

Complex Dynamics and Non-Equilibrium Field Theory

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Abstract

Perturbative methods are notoriously ineffective in the analysis of non-equilibrium systems and strongly coupled field theory. This brief note gives three examples on how *complex dynamics* deals with the non-perturbative regime of Quantum Chromodynamics (QCD), as well as with the emergence of many-body chaos in condensed matter physics.

Key words: non-perturbative methods, strongly coupled field theory, Quantum Chromodynamics, Many-body chaos.

Recent years have witnessed a proliferation of studies on complex dynamics and its applications across various branches of science and engineering. Nowadays, complex dynamics is an invaluable source for novel non-perturbative methods in field theory, the analysis of bifurcations and chaos, pattern formation and multifractals, self-organized criticality, non-extensive thermodynamics, and fractional dynamics. The goal of this (exceedingly) brief note is to direct the reader to three representative examples focused on QCD and the onset of many-body chaos in condensed matter [1-3].

1. <http://www.ejtp.com/articles/ejtpv7i23p75.pdf>

2. Available at the following site:

[https://www.academia.edu/38744633/On the asymptotic transition to complexity
in quantum chromodynamics](https://www.academia.edu/38744633/On_the_asymptotic_transition_to_complexity_in_quantum_chromodynamics)

3. <https://journals.aps.org/prl/pdf/10.1103/PhysRevLett.126.030602>