Abstract:
Feynman path integrals, introduced heuristically in the 1940s, are a powerful tool used in many areas of physics, but also an intriguing mathematical challenge.
In this work we provide a rigorous mathematical Feynman path integral formula in the context of infinite dimensional oscillatory integrals. Moreover, the requirement of independence of the integral on the approximation procedure forces the introduction of a counterterm, which has to be added to the classical action functional (this is done by the example of a linear vector potential). Thanks to that, it is possible to give a natural explanation for the appearance of the Stratonovich integral in the path integral formula for both the Schrödinger and the heat equation with magnetic field.

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