Cosmic Ray Modulation in the Outer Heliosphere during the Minimum of Solar Cycle 23/24

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Abstract: We report a next generation model of galactic cosmic ray (GCR) transport in the three dimensional heliosphere. Our model is based on an accurate three-dimensional representation of the heliospheric interface. This representation is obtained by taking into account the interaction between partially ionized, magnetized plasma flows of the solar wind and the local interstellar medium. Our model reveals that after entering the heliosphere GCRs are stored in the heliosheath for several years. The preferred GCR entry locations are near the nose of the heliopause and at high latitudes. Low-energy (hundreds of MeV) galactic ions observed in the heliosheath have spent, on average, a longer time in the solar wind than those observed in the inner heliosphere, which would explain their cooled-off spectra at these energies. We also discuss radial gradients in the heliosheath and the implications for future Voyager observations.