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LA-UR-23-29330

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Speaker: Louis Richard

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Title

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Fast Ion Isotropization by Current Sheet Scattering in Magnetic Reconnection Jets

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Abstract

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Cold ions are commonly observed in the lobes of the Earth's magnetotail. When the lobes reconnect, cold ions in the reconnection inflow can get accelerated by the Hall electric field at the separatrices when entering into reconnection outflow. As a result, they form counter-streaming velocity distribution functions (VDFs) far from thermodynamic equilibrium in the reconnection outflow. However, it remains unclear how these non-Maxwellian ion VDFs are isotropized in the reconnection jets. We present a statistical analysis of ion VDFs in magnetic reconnection jets using data from the Magnetospheric Multiscale spacecraft. Compared with the quiet plasma in which the jet propagates, we often find anisotropic and non-Maxwellian ion distributions in the plasma jets. We observe magnetic field fluctuations associated with unstable ion distributions, but the wave amplitudes are not large enough to scatter ions during the observed lifetime of the jet. We estimate that the phase-space diffusion due to chaotic and quasi-adiabatic ion motion in the current sheet is sufficiently fast to be the primary process leading to isotropization.