Introduction to Feynman path integrals

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This lecture will give a first introduction to Feynman path integrals and demonstrate how quantum mechanics can be based on the action instead of the Hamiltonian. Starting from the propagator of the free particle, we will construct the general expression for the path integral representation of the quantum mechanical propagator.

We will then take a look at some basic quantum mechanical problems like the particle in a potential well or on a ring as well as the harmonic oscillator. Contrasting the standard approach with the path integral approach to these problems will allow us to appreciate the different view on quantum mechanical problems provided by Feynman path integrals.

Literature:

G.-L. Ingold, *Path Integrals and Their Application to Dissipative Quantum Systems*, Lect. Notes Phys. **611**, 1 (2002), in particular sections 1.1 to 1.2.7, arXiv:quant-ph/0208026

H. Kleinert, *Path Integrals in Quantum Mechanics, Statistics, Polymer Physics, and Financial Markets* (World Scientific, 2009)