Part 1
Path Integrals

> "Yossarian? What kind of a name is Yossarian?"
>
> He had the facts at his finger tips. "It's Yossarian's name," he explained.
>
> J. HELLER, *Catch-22*

The path integral is a method of quantization which is equivalent to the operator formalism. It recovers the operator formalism in quantum mechanics and perturbation theory in quantum field theory (QFT).

The approach based on path integrals has several advantages over the operator formalism. It provides a useful tool for nonperturbative studies including:

(1) instantons,
(2) analogy with statistical mechanics,
(3) numerical methods.

A standard way of deriving the path integral is from the operator formalism:

$$\boxed{\text{operator formalism}} \quad \Longleftrightarrow \quad \boxed{\text{path integral}} \quad .$$

We shall proceed in the opposite direction, following the original paper by Feynman [Fey51].