

Abstract for an Invited Paper
for the DPP10 Meeting of
The American Physical Society

Twisting space-time: Relativistic origin of seed magnetic field/ vorticity

SWADESH MAHAJAN, IFS, University of Texas at Austin

It is shown that a purely ideal mechanism, originating in the space-time distortion caused by the demands of special relativity, can break the topological constraint (leading to generalized helicity conservation) that would, otherwise, forbid the emergence of magnetic field (a generalized vorticity) in an ideal non relativistic dynamics. The new mechanism, arising from the interaction between the inhomogeneous flow fields and inhomogeneous entropy, is universal, and can provide a finite seed even for mildly relativistic flows. Simple estimates of the seed fields in cosmic settings, in particular the early hot universe filled with relativistic particle antiparticle pairs (upto the end of the electron-positron era), are provided. Possible applications of the mechanism in (intense) laser produced plasmas is also explored.