drift states). These intensities, as measured with the Pioneers 10/11, Voyagers 1/2, and IMP spacecraft, are examined with numerical solutions of the cosmic ray transport equation. Previous studies have shown that the galactic cosmic ray intensities and radial gradients observed by the Voyagers during 1997 in the outer heliosphere were so low that they cannot be readily explained by a standard no-shock modulation model. Here we investigate whether acceleration at the solar wind termination shock, and the transport of these particles through an extended heliosheath beyond this shock provide sufficient additional modulation to explain these low intensities. In this approach we take into account several different heliomagnetic field configurations. It is found that the acceleration at the termination shock and modulation in the heliosheath do not alleviate the problem, but that a non-spherical shock and heliopause produce modulation features that may possibly explain the observations.

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