Special Issue

Non-equilibrium Physics and Its Interdisciplinary Applications

Message from the Guest Editors

No real-world (e.g., natural, social, engineering) system is strictly in equilibrium. The implication of this is that well-known (e.g., maximization/minimization) principles governing systems in equilibrium are not appropriate to describe the dynamics of real-world systems and could, at most, approximate some near-equilibrium systems subject to small or slow perturbations. And yet that is how physics is taught and often pursued, because it is cleaner and frankly significantly easier. While purposely isolated laboratory systems may approximate the equilibrium, the real world—and all its problems, from online dangers to disease development/spreading, turbulent flows, market crashes and wars—cannot. In fact, all these collective effects are inherently transient, somehow appearing from out of nowhere and often displaying patterns akin to (non-equilibrium) dynamical phase transitions. But when and how?

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