

Abstract Submitted  
for the DPP09 Meeting of  
The American Physical Society

**A new mechanism for the generation of anomalous cosmic rays:  
dissipation of the sectored heliospheric magnetic field in the heliosheath**

J.F. DRAKE, University of Maryland, M. O'PHER, George Mason University, M. SWISDAK, K. SCHOEFFLER, University of Maryland — The recent observations of the anomalous cosmic ray (ACR) energy spectrum as Voyagers 1 and 2 crossed the heliospheric termination shock have called into question the conventional shock source of these energetic particles. We suggest that the sectored heliospheric magnetic field, which results from the flapping of the heliospheric current sheet, piles up as it approaches the heliopause, narrowing the current sheets that separate the sectors and triggering the onset of collisionless magnetic reconnection. MHD simulations of the global heliosphere reveal the structure of sectored field and pileup. Particle-in-cell simulations reveal that the current layers break up into a turbulent bath of magnetic islands that merge to release a large fraction of the energy in the sectored magnetic field. Most of the magnetic energy goes into energetic ions with significant but smaller amounts of energy going into electrons. The ACR differential energy spectrum takes the form of a power law with a spectral index slightly above 1.5, which is consistent with the Voyager observations. The model has the potential to explain several other key observations, including the spectra of super-Alfvénic ions seen throughout the heliosphere.

James Drake  
University of Maryland

Date submitted: 16 Jul 2009

Electronic form version 1.4