

ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ
ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΣΕΜΙΝΑΡΙΟ

ΤΟΜΕΑΣ ΑΣΤΡΟΦΥΣΙΚΗΣ, ΑΣΤΡΟΝΟΜΙΑΣ ΚΑΙ
ΜΗΧΑΝΙΚΗΣ

Θέμα: Strong turbulence and the formation of coherent structures in space and astrophysical plasmas

Ομιλητής: Loukas Vlahos, Department of Physics, Aristotle University

Ημερομηνία: Πέμπτη 11-05-2023, 13:00μμ

Τόπος: Εργαστήριο Αστρονομίας, ΑΠΘ

Περίληψη:

I will review the current literature on the formation of Coherent Structures (CoSs) in strongly turbulent 3D magnetized plasmas. CoSs (Current Sheets (CS), magnetic filaments, large amplitude magnetic disturbances, vortices, and shocklets) appear intermittently inside a turbulent plasma and are collectively the locus of magnetic energy transfer (dissipation) into particle kinetic energy, leading to heating and/or acceleration of the latter. CoSs and especially CSs are also evolving and fragmenting, becoming locally the source of new clusters of CoSs. Strong turbulence can be generated by the nonlinear coupling of large amplitude unstable plasma modes, by the explosive reorganization of large-scale magnetic fields, or by the fragmentation of CoSs. A small fraction of CSs inside a strongly turbulent plasma will end up reconnecting. Magnetic Reconnection (MR) is one of the potential forms of energy dissipation of a turbulent plasma in the solar wind, the solar atmosphere, solar flares and Coronal Mass Ejections (CMEs), large scale space and astrophysical shocks, the magnetosheath, the magnetotail,

astrophysical jets, Edge Localized Modes (ELMs) in confined laboratory plasmas (TOKAMAKS), etc.