

Statistical Ensembles for Unstable Quantum and Classical Systems

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Unstable quantum and classical systems are defined by Hamiltonians without an additive lower bound of the ground state energy. Such systems exhibit explosive or implosive behaviour, metastability, transient dynamics, non-equivalence of ensembles and non-existence of the thermodynamic limit for Boltzmann-Gibbs ensembles. Unstable systems are non-equilibrium many-body systems in the sense that their statistical and thermal behaviour falls outside the domain of applicability of equilibrium thermodynamics and statistical mechanics. Recently [1] the Boltzmann-Gibbs ensembles were generalized and extended to cover unstable systems. Applying the generalized statistical ensembles leads to normal, extensive thermodynamic potential and existence of the thermodynamic limit.

[1] R. Hilfer, Phys. Rev. E105 (2022) 024142