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UNDERSTANDING NON-EQUILIBRIUM STEADY STATES

Physical systems are characterized by their response to perturbations. The Fluctuation Dissipation Theorem predicts the behavior of systems in equilibrium. Can an expression be derived using methods from quantum field theory to describe the vertex response to a perturbation, and is the Fluctuation Dissipation Theorem modified as a result of these perturbations. Using Berezin integration and properties of determinants we derive said expression. The derivation yields the same result as the less rigorous methods. We learn the Fluctuation Dissipation Theorem has an equilibrium-like response to a vertex perturbation making the Fluctuation Dissipation theorem a bad indicator of whether a system is in equilibrium or out of equilibrium. We then apply our result to a biochemical problem.