

Quantum Statistical Physics for Generalized Subsystems

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Quantum mechanics, when combined with statistical mechanics, is capable of explaining everything from the microscopic behavior of materials to the functioning of thermal machines.

Quantum statistical mechanics, however, is primarily built within the open quantum systems paradigm, where the system of interest is weakly coupled to a large, uncontrollable environment. With the current level of control of increasingly large quantum systems, such a paradigm may not be applicable in some cases.

In this seminar, I will suggest a way to deal with the more general scenario where the division between system and environment is not so obvious. To do this, I will employ tools from the area of quantum information to generalize the idea of subsystems. Furthermore, assuming that we only have access to a few effective degrees of freedom, I will show how to assign a description to the underlying quantum system that is consistent with the known data.

With this formalism we begin to develop a quantum thermodynamics of effective systems.

References

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