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The Acceleration of Energetic Particles at and Near the Solar Wind Termination Shock A.C. CUMMINGS, E.C. STONE, California Institute of Technology — The Voyager 1 (V1) spacecraft crossed the solar wind termination shock on 16 December 2004 at a distance of 94 AU from the Sun, marking the first time that a spacecraft has entered the heliosheath. For 2.5 years prior to that crossing, beams of low-energy particles, highly variable in intensity, were observed to be streaming along the magnetic field line connecting the shock to V1. The energy spectrum of H from ∼50 keV to ∼20 MeV in both the upstream and downstream regions of the shock shows evidence of two components consistent with a two-stage injection and acceleration process at the termination shock. At higher energies, observations of anomalous cosmic rays (ACRs) yielded a big surprise. The intensity of ACRs, which originate as interstellar neutral atoms that drift into the heliosphere and become ionized in the solar wind, was predicted to peak at the shock where they were thought to be accelerated. However, the ACR He spectrum did not peak at the termination shock, indicating that the source of ACRs was elsewhere than where V1 crossed the shock. However, the ACR intensity unexpectedly increased as V1 continued downstream of the shock as though V1 was approaching the source region. At the same time, Voyager 2 (V2) is nearing the termination shock and is expected to cross during the next year. Together the V1 and V2 observations should help clarify where and how particles are accelerated in the outer heliosphere.

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