

The Local Interstellar Spectrum Beyond the Heliopause: What can we Learn from Voyager in the Inner Heliosheath?

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The local interstellar spectrum (LIS) is one of the most important but unknown parameters in all model efforts to describe the modulation of Galactic Cosmic Rays on their way from the galaxy through a possible bow shock, heliosheath and heliosphere towards the Earth. Because it could not be measured so far, several LIS models derived from numerical simulations or data at Earth were developed. A new perspective to determine the LIS was opened when the Voyager spacecraft crossed the termination shock and entered the heliosheath. Webber and Higbie (2009) derived a new LIS, which is lower than all previous LIS models over the entire energy range, on the base of these measurements. Numerical simulations by Scherer et al. (2011) showed that already particles in the outer heliosheath are modulated, suggesting that the LIS by Webber and Higbie (2009) is a heliopause spectrum rather than the “true” LIS. By using the same simplified simulation model we estimate the diffusion coefficient in the OHS to be consistent with several 10^{26} to 10^{27} $\text{cm}^2 \text{ s}^{-1}$ for all LIS models under consideration by mapping them to this HPS and conclude that the Voyager measurements will not be able to determine the LIS in the next future. We then discuss the circumstance under which terrestrial archive can be used to at least exclude LIS models unless one has to await a dedicated mission like e.g. the Interstellar Probe.