



Tail-in cosmic ray anisotropy and magnetic reconnection in the heliosphere

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Cosmic ray detected on Earth have been observed to have an energy-dependent anisotropy in arrival direction of the order of 10^{-4} . The origin of such anisotropy is not known but it is believed to provide a probe into the properties of the local interstellar magnetic field at distance scales proportional to the cosmic ray's gyro-radius. At energies up to a few TeV (10^{12} eV), the cosmic proton's gyro-radius is of the order of the heliospheric size (~ 200 AU). In this energy range an excess of cosmic ray arrival direction is observed toward the direction of the heliospheric tail (tail-in anisotropy), and it appears to be modulated in time, depending on the location of Earth inside the heliosphere. This large scale excess seems to disappear at energies in excess of a few TeV, consistently with gyro-radius exceeding the heliospheric size. However a recent detection of a small but significant excess of TeV cosmic rays from the anti-galactic center by MILAGRO has triggered renewed attention. The coincidence of this excess with the direction of the heliospheric tail and its limited angular size ($\sim 10^\circ - 30^\circ$) might suggest this to be the high energy residual of the tail-in anisotropy observed at lower energy. We discuss the possibility that magnetic reconnection in the heliosphere might be the origin of such an observation.