Parametric Study of Current Sheets and Magnetic Reconnection in Relativistic Turbulence

Zachary Davis*[1], Luca Comisso[2], Colby Haggerty[1], and Joonas Nättilä[3]

[1]University of Hawai'i [Honolulu] – United States
[2]Columbia University – United States
[3]University of Helsinki – Finland

Abstract

Turbulence is widely believed to play an important role in particle heating and acceleration across diverse astrophysical phenomena. These phenomena range from the solar corona and Earth's magnetosphere to systems where magnetic energy dominates over plasma internal energy, leading to relativistic turbulence, such as jets from active galactic nuclei (AGN) and gamma-ray bursts (GRBs). In this study, we employ particle-in-cell (PIC) simulations to investigate how current sheets depend on the plasma magnetization (σ)$and the fluctuating magnetic field strength ($\delta B/B_0$). Using a self-organizing map (SOM) algorithm, we systematically identify current sheets and associated reconnection sites within the tur

*Speaker