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Statistical Theory and Modeling of Rare, Extreme Events: Entropy and Information Theory

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Deadline for manuscript
submissions:

closed (30 April 2021)

Message from the Guest Editor

Rare, extreme events refer to those that occur rarely but have a significant impact when they occur. Examples include the sudden outbreak of devastating infectious diseases, solar flares, extreme weather conditions, flood, forest fire, etc. Such events often result from strong non-linear interactions across a wide range of different lengths and time scales, with the limited utility of conventional perturbative methods. Furthermore, rare events contribute to tails of a probabilistic distribution function while hardly affecting mean values or variance. These present the main challenge in the theory and modeling of rare, extreme events.

This Special Issue aims to present different approaches to address this challenge in a broad range of disciplines from the perspective of entropy and information theory. This will include the development of a new theory, applications to phenomena in nature, industry, society, medicine, and finances, as well as data analysis from these systems.



mdpi.com/si/48425

Special Issue



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Message from the Editor-in-Chief

The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.

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