Abstract Submitted
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Quantum Macrophysics for Turbulence Concepts in High Temperature Plasma Systems[1] JOSEPH A. JOHNSON III, EPHREM MEZONLIN, DELONIA WIGGINS, Florida A&M University, CEPAST/FAMU, TALLAHASSEE, FL 32310 TEAM — A quantum statistical theory of equilibrium states within the operator algebraic framework allows a reformulation of classical thermodynamics in terms of the restriction of the equilibrium states to macroscopic observables. This provides a radically different treatment from traditional statistical thermodynamics since it is based on the theory of finite systems and cannot support different equilibrium states under the same external macroscopic constraints. In this context, the classical thermodynamical characterization of phase transitions by singularities in the reduced pressure coincides with the quantum statistical one given by the existence of different equilibrium states with the same values of the thermodynamic variable conjugate to the dominant extensive variable. We use this formulation to explore the transition to turbulence as a phase transition of the second kind and the implications of this use in the prediction of turbulent transport parameters.

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Joseph A. Johnson III
Florida A&M University

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