

KMS States and Tomita-Takesaki Theory

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Abstract

The many mathematical problems of modern physical theories point at the need for a deeper structural understanding of the physical world. One of the most recurring and less understood features of these theories is the relationship between imaginary times and temperature. Here we review one of the manifestations of this relationship. We show that under certain conditions, thermal equilibrium states induce canonical dynamics on the algebra of observables. In order to do this we will explore KMS states and Tomita-Takesaki theory. KMS states will serve as our model for thermodynamical equilibrium in quantum systems. Tomita-Takesaki theory will yield the operators necessary for the construction of the canonical dynamics.