Symposium IFA-INFLPR

EXTREME EVENTS

Dr. Florin SPINEANU, INFLPR, Lab. 22

Abstract

The simple intuitive representation of an extreme event consists of a cuasi-static state in which a fluctuation raises rapidly to catastrophic amplitude followed by the decay at the exhaust of the reservoir of free energy. This reminds the graph of the mathematical „cusp" function. It has the particular property that the extension to complex variables exhibits alignment of pole singularities precisely above the extremum, which would correspond to the location of the extreme event. We will explore this unifying perspective on several systems: Burgers equation, expansion of atmospheric clouds, laser pulse, etc. For multidimensional systems the alignment of complex poles must be replaced by alignment of instantons, which requires the formulation in terms of a field theory, and we will show this in detail for the 2D Euler fluid. For this particular case we will reveal the existence of the attraction between elements of vorticity, which may explain the strong vorticity concentration in tropical cyclones.

This proposed approach, of connection between extreme events and the alignment of singularities in an extended version of the analytical description, seems to suggest profound connections (which we just mention): the Burgers singularity is a reduced form of the string interaction as described by Matrix String Theory; the Riemann's zeta function results from an anti-diffusion leading to precise alignment of its zeros on a purely imaginary line.

Miercuri, 19 februarie 2020, ora 11:00, Măgurele, Bloc Turn IFA, Et. 9, Sala Consiliu

EURATOM
FAIR
F4E
CERN
JINR
ELI
CEA
AUF